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Dear Researcher,

Greetings!

In this issue discusses about recent trends on mathematics concepts and computer science.

We look forward many more new technologies in the next month.

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IOT-Based Air Pollution Monitoring and Forecasting System

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Abstract:

One of the most important issues of our day is global air pollution. A number of factors, including population growth, improved vehicle use, industrialization, and urbanization, have contributed to an increase in pollution levels throughout time, which has a negative impact on human wellbeing by adversely affecting the health of those exposed to it. When the air contains enough dangerous gases including carbon dioxide, smoking, alcohol, benzene, NH3, and NO2, air quality suffers. We are building an IOT-based pollution monitoring system that will allow us to track the air quality online in order to conduct analysis. Current monitoring techniques need laboratory analysis and have poor precision and sensitivity. As a result, better monitoring methods are required. We suggest a threephase pollution monitoring method to address the problems with current systems. The air quality will be displayed on the LCD and on a website in PPM so that we can easily monitor it. With this IOT project, you may use a computer or mobile device to check the pollution level from anywhere. The MQ2 and MQ7 sensors are used by the system to measure air quality. It precisely measures their presence and identifies dangerous gases.

Key Words: IoT, Smart Device, Pollution, Monitoring.

1. INTRODUCTION

Air pollution is one of the biggest problems to the present-day environment. Everyone is being affected by air pollution day by day including humans, animals, crops, cities, forests and aquatic ecosystems. Besides that, it should be controlled at a certain level to prevent the increasing rate of global warming.

In this paper design to an IOT-based air pollution monitoring system using the internet from anywhere using a computer or mobile to monitor the air quality of the surrounds and environment. There are various approaches and instruments available for the measurement and monitoring quality of air. The IoT-based air pollution monitoring system would not only help us to monitor the air quality but also be able to send alert signals whenever the air quality deteriorates and goes down beyond a certain level. In this work, Node MCU plays the main role. It has been programmed in a manner, such that, it senses the sensors signals from the sensors and shows the quality level via led indicators. Besides the harmful gases (such as CO2, CO, smoke, etc.) temperature and humidity can be monitored through the temperature and humidity sensor by this system

2. LITERATURE REVIEW

Monika Singh Et al. in August 2019 proposed an Air Pollution Monitoring System. This system uses an Arduino microcontroller connected with MQ135 and MQ6 gas sensor which senses the different types of gases present in the environment. It was then connected to the Wi-Fi module which

connects to the internet and LCD is used to display the output to the user and buzzer alerts when the ppm crosses certain limit. Their applications were industrial perimeter monitoring, indoor air quality monitoring, site selection for reference monitoring stations, making data available to users. Yamunathangam Et al. in November 2018 used IoT by measuring the concentration of gas using various sensors which were observed through serial monitor of arduino. This data is collected in Thing speak channels by means of Ethernet shield which is available in live for further processing. These analyzed results were viewed through thing speak in a graphical format. Then the average pollution level was calculated using matlab analysis and the time controlled results were viewed through an android app. Further based on the location, the air quality index value was obtained through the android app. Along with this, the health effects were also displayed in this app, so that the users can stay aware of the pollution levels. K. S. E. Phala Et al. in November 2014 presented an air quality monitoring system that consists of air quality monitoring station, communication links, a sink node module and a data server. They developed the GSM module based sink node with data server PC. The real-time data were saved in a micro SD card in text format and also saved in the data server (PC). For the data base they chose MySQL as the DBMS. Electrochemical and infrared sensors were used to measure the concentrations of CO, CO2, SO2 and NO2. GSM modules have been used for the wireless communication between the base station and remote sensor node. The GSM modules communicate over cellular networks and a MCU was used to control all the processes on the sensor node. The MCU samples the sensor outputs using an internal ADC, it then calculates the gas concentrations and transmits the computed data as packets using the GSM. A test incubator was designed and constructed to evaluate the performance of the sensor node. The sensor node was tested by placing it inside the incubator; pumping gas into the incubator and observing the measurements taken by the sensor node. The base station comprises a sink node serially connected to a computer which runs the GUI software. The sink or receiving node captures the data transmitted by the remote sensor node and serially forwards it to the computer. The data was then plotted on the GUI and stored in text files. Nitin SadashivDesai Et al. in 2017 proposed a system that consists of Beagle bone Interfaced with air pollution measure sensors such as carbon dioxide [CO2], carbon monoxide [CO] and noise sensor. Analog output from sensor was read from Analog pin of Beagle bone black which reads the input signal in the range 0 v to 1.8v. Data from sensor was uploaded on Azure Cloud with the help of python SQL. Reserved data base was created in the beagle bone itself in the form of .CSV file. At the end of each day, same data present in the .CSV file is uploaded in the cloud data base. Old data in the beagle bone have been deleted with the help of automated shell script. Data from different sensor was stored in the Azuredata base. This data from database has been fetched as input for machine learning service. Machine learning service was used to train the module with the help of previous data. Power BI has been used to represent sensor data fetched by beagle bone black. Harsh Gupta Et al.in 2019 presented an IOT based Air Pollution Monitoring System which consists of sensors that were to constantly monitor the Temperature, Humidity, Carbon Monoxide, Smoke, LPG, PM2.5 and PM10 levels in the atmosphere. In their work, a one-way communication between Thing Speak, an open source cloud platform, and an Android Application has been developed. Raspberry Pi has been used as a gateway to interface the hardware system. Once the firebase API was included in Android or iOS App, firebase features like Analytics, Authentication, Storage, Messaging, Hosting, Crash reporting, Real-time Database etc. were used. The Graphs were plotted in Thing Speak according to the sensors data received and the same were visualized in an Android App in a tabular format. Rajat Sankhe Et al. in 2017 used carbon sensor for sensing the pollutants or the carbon particles in the air and it also detects the level of pollutants in air and gives the output in form of analog signal. The microcontroller takes input in digital form so ADC was used to

convert the analog output of the sensor into digital form and gives it as input to the micro controller. These values are continuously displayed on the LCD. A switch pad was used for entering the critical value. If the value of pollutants in air exceeds the critical value entered then the buzzer beeps and also a notification will be sent to the webpage on the mobile phone by the micro controller through the GPRS module.

3. HARDWARE REQUIREMENT

- ARDUINO UNO
- LCD DISPLAY
- AIR POLLUTION SENSOR
- C02 SENSOR
- IOT

SOFTWARE SPECIFICATIONS:

- 1) Raspberry pi3 - Raspian OS
- 2) Python

4. HARDWARE IMPLEMENTATION

Hardware implementation requires a Raspberry Pi. The ESP8266 Wi-Fi Module is a self-contained System On Chip (SOC)that can give any microcontroller access to your Wi-Fi network. MCP3008 is a 10-bit (ADC) Analog-to- Digital Converter combines high performance and low power consumption in a small package, making it ideal for embedded control applications. MQ-2 Gas Sensor can measure gases like LPG, Alcohol, Propane, Hydrogen, CO and even Methane. MQ-7 Gas Sensor detects CO concentrations in the air anywhere from 20 to 2000ppm and it also makes detection by method of cycle high and low temperature, and detect CO when low temperature (heated by 1.5V). These sensors conductivity is more high along with gas concentration rising.

- STEP 1: Install Raspbian OS in Windows operating system.
- STEP 2: Open IDLE and create a new sketch by clicking programming. Programming > Programming C (IDLE).

4.1 ARDUINO UNO

Arduino Uno is a microcontroller board based on the AT mega 328P . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It holds everything needed to support the microcontroller; it connects to a computer with a USB cable or powers it with a AC-to-DC adapter or battery to get started.

Fig. 1 (Arudino UNO Board)

The "Uno" which means that Italians chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino

4.2 LCD DISPLAY

Fig 2 . (LCD Display)

A liquid crystal display (LCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). They are used in a wide range of applications including: computer monitors, television, instrument panels, aircraft signage, etc. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones. LCDs have displaced cathode ray tube (CRT) displays in most applications. They are usually more compact, lightweight, portable, less expensive, more reliable, and easier on the eyes. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they cannot suffer image burn-in. LCDs are more

energy efficient and offer safer disposal than CRTs. Its low electrical power consumption enables it to be used in battery- powered electronic equipment. It is an electronically-modulated optical device made up of any number of pixels filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in color or monochrome.

4.3 GAS SENSORS

Electrochemical gas sensors are gas detectors that measure the concentration of a target gas by oxidizing or reducing the target gas at an electrode and measuring the resulting current.

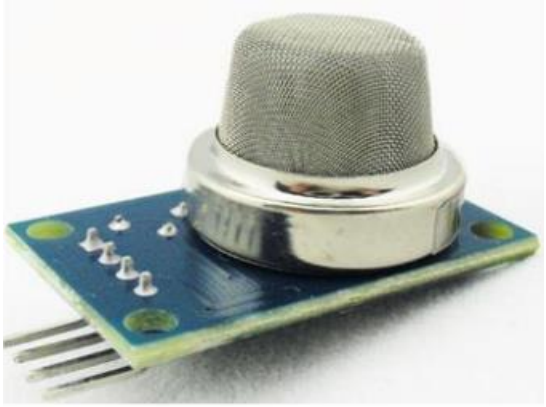

Fig 3. (CO Sensor)

Fig 3. (CO2 Sensor)

The sensors contain two or three electrodes, occasionally four, in contact with an electrolyte. The electrodes are typically fabricated by fixing a high surface area precious metal on to the porous hydrophobic membrane. The working electrode contacts both the electrolyte and the ambient air to be monitored usually via a porous membrane. The electrolyte most commonly used is a mineral acid, but organic electrolytes are also used for some sensors. The electrodes and housing are usually in a plastic housing which contains a gas entry hole for the gas and electric contacts.

5. SOFTWARE IMPLEMENTATION

The software implementation provides the creation of API. User needs to sign-in into the application by providing the specified details. For accessing, user must login into the application by providing the credentials when the user feeds the source and destination details and clicks “NEXT” the application displays the level of pollutants he is exposed to.

6. METHODOLOGY

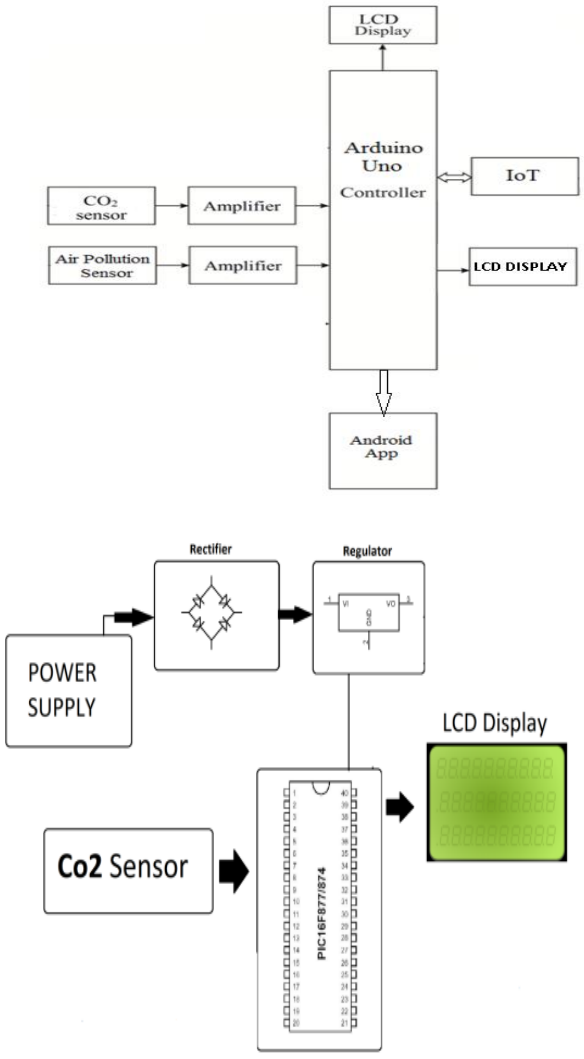

Fig 4. (Over all work flow)

PHASE - 1: Detection of Air Pollutant Level It indicates the early phase of the project. An IoT based air pollution detection kit is developed. It deals with the collection of data from gas sensors connected to RaspberryPi and the information is sent to the cloud platform that stores it.

PHASE - 2: Creating the interface this stage involves the clarification of the various components for optional performance. MCP3008 is a 10 bit converter which is calibrated to convert analog data to digital with on-board sample and hold circuitry. The data collected is stored, processed and can be monitored using the Mobile Application. Users can review the stored data through the application.

PHASE - 3: Execution and testing the various components are interfaced together and the project deliverables are built with the help of different circuit designs. The testing, debugging and troubleshooting of the design is performed to test the performance of the design under various conditions. If a circuit design fails to pass the tests, then a newer circuit design should be completed, implemented and tested.

7. RESULT & DISCUSSION

As a result, our project is to check the quality of the exposed level in the air pollution. The mobile application is developed by getting the source and destination address from the user. In this application it monitors the pollutant level through that way. It is also tracks the individual‘s exposure level of air pollutants for a single day. Our project was designed to help a person to detect, monitor, and test air pollution in a given area. The kit has been integrated with a mobile application that helps the user in predicting the pollution level of their entire route. This proposed air pollution monitoring kit along with the integrated mobile application can be helpful to people to identify their exposure level to air pollutants.

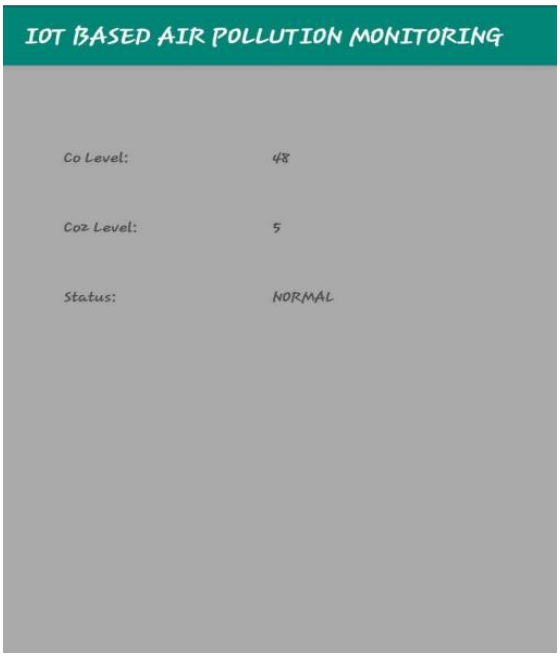

Fig 5. (Air pollution Monitoring app)

8.CONCLUSION

In this paper, we suggest a three-phase system for monitoring pollution. The air quality will be displayed on the LCD and on a website in PPM so that we can easily monitor it. With the help of this paper and a mobile app we developed, you may check the pollution level from any location using a computer or mobile device. The MQ2 and MQ7 sensors are used by the system to measure air quality. It precisely measures their presence and identifies dangerous gases. The app's features included real-time air quality indices, daily air quality reports based on the user's travel distance, and location-based reporting for specific air quality measurements. Our environment is primarily impacted by air pollution. The smartphone application was created as a monitoring mechanism, tracking the amount of exposure that people have had each day. The carbon monoxide, smoke, propane, and leakage gas were all detected using the gas sensors. The sensor detects gases, converts them to digital data, and presents that data in the application. PPM (Parts per Million) is the unit used to measure the exposure level.

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EVALUATING THE DEDUPLICATION APPROACHES USING HYBRID METRICS

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ABSTRACT

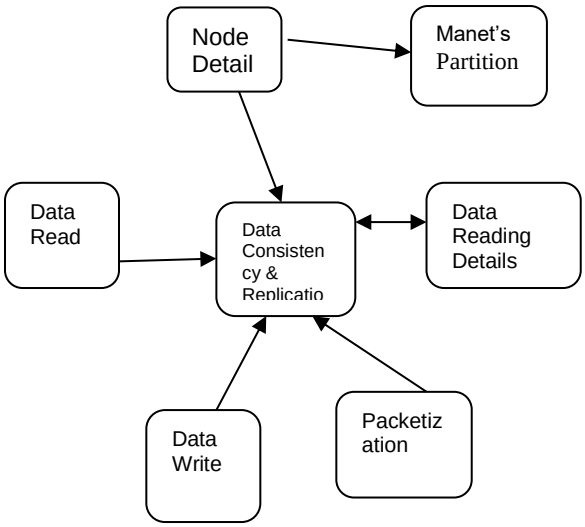
Because of the increased level of education among the populace in this age of competition, there are fewer employment available for them. Even the greatest in their industries are desired by the companies. Finding persons who are intelligent enough to be hired then becomes challenging. Finding personnel who can meet their needs is becoming more of a challenge for businesses. When considering these issues, one may consider a method that can manage them and simplify the work. This project is focused on the online hiring procedure. The system in place here manages the hiring process. With the help of this project, the applicant will be able to apply for any open positions that may be of interest to the organization. After registering, the person will have an account and is referred to as an applied user. He would be communicating with the system for the updates if he were qualified. The project was developed to satisfy the needs of the company managers, who wanted the recruiting module to be included to the firm's website so that users could examine the openings in the company and apply directly from a distance. The administrator will list the openings in accordance with the company's requirement for personnel. The admin will have all rights of handling this process except the evaluation process as it is the company specific and so the steps of the evaluation process cannot be predicted. It also includes the layers at the admin side so the privileges will have great impact on the functionalities given to the different levels of admin. The privileges will be user specific, so different admin even at same level will have different privileges and so different functionalities. The higher level admin will handle whole system by him. Although the lower level admin is given such privileges that he can send any kind of request to the higher level admin. The higher level admin can approve or disapprove the request. Whatever the result of the request approval, the notification will be sent to the lower level admin. This project plays main role at admin side for recruitment process. Main aim of this project is to provide an online job search portal for fresher's and experience employees for knowing about opportunities in different companies. Users need to register with application and obtain unique username and password for accessing available features.

I. INTRODUCTION

Data deduplication is a lossless compression technology that has been widely used in large-scale storage systems. It breaks data streams into serials of chunks and then removes redundant ones to save storage space. The identifier of each data chunk, generally called chunk data, is produced by hash algorithms according to each chunk content. Any two data chunks that have the same chunk data are regarded as redundant ones and are stored only once. According to the literatures, the compression ratio can achieve above 30 : 1 for backup streams in real data centers. However, due to the removal of redundant chunks, data deduplication has negative influences on other performance metrics, such as data reading performance, data writing performance and data reliability.Firstly, data deduplication de-linearizes data placement and affects data reading performance. During deduplication process, data chunks are classified into two categories: new unique chunks and redundant chunks. The former are writing to permanent disk storage while the latter are removed by being linked to the already-stored ones. In order to maximize

deduplication throughput and data write performance, the new unique chunks are always appending to disks sequentially and stored together. But for the redundant ones, their locations are determined by the same already-stored chunks by other data objects (i.e, each data object represents a superset of multiple chunks, such as one data stream, a file directory, one data segment, or a single file). Thus these two kinds of chunks are stored separately although they belong to the same data object. Reading such objects need lots of random disk seeks for their separate locations. In the worst case, it would need one disk seek per one chunk, which significantly affects data read performance. Recently, a few literatures try to address this problem by writing more data chunks.

Secondly, data deduplication faces a significant disk bottleneck problem due to the limited RAM capacity for redundancy identification, which throttles deduplication process and leads to degraded deduplication throughput and data write performance. For example, when the disk usage for storing data chunks is 8TB, it needs more than 20GB space to store chunk index, with the assumption that the average chunk size is 8KB(i.e., as suggested in [2]) and each chunk data is 20Byte long (i.e., the chunk data is produced by SHA-1 hash algorithm). When detecting chunk redundancy, such large chunk index cannot all be put into memory and most of them must be fetched from disks page by page for the data comparison, which signicantly throttles deduplication process and affects data write performances. So far, many researchers have addressed this problem and proposed smart and novel approaches.



Thirdly, the removal of redundant data by data deduplication undermines the improvement of data reliability by data replicates. During deduplication, any data chunk is stored only once. The redundant chunks shared across multiple data objects are always removed. Thus for those data objects who share data chunks, their data reliability and availability are related to each other, because the failure of any shared data chunk will make all of those data objects unavailable. In literatures, the researchers have addressed this problem by selectively replicating some redundant chunks or storing these chunks by erasure coding.

II. LITERATURE STUDY

System analysis will be performed to determine if it is flexible to design information based on policies and plans of organization and on user requirements and to eliminate the weakness of present system. This chapter discusses the existing system, proposed system and highlights of the system requirements. Haruna et al. presented a hybrid based data deduplication approach in ER. Where a machine-based system, the Cosine similarity function was first used on sets of data to calculate for the similarity scores between each pair of records using metrics with a set threshold. The pairs with scores greater than the threshold were pruned to form a candidate set S. An adaptive clustering algorithm, the Chromatic Correlation Clustering under crowdsourcing was used on the pairs of records in S to either group them into single or compound clusters. Finally, the clusters were submitted to the crowdsourcing platform, for the humans to thoroughly examine the pairs of records, to confirm their equivalence and submit their answers.

Drawbacks of Existing System:

- Based on the crowd's confidence and triangular similarity scores, a permanent cluster is either formed, implying the records in it are almost equal, or otherwise not formed.

- However, during the cluster generation stages in this work, some of the record pairs were not issued to the crowd for examination. They were either deleted when forming the clusters or were not

chosen at all for the cluster formation. This is a huge problem because the aim of the deduplication mechanism is to examine all records and identify duplicates among them.

- Therefore, for some of the record pairs not be examined defaults the objective of the deduplication mechanism

III. DEVELOPMENT ON EVALUATING THE DEDUPLICATION APPROACHES USING HYBRID METRICS

The extended work on the hybrid deduplication method is proposed in this work consists of:

- Firstly, propose a procedure to fine-tune the clusters.
- Secondly, we present an adaptive alternating minimization approach to specify a desired number of K output clusters if needed.
- Finally, with the clusters refined, we again conducted the same experiments as in and compared the results to some existing models including the proposed human-machine based deduplication.
- Our results will show improvements on the results obtained existing in terms accuracy and effi-ciency but incurred a little more crowdsourcing cost. The proposed methods in this work, seek to rectify the shortcomings of existing work, by posting all record to the crowd while using additional Human Intelligent Tasks (HITs) to examine the record pairs.

BENEFITS OF PROPOSED SYSTEM:

- An HIT is where the crowd are given easy duties to execute and are given some reward.
- In examining all the record pairs while generating the clusters as well, there is the possibility of having a higher accuracy and efficiency during the experiments, which shall be determined and explained later in the work.
- The crowd cost, which is dependent on the number of record pairs submitted to the crowd will be determined as well.

MODULE DESIGN DESCRIPTION OF MODULES

Pair Identification and Annotation Module (PIAM):

Identifies the HITs for posting to the workers for annotation as either being duplicate, possibly duplicate or not duplicate. The reason we do not send all the pairs of records is that the percentage of duplicate profiles is usually not high. Also the majority of plausible pairs are not very similar, hence they are clearly not duplicates.

Workers' Error Estimation Module (WEEM)

Based on the annotated output ofworkers from PIAM, this module estimates the performance error ofworkers in annotating the given HITs. The error is estimated on a scale of 0 to 1 with the value 0 representing no error and 1 representing otherwise in annotating all HITs of the given batch. The Hybrid Gold-Plurality (HGP) algorithm estimates worker error. The WEEM's output will be used for workers' performance monitoring.

WORKERS' PERFORMANCE MANAGEMENT MODULE (WOPM)

This module monitors the workers' performance by considering their errors and determines a status for them. It also evicts workers who perform poorly. A multi-rule QC system is used that takes both the current and past errors of a worker and ascertains the worker's status either as active or evict at the end of each batch. Active means that the worker can continue to make annotations in the next batch, whereas evict indicates the worker is evicted due to their poor performance in the crowdsourcing process.

LABEL ASSIGNMENT MODULE (LAM):

This module assigns the final label for each HIT identified in PIAM based on the Weighted Majority of Voting (Weighted MV) method. At the end of this process, the final label for the HITs is recorded as duplicate, possibly duplicate or not duplicate.

SYSTEM TESTING

Software testing is a critical element if software quality assurance represents the ultimate reviews of specification, design and coding. Testing is vital of the system. Errors can be injected at any stage during development.

During testing, the program is executed with correctness. A series of testing are performed for the proposed systems before the system is delivered to the user.

UNIT TESTING

In the unit testing the testing is performed on each module and this module is known as module testing. This testing was carried out during programming state itself. In this testing all the modules working satisfactorily as regard to the expected output from the module.Unit testing is a method by which individual units of source code are tested to determine if they are fit for use. A unit is the smallest testable part of an application. In procedural programming a unit may be an individual function or procedure. Unit tests are created by programmers or occasionally by white box testers.

Unit test cases embody characteristics that are critical to the success of the unit. These characteristics can indicate appropriate / inappropriate use of a unit as well as negative behaviors that are to be trapped by the unit. A unit test case, in and of itself, documents these critical characteristics, although many software development environments do not rely solely upon code to document the product in development. Unit testing provides a sort of living documentation of the system. Developers looking to learn what functionality is provided by a unit and how to use it can look at the unit tests to gain a basic understanding of the unit API.

ACCEPTANCE TESTING

Acceptance testing is black-box testing performed on a system (e.g. software, lots of manufactured mechanical parts, or batches of chemical products) prior to its delivery. It is also known as functional testing, black-box testing, release acceptance, QA testing, application testing, confidence testing, final testing, validation testing, or factory acceptance testing.

Acceptance testing generally involves running a suite of tests on the completed system. Each individual test, known as a case, exercises a particular operating condition of the user's environment or feature of the system, and will result in a pass or fail, or Boolean, outcome. There is generally no degree of success or failure. The test environment is usually designed to be identical, or as close as possible, to the anticipated user's environment, including extremes of such. These test cases must each be accompanied by test case input data or a formal description of the operational activities (or both) to be performed—intended to thoroughly exercise the specific case—and a formal description of the expected results.

TYPES OF ACCEPTANCE TESTING

Typical types of acceptance testing include the following

User Acceptance Testing

This may include factory acceptance testing, i.e. the testing done by factory users before the factory is moved to its own site, after which site acceptance testing may be performed by the users at the site.

Operational Acceptance Testing

Also known as operational readiness testing, this refers to the checking done to a system to ensure that processes and procedures are in place to allow the system to be used and maintained.

Contract and Regulation Acceptance Testing

In contract acceptance testing, a system is tested against acceptance criteria as documented in a contract, before the system is accepted. In regulation acceptance testing, a system is tested to ensure it meets governmental, legal and safety standards.

Alpha and Beta Testing

Alpha testing takes place at developers' sites, and involves testing of the operational system by internal staff, before it is released to external customers. Beta testing takes place at customers' sites, and involves testing by a group of customers who use the system at their own locations and provide feedback, before the system is released to other customers. The latter is often called “field testing”.

INTEGRATION TESTING

One module can have adverse effect on another such functions when combined may not produce the desired results. Integration testing is a systematic technique for constructing the program structure and conducting test to uncover errors associated with interface. All the modules are combined in this testing step. The entire program is tested as the whole. The errors uncovered are corrected for the next testing step.

BLACK BOX TESTING

The black box approach is attesting method in which test data are delivered from the functional requirement without regard to the final program structure. Because only functionality of the software is concerned.

In black box testing, only the functionality is determined by observing the outputs to the corresponding input. In this testing various input images are exercised and the output images are compared as required by the content retriever.

WHITE BOX TESTING

White box testing are the software predicates on close examination of procedure details. It provides test cases that exercise specific test for conditions and loops. White box testing was carried out in the order to guarantee that

- All independent parts within a module exercised at least once.
- All logical decision on this true and false side was exercised.

VALIDATION TESTING

Computer input procedures are designed to detect errors in the data at the lower level of detail which is beyond the capability of the control procedures. The validation succeeds when the software functions in the manner that can be reasonably expected by the customer.

IV. IMPLEMENTATION

The implementation phase focuses how the engineer attempts to develop the system. It also deals with how data are to be structured, how procedural details are to be implemented, how interfaces are characterized, how the design will be translated into programming and hoe the testing will be performed. The methods applied during the development phase will vary but three specific technical tasks should always occur.

- The software design
- Code generation
- Software testing

The system group has changed with responsibility to develop a new system to meet requirements and design and development of new information system. The source of these study facts is variety of users at all level throughout the organization.

STAGE OF DEVELOPMENT OF A SYSTEM

- Feasibility assessment
- Requirement analysis
- External assessment
- Architectural design
- Detailed design
- Coding
- Debugging
- Maintenance

FEASIBILITY ASSESSMENT

In Feasibility this stage problem was defined. Criteria for choosing solution were developed, proposed possible solution, estimated costs and benefits of the system and recommended the course of action to be taken.

REQUIREMENT ANALYSIS

During requirement analysis high-level requirement like the capabilities of the system must provide in order to solve a problem. Function requirements, performance requirements for the hardware specified during the initial planning were elaborated and made more specific in order to characterize features and the proposed system will incorporate.

EXTERNAL DESIGN

External design of any software development involves conceiving, planning out and specifying the externally observable

characteristic of the software product. These characteristics include user displays, report formats, external data source and data links and the functional characteristics.

INTERNAL DESIGN ARCHITECTURAL AND DETAILED DESIGN

Internal design involved conceiving, planning out and specifying the internal structure and processing details in order to record the design decisions and to be able to indicate why certain alternations were chosen in preference to others. These phases also include elaboration of the test plans and provide blue prints of implementation, testing and maintenance activities. The product of internal design is architectural structure specification. The work products of internal design are architectural structure specification, the details of the algorithm, data structure and test plan. In architectural design the conceptual view is refined.

DETAILED DESIGN

Detailed design involved specifying the algorithmic details concerned with data representation, interconnections among data structures and packaging of the software product. This phase emphasizes more on semantic issues and less synthetic details.

CODING

This phase involves actual programming, i.e, transacting detailed design into source code using appropriate programming language.

DEBUGGING

This stage was related with removing errors from programs and making them completely error free.

V. CONCLUSION AND FUTURE ENHANCEMENT

Motivated by the observation that data deduplication has negative influences on data write performance, data read performance and data reliability while getting high compression ratio, we propose a multi-objective based analysis framework to quantify multiple performance metrics and evaluate the existing well-known deduplication approaches. Our analysis and experimental results clearly show that the removal of redundant chunks de-linearizes data placement and weakens duplicate locality, which significantly affects data write/read performance and data reliability. Based on these results and our proposed hybrid framework which focuses on keeping some redundant data removed to alleviate data fragmentation. According to our experimental evaluation, performances are closely related to the preset value. In our experiments, by setting values significantly improve the data write/read performance.

SCOPE FOR FUTURE ENHANCEMENT

As part of future work, we plan to consider replication strategies suitable for each consistency level. We also plan to extend our protocols to deal with more complex transactions.

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A NOVEL AUTHENTICATE ROUTING WITH SECURE KEY GENERATION SCHEME FOR WIRELESS SENSOR NETWORKS

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ABSTRACT- One type of active eavesdropping operations carried out by a malicious user during the channel training phase is the pilot spoofing attack. Such an attack can trick the channel estimation process into giving the adversary a higher channel rate while giving the legitimate receiver a lower channel rate by transmitting the same pilot (training) signals as the legal users. Adversaries in wireless sensor networks can execute DoS attacks on legitimate reports and insert fraudulent data reports through infected nodes. Many filtering strategies against bogus reports have recently been put out. However, they are either weak in filtering or poorly able to support extremely dynamic sensor networks. Few of them can also defend against DoS attacks concurrently. In this project, we provide a dynamic en-route filtering system that defends against DoS attacks as well as fake report insertion in wireless sensor networks. A valid report must be validated by a specific number of nodes in our system, and each node has a hash chain of authentication keys that it uses to endorse reports. Each node first shares its key with the forwarding nodes. The sending nodes then reveal their keys after delivering reports, enabling the forwarding nodes to confirm the reports. The Hill Climbing key dissemination strategy is created with the goal of maximizing the filtering power of the nodes closest to the data sources. In addition, we use wireless communication's broadcast feature to counter DoS attacks and multipath routing to deal with sensor networks' changing topologies.

Keywords: Hill climbing, Network, Routing

I. INTRODUCTION

Recent advances in electronic and computer technologies have paved the way for the proliferation of wireless sensor networks (WSN). Sensor networks usually consist of a large number of ultra small autonomous devices. Each device, called a sensor node, is battery powered and equipped with integrated sensors, data processing capabilities, and short-range radio communications. In typical application scenarios, sensor nodes are spread randomly over the terrain under scrutiny and collect sensor data. Examples of sensor network projects include Smart Dust and WINS. Sensor networks are being deployed for a wide variety of applications, including military sensing and tracking, environment monitoring, patient monitoring and tracking, smart environments, etc. When sensor networks are deployed in a hostile environment, security becomes extremely important, as they are prone to different types of malicious attacks. For example, an adversary can easily listen to the traffic, impersonate one of the network nodes, or intentionally provide misleading information to other nodes. To provide security, communication should be encrypted and authenticated. The open problem is how to bootstrap secure communication between sensor nodes, i.e. how to set up secret keys between communicating nodes? This problem is known as the key agreement problem, which has been widely studied in general network environments. There are three types of general key agreement schemes: trusted-server scheme, self-enforcing scheme, and key pre-distribution scheme.

The trusted-server scheme depends on a trusted server for key agreement between nodes, e.g., Kerberos. This type of scheme is not suitable for sensor networks because there is no trusted infrastructure in sensor networks. The self-enforcing scheme depends on asymmetric cryptography, such as key agreement using public key certificates. However, limited computation and energy resources of sensor nodes often make it undesirable to use public key algorithms, such as Diffie-Hellman key agreement or RSA, as pointed out. The third type of key agreement scheme is key pre-distribution, where key information is distributed among all sensor nodes prior to deployment. If we know which nodes will be in the same neighborhood before deployment, keys can be decided a priori. However, most sensor network deployments are random; thus, such a priori knowledge does not exist. There exist a number of key pre-distribution schemes which do not rely on a priori deployment knowledge. A naive solution is to let all the nodes carry a master secret key. Any pair of nodes can use this global master secret key to achieve key agreement and obtain a new pair wise key. This scheme does not exhibit desirable network resilience: if one node is compromised, the security of the entire sensor network will be compromised. Some existing studies suggest storing the master key in tamper-resistant hardware to reduce the risk, but this increases the cost and energy consumption of each sensor.

II. LITERATURE STUDY

Other than the passive eavesdropping, the adversary could choose the active attack instead. One intelligent attack is called the spoofing attack, in which the adversary pretends to be the legitimate transmitter to spread false messages, or be the legitimate receiver to filch confidential information. This spoofing attack is originally studied in cyber network.Though some related detection algorithms are designed based on utilizing the physical layer properties, e.g., comparing the channel state information (CSI) in neighboring time slots. However, recent study illustrates that spoofing attack could also happen in the physical layer of communication systems.Due to that the CSI is essential for data transmission and reception, a pilot-assisted channel estimation method is widely used in practical systems. For example, in a time duplex division (TDD) system, the legal receiver is required to send the assigned pilot signals to the transmitter, and the CSI can be estimated based on the received pilot signals due to the reciprocity of the uplink and downlink channels. The pilot signal set is pre-designed and known by the transmitter and receiver, and different pilot signals are usually orthogonal to each other to avoid contamination phenomenon.

Because of being repeatedly used and publicly known, the knowledge of pilot signals could easily be learned by an adversary, and the spoofing attack to the transmitter becomes possible by broadcasting the identical pilot signal as that of a legitimate receiver. By doing so, the adversary could manipulate the channel estimation result and benefit from the attack. If the transmitter is equipped with multiple antennas to perform beamforming during downlink transmission, e.g., maximum ratio transmission (MRT), the main beam of the data signal might be directed to the adversary or other unwanted destinations. This attack is named as **pilot spoofing attack** and obviously it could create terrible consequences. However, due to variable purposes of attacks, the pilot spoofing attack may not be the worst-case attack as the definition of worst-case could be subjective.In EXISTING the authors arose this attack problem from the pilot contamination scenario and mainly analyzed its damages. They used two new channel estimation schemes were proposed with fundamentally modified pilot signal design and estimation process, the former suggested to transmit two random phase-shift keying (PSK) symbols as the pilot signal and tried to detect the pilot spoofing attack based on the phase difference of those two symbols; the latter proposed a new discriminatory channel estimation method and claimed to be secure from the pilot spoofing (contamination) attack by randomly choosing the newly designed stochastic pilot signals. With the intention of incurring as less modifications as possible to the current pilot-assisted channel estimation process, the energy ratio detector (ERD) was proposed by

exploiting the power unbalance between the transmitter side and the receiver side when they are under attack. Although the ERD provides good detection performance, it did not propose explicit backup plans to recover the secure data transmission.

DISADVANTAGES OF EXISTING SYSTEM

- Using key pool schemes are not scalable and need a rather large storage space.
- The main disadvantage of this if an attacker compromises several nodes, many links may be potentially rendered insecure.

III. DEVELOPMENT ON NOVEL AUTHENTICATE ROUTING WITH SECURE KEY GENERATION SCHEME FOR WIRELESS SENSOR NETWORKS

Therefore, a secure routing algorithm based on the secrecy connectivity probability (SCP) in wireless ad hoc networks with inhomogeneous (both random and fixed location) eavesdropper clusters will be proposed in this work. Moreover, the proposed secure routing algorithm can be easily utilized in public safety and military applications when some areas are potentially unsafe. Furthermore, full-duplex (FD) scheme is an attractive alternative to enhance the security in PLS because the self-interference can be cancelled to achieve the noise floor by utilizing hill climbing approach and Elliptic-curve cryptography (ECC). Thus, to improve secrecy connectivity, the FD scheme at the receiver will be considered in our work. The contributions of work are as follows:

- We derive the exact expressions and lower bound of SCP for half-duplex (HD) legitimate receivers based on the randomize-and-forward (RaF) scheme for a given path in the presence of multiple inhomogeneous (both random and fixed) eavesdropper clusters.
- We propose an FD scheme at the legitimate receivers to enhance the SCP and obtain the exact expressions for the SCP.
- We propose a secure routing algorithm by using two approximate metrics to find the sub-optimal route from the source to the destination in a distributed way.
- We verify the theoretical analysis and illustrate the proposed secure routing algorithm by utilizing java simulations and numerical results. The results give useful insight for designing practical secure ad hoc networks based on different system parameters.

ADVANTAGES

- We model a network with sensor nodes in which all edges and vertices have their own cost.
- Used for secure routing in any network using any key pre-distribution scheme.
- Experimental results show that our algorithm improves network performance and enhances network security.

KEY PREDISTRIBUTION PHASE

Key pre distribution needs to be performed only once. It consists of two steps.

Step1: Each node is preloaded with a distinct seed key. From the seed key, it can generate a sequence of auth-keys using a common hash function. Thus, each node's authkeys form a hash chain.

Step2: Among n nodes of a cluster, we assume that there are at least nodes each having a distinct -key.

KEY DISSEMINATION PHASE

In our scheme, the cluster-head discloses the sensing nodes' auth-keys after sending the reports of each round. However, it is vulnerable to such an attack that a malicious node can pretend to be a cluster-head and inject arbitrary reports followed by falsified auth-keys. To prevent this attack, we enforce key dissemination, that is, the cluster-head should disseminate the first auth-keys of all nodes to the forwarding nodes before sending the reports in the first round. By using the disseminated keys, the forwarding nodes can verify the authenticity of the disclosed auth-keys, which are in turn used to check the validity and integrity of the reports. Key dissemination should be performed periodically in case that some forwarding nodes aware of the disseminated keys become failed, especially when the network topology is highly dynamic. In this case (of predissemination), the first unused, instead of the first, auth-keys will be disseminated. The first unused auth-key of a node is called the current

auth-key of that node. When none of a node's auth-keys has ever been used, the current auth-key is just the first auth-key of its hash chain.

HILL CLIMBING

We introduce two important observations. First, when multiple clusters disseminate keys at the same time, some forwarding nodes need to store the auth-keys of different clusters. The nodes closer to the base station need to store more auth-keys than others (typically those closer to clusters) do because they are usually the hot spots and have to serve more clusters. Second, the false reports are mainly filtered by the nodes closer to clusters, while most nodes closer to the base station have no chance to use the auth-keys they stored for filtering. Hill Climbing involves two variations, one for the key predistribution phase and the other for the key dissemination phase.

REPORT FORWARDING PHASE

In this phase, sensing nodes generate sensing reports in rounds. Each round contains a fixed number of reports, e.g., 10 reports, where this number is predetermined before nodes are deployed. In each round, every sensing node chooses a new auth-key, i.e., the node's current auth-key, to authenticate its reports.

IV.IMPLEMENTATION

The implementation phase focuses how the engineer attempts to develop the system. It also deals with how data are to be structured, how procedural details are to be implemented, how interfaces are characterized, how the design will be translated into programming and hoe the testing will be performed. The methods applied during the development phase will vary but three specific technical tasks should always occur.

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- Requirement analysis
- External assessment
- Architectural design, Detailed design
- Coding, Debugging, Maintenance

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Detailed design involved specifying the algorithmic details concerned with data representation, interconnections among data structures and packaging of the software product. This phase emphasizes more on semantic issues and less synthetic details.

CODING

This phase involves actual programming, i.e, transacting detailed design into source code using appropriate programming language.

DEBUGGING

This stage was related with removing errors from programs and making them completely error free.

MAINTENANCE

During this stage the systems are loaded and put into use. They also get modified accordingly to the requirements of the user. These modifications included making enhancements to system and removing problems.

V. CONCLUSION AND FUTURE ENHANCEMENT

We examine the interesting applications of our work as we wrap up this section. We see our work as a more useful alternative for use in key-distribution-required secure network routing applications. Pre-planned MANETs used in mission-critical and emergency response networks are an example of such applications. Public key infrastructure (PKI) or identity-based cryptography (IBC) techniques are employed as the key distribution mechanisms in such systems. Infrastructure and centralized servers with knowledge of the entire set of keys and their assignments are required for both PKI and IBC techniques. These applications frequently entail routing across a number of encrypted and unencrypted domains and are burdened by the high overheads of IP address mappings between domains that have distinct address spaces. Our proposed work hill climbing approach introduces a low overhead alternative eliminating the need for infrastructure and central servers as well as the need for multiple routing domains at the cost of storing a small number of per node keys and negligible additional cost of encryption-decryption.

SCOPE FOR FUTURE ENHANCEMENT

In future, we will study how to take advantage in our scheme of various energy-efficient data aggregation and dissemination protocols for wireless sensor networks.

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SECURE SHARING AND PRIVACY PRESERVING OF PERSONAL HEALTH RECORD IN DATA MINING

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ABSTRACT- This paper secure sharing and privacy preserving of personal health record in data mining is designed using JAVA as Front End and MS Access as Back end. In order to provide quick access to data resources on the Web, Data as a Service (DaaS) builds on service-oriented technologies. This paradigm, however, introduces a number of fresh privacy issues that conventional privacy models are unable to address. DaaS composition may also make private information available. In this paper, we suggest a formal privacy model to add privacy features to DaaS descriptions. A service can specify a privacy policy and a list of privacy requirements using the privacy model. Additionally, we provide a DaaS composition method that protects privacy and enables users to confirm that privacy standards and rules are compatible. When incompatibilities occur in a composition, we provide a negotiation approach that enables dynamic reconciliation of the privacy capabilities of services. Through the use of an experimental set and a prototype implementation, we confirm the applicability of our suggestion.

Keyword: Web, P3P,Daas,SOA.

I. INTRODUCTION

WEB services have recently emerged as a popular medium for data publishing and sharing on the Web. Modern enterprises across all spectra are moving towards a service-oriented architecture by putting their databases behind Web services, thereby providing a well-documented, and platform independent and interoperable method of interacting with their data. This new type of services is known as DaaS (Data-as-a-Service) services where services correspond to calls over the data sources. DaaS sits between services-based applications (i.e., SOA-based business process) and an enterprise's heterogeneous data sources. They shield applications developers from having to directly interact with the various data sources that give access to business objects, thus enabling them to focus on the business logic only. While individual services may provide interesting information/functionality alone, in most cases, users' queries require the combination of several Web services through service composition. In spite of the large body of research devoted to service composition over the last years, service composition remains a challenging task in particular regarding privacy. In a nutshell, privacy is the right of an entity to determine when, how, and to what extent it will release private information.

II. LITERATURE STUDY

System analysis will be performed to determine if it is flexible to design information based on policies and plans of organization and on user requirements and to eliminate the weakness of present system. This chapter discusses the existing system, proposed system and highlights of the system requirements.

EXISTING SYSTEM

A typical example of modeling privacy is the Platform for Privacy Preferences (P3P). However, the major focus of P3P is to enable

only Web sites to convey their privacy policies. In privacy only takes into account a limited set of data fields and rights. Data providers specify how to use the service (mandatory and optional data for querying the service), while individuals specify the type of access for each part of their personal data contained in the service: free, limited, or not given using DAML-S ontology.

DRAWBACKS OF EXISTING SYSTEM

Two factors exacerbate the problem of privacy in DaaS. First, DaaS services collect and store a large amount of private information about users. Second, DaaS services are able to share this information with other entities. Besides, the emergence of analysis tools makes it easier to analyze and synthesize huge volumes of information, hence increasing the risk of privacy violation. In the following, we use our epidemiological scenario to illustrate the privacy challenges during service composition.

Challenge 1: Privacy Specification.

Challenge 2: Privacy within compositions.

Challenge 3: Dealing with incompatible privacy policies in compositions.

PROPOSED SYSTEM

We describe a formal privacy model for Web Services that goes beyond traditional data-oriented models. It deals with privacy not only at the data level (i.e., inputs and outputs) but also service level (i.e., service invocation). In this project, we build upon this model two other extensions to address privacy issues during DaaS composition. The privacy model described in this PROJECT is based on the model initially proposed

BENEFITS OF PROPOSED SYSTEM:

- Privacy-Aware Service Composition:

  We propose a compatibility matching algorithm to check privacy compatibility between component services within a composition. The compatibility matching is based on the notion of privacy subsumption and on a cost model. A matching threshold is set up by services to cater for partial and total privacy compatibility.
- Negotiating Privacy in Service Composition:

  In the case when any composition plan will be incompatible in terms of privacy, we introduce a novel approach based on negotiation to reach compatibility of concerned services (i.e., services that participate in a composition which are incompatible). We aim at avoiding the empty set response for user queries by allowing a service to adapt its privacy policy without any damaging impact on privacy. Negotiation strategies are specified via state diagrams and negotiation protocol is proposed to reach compatible policy for composition.

III. SYSTEM DESIGN AND DEVELOPMENT

INPUT DESIGN

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:'

- What data should be given as input?
- How the data should be arranged or coded?
- The dialog to guide the operating personnel in providing input.
- Methods for preparing input validations and steps to follow when error occur.

OBJECTIVES

1.Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.

2. It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.

3.When the data is entered it will check for its validity. Data can be entered with the help of screens. Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus the objective of input design is to create an input layout that is easy to follow.

OUTPUT DESIGN

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

1. Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.

2.Select methods for presenting information.

3.Create document, report, or other formats that contain information produced by the system.

The output form of an information system should accomplish one or more of the following objectives.

- Convey information about past activities, current status or projections of the
- Future.
- Signal important events, opportunities, problems, or warnings.
- Trigger an action.
- Confirm an action.

DATABASE DESIGN

Databases are normally implemented by using a package called a Data Base Management System (DBMS). Each particular DBMS has somewhat unique characteristics, and so such, general techniques for the design of database are limited. One of the most useful methods of analyzing the data required by the system for the data dictionary has developed from research into relational database, particularly the work of E.F.Codd. This method of analyzing data is called "Normalization". Unnormalized data are converted into normalized data by three stages. Each stage has a procedure to follow.

NORMALIZATION:

The first stage is normalization is to reduce the data to its first normal form, by removing repeating items showing them as separate records but including in them the key fields of the original record.

The next stage of reduction to the second normal form is to check that the record, which one is first normal form, all the items in each record are entirely dependent on the key of the record. If a data item is not dependent on the key of the record, but on the other data item, then it is removed with its key to form another record. This is done until each record contains data items, which are entirely dependent on the key of their record.

The final stage of the analysis, the reduction of third normal form involves examining each record, which one is in second normal form to see whether any items are mutually dependent. If there are any item there are removed to a separate record leaving one of the items behind in the original record and using that as the key in the newly created record.

BUSINESS MODELING:

The information flow among business function is modeled in a way that answers the following questions: what information drives the business process? What information is generated? What generate it? Where does the information go? Who process it?

DATA MODELING:

The information flow defined as a process of the business modeling is refined into a set of data objects that are needed to support

the business. The characteristics (called attributes) of each object are identified and relationships between these objects are defined.

PROCESS MODELING:

The data objects defined in the data-modeling phase are transformed to achieve the information flow necessary to implement a business function. Processing description is created for addition, modifying, deleting, or retrieving a data object.

phara_id	nvarchar(50)
name	nvarchar(50)
age	nvarchar(50)
gender	nvarchar(50)
fathername	nvarchar(50)
city	nvarchar(50)
contactno	nvarchar(50)
address	nvarchar(50)
dob	nvarchar(50)
username	nvarchar(50)
psw	nvarchar(50)

TABLE DESIGN
File details
Doctor
Patient
Pharmacy
Private user

Record

Name	nvarchar(50)
Userkey	nvarchar(50)
Content_Type	nvarchar(MAX)
File_Upload	nvarchar(50)

docter_id	nvarchar(50)
Name	nvarchar(50)
Age	nvarchar(50)
Gender	nvarchar(50)
Fathername	nvarchar(50)
City	nvarchar(50)
Contactno	nvarchar(50)
address	nvarchar(50)
Qualification	nvarchar(50)
Proof	nvarchar(50)
Username	nvarchar(50)
Psw	nvarchar(50)

IV. IMPLEMENTATION

The implementation phase focuses how the engineer attempts to develop the system. It also deals with how data are to be structured, how procedural details are to be implemented, how interfaces are characterized, how the design will be translated into programming and hoe the testing will be performed. The methods applied during the development phase will vary but three specific technical tasks should always occur.

- The software design, Code generation
- Software testing

The system group has changed with responsibility to develop a new system to meet requirements and design and development of new information system. The source of these study facts is variety of users at all level throughout the organization.

STAGE OF DEVELOPMENT OF A SYSTEM

- Feasibility assessment
- Requirement analysis
- External assessment
- Architectural design
- Detailed design
- Coding
- Debugging
- Maintenance

patient_id	nvarchar(50)
name	nvarchar(50)
gender	nvarchar(50)
Fathername	nvarchar(50)
Dob	nvarchar(50)
Contactno	nvarchar(50)
address	nvarchar(50)
Username	nvarchar(50)
Psw	nvarchar(50)

FEASIBILITY ASSESSMENT

In Feasibility this stage problem was defined. Criteria for choosing solution were developed, proposed possible solution, estimated costs and benefits of the system and recommended the course of action to be taken.

Requirement Analysis

During requirement analysis high-level requirement like the capabilities of the system must provide in order to solve a problem.

Function requirements, performance requirements for the hardware specified during the initial planning were elaborated and made more specific in order to characterize features and the proposed system will incorporate.

EXTERNAL DESIGN

External design of any software development involves conceiving, planning out and specifying the externally observable characteristic of the software product. These characteristics include user displays, report formats, external data source and data links and the functional characteristics.

INTERNAL DESIGN ARCHITECTURAL AND DETAILED DESIGN

Internal design involved conceiving, planning out and specifying the internal structure and processing details in order to record the design decisions and to be able to indicate why certain alternations were chosen in preference to others. These phases also include elaboration of the test plans and provide blue prints of implementation, testing and maintenance activities. The product of internal design is architectural structure specification.

The work products of internal design are architectural structure specification, the details of the algorithm, data structure and test plan. In architectural design the conceptual view is refined.

DETAILED DESIGN

Detailed design involved specifying the algorithmic details concerned with data representation, interconnections among data structures and packaging of the software product. This phase emphasizes more on semantic issues and less synthetic details.

CODING

This phase involves actual programming, i.e, transacting detailed design into source code using appropriate programming language.

V. CONCLUSION AND FUTURE SCOPE

We suggested a dynamic privacy approach for Web services in this research. The model addresses data and operation-level privacy. We also suggested using a negotiating strategy to resolve conflicts between privacy requirements and policies. Although privacy cannot be negotiated casually like ordinary data, it is still possible to negotiate a specific portion of the privacy policy.We run the software to determine the best method for maximizing the privacy of the user's location. The usefulness and efficiency of the suggested approach are clearly shown through simulations.

SCOPE FOR FUTURE ENHANCEMENT

- In any case, privacy policies always reflect the usage of private data as specified or agreed upon by service providers.
- As a future work, we aim at designing techniques for protecting the composition results from privacy attacks before the final result is returned by the mediator.
- Our future work includes other security issues in database-driven.

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ENSURING DATA SECURITY IN CLOUD USING AN EFFICIENT MERKEL BASED DATA AUDITING PROTOCOL

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ABSTRACT- Users could benefit from a variety of conveniences with the widespread adoption of cloud storage, including affordable remote data storage and adaptable data sharing. Numerous cloud auditing systems are put forth to guarantee the security and integrity of shared data because Cloud Service Providers (CSPs) are not fully trusted. In order to solve the aforementioned issue, researchers created an effective sampling verification algorithm. The auditing scheme is further optimized based on this methodology, and a dynamic auditing function has been created for the scheme to make it easier for data owners to update data. However, there are some security issues with the current cloud auditing techniques, including user identity leak, denial of service attacks, and single-manager power abuse. In this study, we suggest Merkel-based Message Authentication Codes (MACs), which can aid in the full establishment of the fledgling cloud economy by enabling publicly auditable cloud data storage. With public auditability, a reliable organization that possesses the knowledge and skills that data owners lack can be designated as an external audit party to evaluate the risk of outsourced data as needed. Such an auditing service offers data owners a visible yet affordable way to build confidence in the cloud, in addition to saving data owners' compute resources. As a result, we improved the Owner's and the cloud server's interaction in this notion. We describe approaches and system requirements that should be brought into consideration, and outline challenges that need to be resolved for such a publicly auditable secure cloud storage service to become a reality.

Keywords: MAC, CSP, TPA

I. INTRODUCTION

CLOUD STORAGE ARCHITECTURE AND SECURITY THREATS:

We begin with a high-level architecture description of cloud data storage services illustrated in Fig. 1. At its core, the architecture consists of four different entities:

- Data owner
- User
- Cloud server (CS) and
- TPA.

Here the **TPA** is “the trusted entity that has expertise and capabilities to assess cloud storage security on behalf of a data owner upon request”. Under the cloud paradigm, the **data owner** “may represent either the individual or the enterprise customer, who relies on the cloud server for remote data storage and maintenance, and thus is relieved of the burden of building and maintaining local storage infrastructure”.

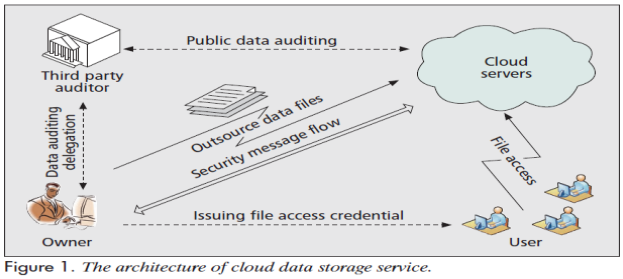

Figure 1. *The architecture of cloud data storage service.*

In most cases cloud data storage services also provide benefits like:

- Availability (being able to access data from anywhere),
- Relative low cost (paying as a function of need) and
- On demand sharing among a group of trusted users, such as partners in a collaboration team or employees in the enterprise organization.

For simplicity, we assume single writer/many readers scenario here. Only the data owner can dynamically interact with the CS to update her stored data, while users just have the privilege of file reading.Within the scope of this PROJECT, "we focus on how to ensure publicly auditable secure cloud data storage services". As the data owner no longer possesses physical control of the data, it is of critical importance to allow the data owner to verify that his data is being correctly stored and maintained in the cloud. Considering the possibly large cost in terms of resources and expertise, the data owner may resort to a TPA for "the data auditing task to ensure the storage security of her data, while hoping to keep the data private from the TPA". We assume the TPA, who is in the business of auditing, is reliable and independent, and thus has no incentive to collude with either the CS or the owners during the auditing process. The TPA should be able to efficiently audit the cloud data storage without local copy of data and without any additional online burden for data owners. Besides, any possible leakage of an owner's outsourced data toward a TPA through the auditing protocol should be prohibited.We consider both malicious outsiders and a **semi-trusted CS** "as potential adversaries interrupting cloud data storage services".**Malicious** outsiders can be economically motivated, and "have the capability to attack cloud storage servers and subsequently pollute or delete owners' data while remaining undetected". The CS is semi-trusted in the sense "that most of the time it behaves properly and does not deviate from the prescribed protocol execution". However, for its own benefit the CS might neglect to keep or deliberately delete rarely accessed data files that belong to ordinary cloud owners. Moreover, the CS may decide to hide the data corruptions caused by server hacks or Byzantine failures to maintain its reputation. Note that in our architecture, we assume that basic security mechanisms such as a preloaded public/private key pair "with each entity are already in place to provide basic communication security, which can be achieved in practice with little overhead".

II. LITERATURE STUDY

System analysis will be performed to determine if it is flexible to design information based on policies and plans of organization and on user requirements and to eliminate the weakness of present system. This chapter discusses the existing system, proposed system and highlights of the system requirements.

EXISTING SYSTEM

A straightforward approach to protect the data integrity would be using traditional cryptographic methods, such as the well-known public key encryption method. Initially, data owners can locally maintain a small amount of keys for the data files to be outsourced. Whenever the data owner needs to retrieve the file, she can verify the integrity by recalculating the key of the received data file and comparing it to the locally precomputed value. While this method allows data owners to verify the correctness of the received data from the cloud, it does not give any assurance about the correctness of other outsourced data. In other words, it does not give any guarantee that the data in the cloud are all actually intact, unless the data are all downloaded by the owner

DISADVANTAGES OF EXISTING SYSTEM

- Because the amount of cloud data can be huge, it would be quite impractical for a data owner to retrieve all of her data just in order to verify the data is still correct.
- If the data auditing task is delegated to a TPA, this method inevitably violates our suggested requirements, with large auditing cost for a cloud server (for accessing and transferring all of the data) and data privacy exposure to the TPA (for retrieving a local copy of data).

III. DEVELOPMENT A UAV UNIT FOR THE DATA DISSEMINATION PROTOCOL IN VANET WITH THE NAMED DATA ARCHITECTURE

Utilizing Merkel based Homomorphic Authenticators well-known message authentication codes (MACs) to significantly reduce the arbitrarily large communication overhead for public auditability without introducing any online burden on the data owner, we resort to this authenticator technique. Here authenticators are unforgeable metadata generated from individual data blocks, which can be securely aggregated in such a way to assure a verifier that a linear combination of data blocks is correctly computed by verifying only the aggregated authenticator. Using this technique requires additional information encoded along with the data before outsourcing.

ADVANTAGES OF PROPOSED SYSTEM:

- It achieves a constant communication overhead for public auditability.
- Its excellent flexibility makes it applicable not only to large IT Companies and Internet companies, but also to medium-sized and even small IT systems.
- The individual data operation on any file block, especially block insertion and deletion, will no longer affect other unchanged blocks.

DESCRIPTION OF MODULES

Minimize auditing overhead:

First and foremost, the overhead imposed on the cloud server by the auditing process must not outweigh its benefits. Such overhead may include both the I/O cost for data access and the bandwidth cost for data transfer. Any extra online burden on a data owner should also be as low as possible. Ideally, after auditing delegation, the data owner should just enjoy the cloud storage service while being worry-free about storage auditing correctness.

Protect Data Privacy:

Data privacy protection has always been an important aspect of a service level agreement for cloud storage services. Thus, the implementation of a public auditing protocol should not violate the owner's data privacy. In other words a TPA should be able to efficiently audit the cloud data storage without demanding a local copy of data or even learning the data content.

Support Data Dynamics:

As a cloud storage service is not just a data warehouse, owners are subject to dynamically updating their data via various application purposes. The design of auditing protocol should incorporate this important feature of data dynamics in Cloud Computing.

Support Batch Auditing:

The prevalence of large-scale cloud storage service further demands auditing efficiency. When receiving multiple auditing tasks from different owners' delegations, a TPA should still be able to handle them in a fast yet cost-effective fashion.

This property could essentially enable the scalability of a public auditing service even under a storage cloud with a large number of data owners.

IV. IMPLEMENTATION

The implementation phase focuses how the engineer attempts to develop the system. It also deals with how data are to be structured, how procedural details are to be implemented, how interfaces are characterized, how the design will be translated into programming and hoe the testing will be performed. The methods applied during the development phase will vary but three specific technical tasks should always occur.

- The software design
- Code generation
- Software testing

The system group has changed with responsibility to develop a new system to meet requirements and design and development of new information system. The source of these study facts is variety of users at all level throughout the organization.

Stage of Development of a System

- Feasibility assessment
- Requirement analysis
- External assessment
- Architectural design
- Detailed design
- Coding
- Debugging
- Maintenance

Feasibility Assessment

In Feasibility this stage problem was defined. Criteria for choosing solution were developed, proposed possible solution, estimated costs and benefits of the system and recommended the course of action to be taken.

Requirement Analysis

During requirement analysis high-level requirement like the capabilities of the system must provide in order to solve a problem. Function requirements, performance requirements for the hardware specified during the initial planning were elaborated and made more specific in order to characterize features and the proposed system will incorporate.

External Design

External design of any software development involves conceiving, planning out and specifying the externally observable characteristic of the software product. These characteristics include user displays, report formats, external data source and data links and the functional characteristics.

Internal Design Architectural and Detailed Design

Internal design involved conceiving, planning out and specifying the internal structure and processing details in order to record the design decisions and to be able to indicate why certain alternations were chosen in preference to others. These phases also include elaboration of the test plans and provide blue prints of implementation, testing and maintenance activities. The product of internal design is architectural structure specification. The work products of internal design are architectural structure specification, the details of the algorithm, data structure and test plan. In architectural design the conceptual view is refined.

Detailed Design

Detailed design involved specifying the algorithmic details concerned with data representation, interconnections among data structures and packaging of the software product. This phase emphasizes more on semantic issues and less synthetic details.

Coding

This phase involves actual programming, i.e, transacting detailed design into source code using appropriate programming language.

Debugging

This stage was related with removing errors from programs and making them completely error free.

Maintenance

During this stage the systems are loaded and put into use. They also get modified accordingly to the requirements of the user. These modifications included making enhancements to system and removing problems.

V. CONCLUSION AND FUTURE ENHANCEMENT

Cloud computing has been envisioned as the next-generation architecture of enterprise IT. In contrast to traditional enterprise IT solutions, where the IT services are under proper physical, logical, and personnel controls, cloud computing moves the application software and databases to servers

in large data centers on the Internet, where the management of the data and services are not fully trustworthy. This unique attribute raises many new security challenges in areas such as software and data security, recovery, and privacy, as well as legal issues in areas such as regulatory compliance and auditing, all of which have not been well understood. In this work we focus on cloud data storage security. We first present network architecture for effectively describing, developing, and evaluating secure data storage problems. We then suggest a set of systematically and cryptographically desirable properties for public auditing services of dependable cloud data storage security to become a reality. Through in-depth analysis, some existing data storage security building blocks are examined. Thus finally we proved our proposed algorithm overcome the limitation of existing.

Scope for Future Enhancement

In the above sections we have described some suggested requirements for public auditing services and the state of the art that fulfills them. However, this is still not enough for a publicly auditable secure cloud data storage system, and further challenging issues remain to be supported and resolved. We believe security in cloud computing, an area full of challenges and of paramount importance, is still in its infancy now but will attract enormous amounts of research effort for many years to come.

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HEALTH MONITORING OF MULTIPLE PHYSIOLOGICAL PARAMETERS IN PATIENTS BASED ON IOT WIRELESS REMOTE MEDICAL SYSTEM

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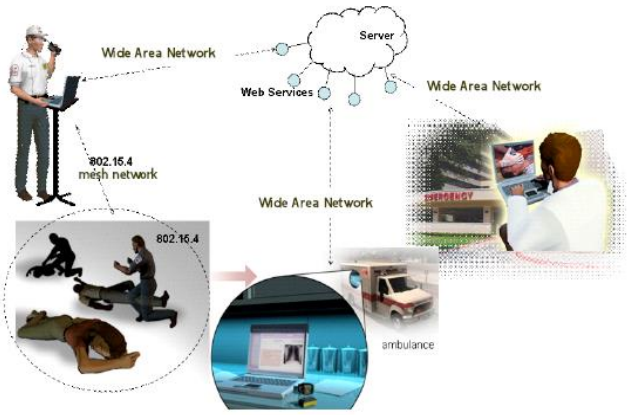
ABSTRACT- The exchange and monitoring of telemedicine information can be effectively realized by telemedicine as a new technical tool and medical paradigm, which will ultimately guarantee that everyone has equitable access to medical and health resources. This study presents a multi-physical parameter wireless telemedicine health monitoring system solution and evaluates the system's overall structure and functional needs on the basis of research on the state of telemedicine application and wireless communication technology. The wireless remote medical system for health monitoring uses human physiological data such as body temperature, respiration, blood oxygen saturation, pulse, blood pressure, and ECG. In this project, the impact of mobile computing on the effectiveness and efficiency of emergency medical services is examined. One of the most desirable targets for Internet of Things (IoT) applications right now is the healthcare industry. For instance, a health monitoring application enables medical staff (doctors, nurses, etc.) in a hospital or clinic to continuously monitor patients who are equipped with small, wearable sensors that can gather sensitive, important health information in real-time. The sensors are often used to track a variety of global parameters, including electrocardiograms (ECG), blood pressure, pulse rate, temperature, and blood oxygen levels. The project's primary goal is to provide patients with rapid care as quickly as possible utilizing mobile computing technology, keeping them alive thanks to the prompt action. This project can be implemented in In-hospitalization and other areas outside of disaster response.

Keywords: IOT, ECG

I. Introduction

Traditional medical technology often requires patients to come to the hospital for treatment in front of a doctor, which often requires the patient to have enough time, but it is very unsatisfactory for some irregular diseases, sudden diseases, and patients who need periodic care. In order to reduce the consequences of sudden illness, researchers around the world are stepping up research and development of effective telemedicine technologies. Of course, as a technology of great significance, telemedicine can remotely monitor the patient's physiological condition in real time through a monitoring center, which can effectively control the spread of sudden infectious diseases to a large extent. When a disaster occurs (COVID 19), the chaotic setting of limited resources, unreliable communication infrastructure, and inadequate information produces an organizational nightmare for care provider teams and prevents them from providing quality trauma care. We are introducing a new patient care paradigm to the

emergency response arena through automation of the patient monitoring and tracking process. The miTags is a wireless sensor that can be distributed to casualties at a disaster scene in lieu of paper triage tags. Much like paper triage tags, a visible patient triage priority number can be set onboard the miTag. As shown in Fig. 1, miTags relay sensor data - including vital signs, location, and triage status over an ad-hoc mesh network to monitoring stations. The miTag supports two-way communication and can also be used to send messages to and from the patient. Multiple sensor add-ons to miTags were developed, including a GPS receiver, pulse oximeter, blood pressure cuff, temperature sensor, and ECG sensors. Members of the distributed response team, such as treatment officers, incident commanders, receiving hospitals, and public health officials, can log onto a web portal to review real-time patient information. This allows them to maintain an accurate and global situational awareness of the casualties and provide better coordination between the pre-hospital caseload and receiving care facilities.MiTags extend upon mote technologies, which were originally developed at the University of California, Berkeley in the late 1990's through a DARPA program to create tiny, low-power, wireless sensor networks for military operations.Each miTag transmits and receives data with approximate transmission bandwidth of 250 kbps over the 2.4GHz open ISM frequency band, and is compatible with the IEEE 802.15.4 standard. It has a practical indoor range of approximately 20m, and is designed to optimize cost and battery-life, two important requirements for the emergency response industry.Disasters present a number of challenges to sensors due to unique patient, user, and environmental needs. Casualties can be distributed over areas well outside the communication range of pre-installed wireless access points. The number of patients can increase to an unpredictably large size, and high usage demands for wireless data exchange can easily overload existing radio communication channels. Medical providers are overwhelmed, often having zero tolerance for technologies that are unreliable or slow them down. During a disaster, they can spare little time being trained in the use of technologies. These complex conditions require highly adaptable sensor solutions that can be intelligently tailored to the evolving user and workflow requirements, with minimal need for manual configuration.



WIRELESS PATIENT MONITORING

We developed an end-to-end sensor network platform to support automated patient monitoring by drawing upon the research and development of disaster response technologies. Throughout our research, we have collaborated closely with the diverse groups of stakeholders within the disaster response, including first responders, public health officials, and trauma centers, in order to design a system that would take into account each of their perspectives and accommodate their requirements. In this project, we present the miTag as a solution for improving patient monitoring. It should be emphasized that the miTag is designed to optimize extensibility, scalability, and cost. It can be integrated with new sensor modalities to address a wide variety of problems within disaster response

II. Literature Study

System analysis will be performed to determine if it is flexible to design information based on policies and plans of organization and on user requirements and to eliminate the weakness of present system. This chapter discusses the existing system, proposed system and highlights of the system requirements. Disaster response scenarios require a major shift toward more scalable, workflow-efficient, and cost-effective products for monitoring

patients. Commercial monitors currently on the market require pre-installation of wireless networking infrastructure (e.g. GE requires Cisco wireless access points) and can only accommodate a limited number of patients per installed network (e.g. Nihon Kodhen's solution allows up to 8 monitors per network). These monitors are only capable of vital sign measurement, and have no capability to tracking patient location.

DISADVANTAGES

- This is not viable in a chaotic disaster scenario, as numerous patients are scattered across wide areas, and knowing the whereabouts of a patient is critical for responders to rescue that patient promptly.
- In addition, existing medical monitors are expensive, integrate poorly with workflows, and exhibit a high rate of false alarms that overwhelm care providers.
- These issues have long been barriers to the widespread adoption of automated monitoring products.

III. DEVELOPMENT ON HEALTH MONITORING OF MULTIPLE PHYSIOLOGICAL PARAMETERS IN PATIENTS BASED ON IOT WIRELESS REMOTE MEDICAL SYSTEM

In emergency response scenarios like COVID 19, a critical challenge is designing a medical sensor that can deliver suitable functionality (e.g. sensor data transmission rate, type of data transmitted) to meet the evolving patient, provider, and workflow needs. We are introducing a dynamic medical monitoring paradigm, where both the sensor hardware and application software have the ability to tune themselves to suit the usage scenario. The monitoring system can be statically configured prior to deployment and dynamically reconfigured during operation. For example, the miTag can adjust its sensor data transmission rate if the patient condition deteriorates, it can increase the types of sensor data being transmitted if the patient enters or exits the hot zone of the disaster, or the miTag canenter into sleep-mode to conserve battery life. Customized monitoring systems can be assembled on-thefly for different scenarios.

ADVANTAGES:

- This adaptability offers numerous significant benefits for the emergency response community by supporting the creation of user-centric and workflow-specific sensor applications, which can reduce the required intervention by users and allow for improvements in usability within a wider variety of responder scenarios.
- Finally, because the adjustments are made in software rather than hardware, implementation and manufacturing of new sensor applications are greatly simplified, and costs are minimized because the same hardware can be reused in multiple usage scenarios.

MODULE DESIGN

Retrieving patient details with Gateway

Wireless medical sensors are electronic devices which are used to get patient details from human body. All the devices are connected to its corresponding human physiological input. The sensor gateway integrates all the sensor values from the human body and checks whether all the sensors are working properly, else it generates an alarm indicates that specific sensor was not working. Also, if any sensor was missed to wear in the human body, it generates an alarm indicating that the specific sensor was missed.

First Level Analyzer

The first level analyzer is used to analyze the data from the sensor gateway. Checks whether the value will be in specific range or not. If it is in specific range, it will analyze the data, else it generates an alarm stating that the value will be out of range, so we can avoid the false alarm triggering and also it checks whether the value will be in critical range or not. If it is in critical range it generates a critical alarm in the hand held as well as in the system. Then the data will be processed and stored in the log file.

Server implementation and monitoring

A central server, designed with service oriented architecture principles, processes sensor data from multiple sensor networks and disseminates it to clients data display software. Features of these web services include sensor

history retrieval, sensor reconfiguration, user authentication, alarm monitoring, and alert generation.IOT Server contains a variety of features useful to medical sensor network applications, including built-in security, broadcast messaging, and data management when connectivity to the server is interrupted.

INPUT DESIGN

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:'

- What data should be given as input?
- How the data should be arranged or coded
- The dialog to guide the operating personnel in providing input.
- Methods for preparing input validations and steps to follow when error occur.

OBJECTIVES

1. Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.

2. It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.

3.When the data is entered it will check for its validity. Data can be entered with the help of screens. Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus the objective of input design is to create an input layout that is easy to follow.

OUTPUT DESIGN

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

1. Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.

2.Select methods for presenting information.

3.Create document, report, or other formats that contain information produced by the system.

The output form of an information system should accomplish one or more of the following objectives.

- Convey information about past activities, current status or projections of the
- Future.
- Signal important events, opportunities, problems, or warnings.
- Trigger an action.
- Confirm an action.

IV.IMPLEMENTATION

The implementation phase focuses how the engineer attempts to develop the system. It also deals with how data are to be structured, how procedural details are to be implemented, how interfaces are characterized, how the

design will be translated into programming and hoe the testing will be performed. The methods applied during the development phase will vary but three specific technical tasks should always occur.

- The software design
- Code generation
- Software testing

The system group has changed with responsibility to develop a new system to meet requirements and design and development of new information system. The source of these study facts is variety of users at all level throughout the organization.

Stage of Development of a System

- Feasibility assessment
- Requirement analysis
- External assessment
- Architectural design
- Detailed design
- Coding
- Debugging
- Maintenance

Feasibility Assessment

In Feasibility this stage problem was defined. Criteria for choosing solution were developed, proposed possible solution, estimated costs and benefits of the system and recommended the course of action to be taken.

Requirement Analysis

During requirement analysis high-level requirement like the capabilities of the system must provide in order to solve a problem. Function requirements, performance requirements for the hardware specified during the initial planning were elaborated and made more specific in order to characterize features and the proposed system will incorporate.

External Design

External design of any software development involves conceiving, planning out and specifying the externally observable characteristic of the software product. These characteristics include user displays, report formats, external data source and data links and the functional characteristics.

Internal Design Architectural and Detailed Design

Internal design involved conceiving, planning out and specifying the internal structure and processing details in order to record the design decisions and to be able to indicate why certain alternations were chosen in preference to others. These phases also include elaboration of the test plans and provide blue prints of implementation, testing and maintenance activities. The product of internal design is architectural structure specification.The work products of internal design are architectural structure specification, the details of the algorithm, data structure and test plan. In architectural design the conceptual view is refined.

Detailed Design

Detailed design involved specifying the algorithmic details concerned with data representation, interconnections among data structures and packaging of the software product. This phase emphasizes more on semantic issues and less synthetic details.

Coding

This phase involves actual programming, i.e, transacting detailed design into source code using appropriate programming language.

Debugging

This stage was related with removing errors from programs and making the completely error free.

Maintenance

During this stage the systems are loaded and put into use. They also get modified accordingly to the requirements of the user. These modifications included making enhancements to system and removing problems.

V. CONCLUSION AND FUTURE ENHANCEMENT

We have developed the IOT based system to automate patient monitoring during emergency events. The system was specifically designed to meet the diverse needs of users in the disaster response arena, minimizing cost and maximizing extensibility and reliability. Cost is minimized on the hardware side through the use of an extensible communication platform that supports a variety of sensors. Reliability is maximized as the long-range mesh network and short-range body area networks are capable of dynamic reconfiguration in the event of node failure. A number of additional capabilities add to the ease-of-use of the system, including user feedback features on the repeater nodes, and the capability to automatically reconfigure the sensor network behavior to suit various usage scenarios. Cost is minimized on the server software side through the exclusive use of open source technologies. Furthermore, the server software is platform independent, requires modest CPU power, and can be rapidly deployed. While we have applied body area network technologies to the patient tracking and monitoring, there are numerous other applications of body area networks within the homeland security arena.

SCOPE FOR FUTURE ENHANCEMENT

The underlying technologies that support our miTag solution can provide a framework for those additional applications and jump-start the development of analogous end to end solutions. Additional pilots can be conducted at Medical Center.

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PARALLEL MINING OF FREQUENT ITEMSETS USING MAPREDUCE

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Abstract-There is currently no automatic parallelization, load balancing, data dissemination, or fault tolerance mechanism for frequent item sets in parallel mining algorithms. We use the MapReduce programming model to create the parallel frequent item sets mining algorithm FiDoop as a solution to this issue. FiDoop uses the frequent items ultra metric tree in place of conventional FP trees to achieve compressed storage and avoid creating conditional pattern bases. Three MapReduce jobs are implemented in FiDoop to finish the mining work. In the essential third MapReduce task, the mappers independently break down item sets, the reducers combine them using tiny ultra metric trees, and the mappers independently mine these trees. FiDoop is put into use on our own data cluster. Because item sets with varying lengths have different decomposition and construction costs, we demonstrate how FiDoop on the cluster is sensitive to data distribution and dimensions. We create a workload balance metric to assess load distribution among the cluster's computational nodes in an effort to boost FiDoop's performance. In order to improve the mining performance for high-dimensional data analysis, we create FiDoop-HD, an extension of FiDoop. Numerous tests using actual celestial spectral data show that our suggested method is effective and Scalable.

Keywords: FiDoop, FIM, API, CAD FP, NASA, NHL

I. INTRODUCTION

We are in an age often referred to as the information age. In this information age, because we believe that information leads to power and success, and thanks to sophisticated technologies such as computers, satellites, etc., we have been collecting tremendous amounts of information. Initially, with the advent of computers and means for mass digital storage, we started collecting and storing all sorts of data, counting on the power of computers to help sort through this amalgam of information. Unfortunately, these massive collections of data stored on disparate structures very rapidly became overwhelming. This initial chaos has led to the creation of structured databases and database management systems (DBMS). The efficient database management systems have been very important assets for management of a large corpus of data and especially for effective and efficient retrieval of particular information from a large collection whenever needed. The proliferation of database management systems has also contributed to recent massive gathering of all sorts of information. Today, we have far more information than we can handle: from business transactions and scientific data, to satellite pictures, text reports and military intelligence. Information retrieval is simply not enough anymore for decision-making. Confronted with huge collections of data, we have now created new needs to help us make better managerial choices. These needs are automatic summarization of data, extraction of the "essence" of information stored, and the discovery of patterns in raw data.

BUSINESS TRANSACTIONS:

Every transaction in the business industry is (often) "memorized" for perpetuity. Such transactions are usually time related and can be

inter-business deals such as purchases, exchanges, banking, stock, etc., or intra-business operations such as management of in-house wares and assets. Large department stores, for example, thanks to the widespread use of bar codes, store millions of transactions daily representing often terabytes of data. Storage space is not the major problem, as the price of hard disks is continuously dropping, but the effective use of the data in a reasonable time frame for competitive decision-making is definitely the most important problem to solve for businesses that struggle to survive in a highly competitive world.

SCIENTIFIC DATA:

Whether in a Swiss nuclear accelerator laboratory counting particles, in the Canadian forest studying readings from a grizzly bear radio collar, on a South Pole iceberg gathering data about oceanic activity, or in an American university investigating human psychology, our society is amassing colossal amounts of scientific data that need to be analyzed. Unfortunately, we can capture and store more new data faster than we can analyze the old data already accumulated.

MEDICAL AND PERSONAL DATA:

From government census to personnel and customer files, very large collections of information are continuously gathered about individuals and groups. Governments, companies and organizations such as hospitals, are stockpiling very important quantities of personal data to help them manage human resources, better understand a market, or simply assist clientele. Regardless of the privacy issues this type of data often reveals, this information is collected, used and even shared. When correlated with other data this information can shed light on customer behaviour and the like.

SURVEILLANCE VIDEO AND PICTURES:

With the amazing collapse of video camera prices, video cameras are becoming ubiquitous. Video tapes from surveillance cameras are usually recycled and thus the content is lost. However, there is a tendency today to store the tapes and even digitize them for future use and analysis.

SATELLITE SENSING:

There is a countless number of satellites around the globe: some are geo-stationary above a region, and some are orbiting around the Earth, but all are sending a non-stop stream of data to the surface. NASA, which controls a large number of satellites, receives more data every second than what all NASA researchers and engineers can cope with. Many satellite pictures and data are made public as soon as they are received in the hopes that other researchers can analyze them.

GAMES:

Our society is collecting a tremendous amount of data and statistics about games, players and athletes. From hockey scores, basketball passes and car-racing lapses, to swimming times, boxers pushes and chess positions, all the data are stored. Commentators and journalists are using this information for reporting, but trainers and athletes would want to exploit this data to improve performance and better understand opponents.

DIGITAL:

The proliferation of cheap scanners, desktop video cameras and digital cameras is one of the causes of the explosion in digital media repositories. In addition, many radio stations, television channels and film studios are digitizing their audio and video collections to improve the management of their multimedia assets. Associations such as the NHL and the NBA have already started converting their huge game collection into digital forms.

CAD and Software engineering data:

There are a multitude of Computer Assisted Design (CAD) systems for architects to design buildings or engineers to conceive system components or circuits. These systems are generating a tremendous amount of data. Moreover, software engineering is a source of considerable similar data with code, function libraries, objects, etc., which need powerful tools for management and maintenance.

Virtual Worlds:

There are many applications making use of three-dimensional virtual spaces. These spaces and the objects they contain are described with special languages such as VRML. Ideally, these virtual spaces are described in such a way that they can share objects and places. There is a remarkable amount of virtual reality object and space repositories available. Management of these repositories as well as content-based search and retrieval from these repositories are still research issues, while the size of the collections continues to grow.

Text reports and memos (e-mail messages): Most of the communications within and between

companies or research organizations or even private people, are based on reports and memos in textual forms often exchanged by e-mail. These messages are regularly stored in digital form for future use and reference creating formidable digital libraries.

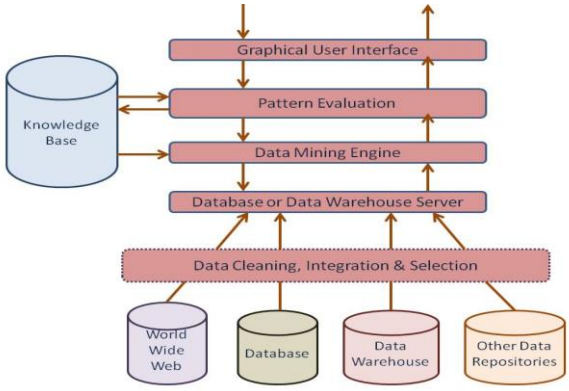
The World Wide Web repositories: Since the inception of the World Wide Web in 1993, documents of all sorts of formats, content and description have been collected and inter-connected with hyperlinks making it the largest repository of data ever built. Despite its dynamic and unstructured nature, its heterogeneous characteristic, and its very often redundancy and inconsistency, the World Wide Web is the most important data collection regularly used for reference because of the broad variety of topics covered and the infinite contributions of resources and publishers. Many believe that the World Wide Web will become the compilation of human knowledge.

Frequent item sets mining (FIM) is a core problem in association rule mining (ARM), sequence mining, and the like. Speeding up the process of FIM is critical and indispensable, because FIM consumption accounts for a significant portion of mining time due to its high computation and input/ output (I/O) intensity. When datasets in modern data mining applications become excessively large, sequential FIM algorithms running on a single machine suffer from performance deterioration. To address this issue, we investigate how to perform FIM using MapReducea widely adopted programming model for processing big datasets by exploiting the parallelism among computing nodes of a cluster. We show how to distribute a large dataset over the cluster to balance load across all cluster nodes, thereby optimizing the performance of parallel FIM. Frequent item sets mining algorithms can be divided into two categories namely, *Apriori* and FP-growth schemes. *Apriori* is a classic algorithm using the generate-and-test process that generates a large number of candidate item sets; *Apriori* has to repeatedly scan an entire database. To reduce the time required for scanning databases.

A) Data Sources

Database, data warehouse, World Wide Web (WWW), text files and other documents are the actual sources of data. You need large volumes of historical data for data mining to be successful. Organizations usually store data in databases or data warehouses. Data warehouses may contain one or more databases, text files, spreadsheets or other kinds of information repositories. Sometimes, data may reside even in plain text files or spreadsheets. World Wide Web or the Internet is another big source of data.

DATA MINING ARCHITECTURE



Different Processes

The data needs to be cleaned, integrated and selected before passing it to the database or data warehouse server. As the data is from different sources and in different formats, it cannot be used directly for the data mining process because the data might not be complete and reliable. So, first data needs to be cleaned and integrated. Again, more data than required will be collected from different data sources and only the data of interest needs to be selected and passed to the server. These processes are not as simple as we think. A number of techniques may be performed on the data as part of cleaning, integration and selection.

B) Database or Data Warehouse Server

The database or data warehouse server contains the actual data that is ready to be processed. Hence, the server is responsible for retrieving the relevant data based on the data mining request of the user.

C) Data Mining Engine

The data mining engine is the core component of any data mining system. It consists of a number of modules for performing data mining tasks including association, classification, characterization, clustering, prediction, time-series analysis etc.

D) Pattern Evaluation Modules

The pattern evaluation module is mainly responsible for the measure of interestingness of the pattern by using a threshold value. It interacts with the data mining engine to focus the search towards interesting patterns.

E) Graphical User Interface

The graphical user interface module communicates between the user and the data mining system. This module helps the user use the system easily and efficiently without knowing the real complexity behind the process. When the user specifies a query or a task, this module interacts with the data mining system and displays the result in an easily understandable manner.

F) Knowledge Base

The knowledge base is helpful in the whole data mining process. It might be useful for guiding the search or evaluating the interestingness of the result patterns. The knowledge base might even contain user beliefs and data from user experiences that can be useful in the process of data mining. The data mining engine might get inputs from the knowledge base to make the result more accurate and reliable. The pattern evaluation module interacts with the knowledge base on a regular basis to get inputs and also to update it.

II. LITERATURE STUDY

In this phase a detailed appraisal of the existing system is explained. This appraisal includes how the system works and what it does. It also includes finding out in more detail- what are the problems with the system and what user requires from the new system or any new change in system. The output of this phase results in the detail model of the system. The model describes the system functions and data and system information flow. The phase also contains the detail set of user requirements and these requirements are used to set objectives for the new system.

2.1 EXISTING SYSTEM

In Existing System Rather than considering Apriori and FP-growth, we incorporate the frequent items ultra metric tree (FIU-tree) in the design of our parallel FIM technique. We focus on FIU-tree because of its four salient advantages, which include reducing I/O overhead, offering a natural way of partitioning a dataset, compressed storage, and averting recursively traverse.

Drawbacks

- Parallel algorithms lack a mechanism that enables
- automatic parallelization,
- load balancing,
- data distribution, and
- Fault tolerance on large computing clusters

III. DEVELOPMENT OF PARALLEL MINING OF FREQUENT ITEMSETS USING MAPREDUCE

In Proposed System a new data partitioning method to well balance computing load among the cluster nodes; we develop FiDoop-HD, an extension of FiDoop, to meet the needs of high-dimensional data processing.The FIUT approach adopts the FIU-tree to enhance the efficiency of mining frequent item sets. The FIUT algorithm consists of two key phases. The first phase involves two rounds of scanning a database. The first scan generates frequent one-item sets by computing the support of all items, whereas the second scan results in *k*-item sets by pruning all infrequent items in each transaction record. Then, phase two starts mining all frequent *k*-itemsets based on the leaves of *k*-FIU-tree without recursively traversing the tree. Compared with the FP-growth method, FIUT significantly reduces the computing time and storage space by averting overhead of recursively searching and traversing conditional FP trees.

Benefits:

- FiDoop is efficient and scalable on Hadoop clusters.
- Reducing I/O overhead,
- Offering a natural way of partitioning a dataset,
- Compressed storage, and
- Averting recursively travers

DESCRIPTION OF MODULES

Frequent Itemset Mining:

Frequent Itemset Mining is one of the most critical and time-consuming tasks in association rule mining (ARM), an often-used data mining task, provides a strategic resource for decision support by extracting the most

important frequent patterns that simultaneously occur in a large transaction database. A typical application of ARM is the famous market basket analysis.

MapReduce Framework:

MapReduce is a popular data processing paradigm for efficient and fault tolerant workload distribution in large clusters. A MapReduce computation has two phases, namely, the Map phase and the Reduce phase. The Map phase splits an input data into a large number of fragments, which are evenly distributed to Map tasks across a cluster of nodes to process. Each Map task takes in a key-value pair and then generates a set of intermediate key-value pairs. After the MapReduce runtime system groups and sorts all the intermediate values associated with the same intermediate key, the runtime system delivers the intermediate values to Reduce tasks

Parallel FP-Growth Algorithm:

This is based on a popular FP-Growth algorithm called Parallel FP-Growth or Pfp for short. Pfp implemented in Mahout is a parallel version of the FPGrowth algorithm. Mahout is an open source machine learning library developed on Hadoop clusters. FP-Growth efficiently discovers frequent itemsets by constructing and mining a compressed data structure (i.e., FP-tree) rather than an entire database. Pfp was designed to address the synchronization issues by partitioning transaction database into independent partitions, because it is guaranteed that each partition contains all the data relevant to the features (or items) of that group.

IV. RESULT AND DISCUSSION

The implementation phase focuses how the engineer attempts to develop the system. It also deals with how data are to be structured, how procedural details are to be implemented, how interfaces are characterized, how the design will be translated into programming and hoe the testing will be performed. The methods applied during the development phase will vary but three specific technical tasks should always occur.

- The software design
- Code generation
- Software testing

The system group has changed with responsibility to develop a new system to meet requirements and design and development of new information system. The source of these study facts is variety of users at all level throughout the organization.

Stage of Development of a System

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- Architectural design
- Detailed design
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- Debugging
- Maintenance

Feasibility Assessment

In Feasibility this stage problem was defined. Criteria for choosing solution were developed, proposed possible solution, estimated costs and benefits of the system and recommended the course of action to be taken.

Requirement Analysis

During requirement analysis high-level requirement like the capabilities of the system must provide in order to solve a problem. Function requirements, performance requirements for the hardware specified during the initial planning were elaborated and made more specific in order to characterize features and the proposed system will incorporate.

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the details of the algorithm, data structure and test plan. In architectural design the conceptual view is refined.

Detailed Design

Detailed design involved specifying the algorithmic details concerned with data representation, interconnections among data structures and packaging of the software product. This phase emphasizes more on semanticsues and less synthetic details.

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This phase involves actual programming, i.e, transacting detailed design into source code using appropriate programming language.

Debugging

This stage was related with removing errors from programs and making them completely error free.

Maintenance

During this stage the systems are loaded and put into use. They also get modified accordingly to the requirements of the user. These modifications included making enhancements to system and removing problems.

V. CONCLUSION AND FUTURE ENHANCEMENT

We create the concurrent frequent itemsets mining technique FiDoop using the MapReduce programming style. Building a method for automatic parallelization, load balancing, and data distribution for parallel mining of frequently occurring itemsets on massive clusters is the design objective of FiDoop. We condense the notation used throughout in order to simplify the presentation of FiDoop. FiDoop uses the FIU-tree concept rather than conventional FP trees in order to increase data storage efficiency and avoid creating conditional pattern bases. With an average improvement of 18%, FiDoop-DP greatly outperforms the current parallel frequent-pattern approach.

SCOPE FOR FUTURE ENHANCEMENT

The future enhancement is by developing a data partitioning approach called FiDoop-DP using the MapReduce programming model. The overarching goal of FiDoop-DP is to boost the performance of parallel Frequent Itemset Mining on Hadoop clusters. FiDoop-DP is conducive to reducing network and computing loads by the virtue of eliminating redundant transactions on Hadoop nodes.

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A MAXIMUM RESIDUAL ENERGY BASED MULTICAST PROTOCOL FOR LARGE-SCALE NETWORKS USING AN NOVEL APPROACH

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ABSTRACT- The prevalence of mobile devices has made routing issues extremely difficult. In situations where network topologies and data traffic may change quickly and unpredictably, this study focuses on power-aware routing. Assuming that no node is effectively maintaining any global information, we suggest a distributed method and its realization to maximize the minimal residual energy of all the nodes for each multicast. On demand, a transient multicast tree is built based on the independent choices made by intermediate nodes. We demonstrate that the generated tree is theoretically the best for maximizing the minimal residual energy and is loop-free. A number of simulations were used to test the suggested protocol's performance over Java, and the results are quite positive.

Keywords: TCP/IP, URL, HTTP, API, JDK, DDM

I. INTRODUCTION

With the popularity of mobile devices, routing becomes increasingly challenging because of the dynamic nature of network topologies and critical energy efficiency considerations. The problem is further complicated by the existence of a huge population of devices and the needs in good communication bandwidth utilization, such as the replacement of multiple unicasts with a multicast. Example applications are advertisement in shopping malls, tourist information distribution, taxi dispatching, and cooperative congestion monitoring.In the past decades, many excellent routing protocols have been proposed for mobile ad hoc networks. Each of them tried to optimize some routing and performance metrics for different application scenarios. Popular metrics include the propagation delay and the delivery ratio, where many studies target applications similar to multiplayer online gaming and teleconferencing. In order to save the network bandwidth, multicast protocols were also widely explored. Routing over mobile ad hoc networks is complicated by the considerations of energy efficiency, while the shortest paths are not favored in routing. In recent years, power-aware routing has received lots of attention and yielded a class of fundamental optimization problems over various routing metrics. Many excellent results were presented in the literature. One of the wellknown metrics under intensive study is Minimum-Energy Routing, which tries to minimize the total energy consumption in packet routing.Another popular direction for power-aware routing is based on Maximum-Lifetime Routing, where its problem instances are often formulated in terms of integer programming so as to maximize the first node failure (or network partition) time. However, most of the existing results rely on the knowledge of certain global information, such as the remaining energy of all nodes and/or the minimum transmission power between every pair of nodes. The maintenance problem of similar global information is highly challenging in protocol designs because of the

difficulty and cost in the maintenance of up-to-date information. As a result, various assumptions, such as static network topologies and/or fixed traffic patterns, are made to reduce the problem complexity in power-aware routing.

II. LITERATURE STUDY

System analysis will be performed to determine if it is flexible to design information based on policies and plans of organization and on user requirements and to eliminate the weakness of present system. This chapter discusses the existing system, proposed system and highlights of the system requirements.In the past decades, many excellent routing protocols have been proposed for mobile ad hoc networks. Each of them tried to optimize some routing andperformance metrics for different application scenarios. Popular metrics include the propagation delay and the delivery ratio, where many studies target applications similar to multiplayer online gaming and teleconferencing. In order to save the network bandwidth, multicast protocols were also widely explored. Among those excellent solutions, MAODV, ODMRP, and DDM are examples of the best ones and were submitted to the IETF MANET Working Group as candidates for standardization. MAODV discovers tree-based routes on demand using a broadcast route discovery mechanism. MAODV is sensitive to node mobility because it actively tracks and reacts to changes in routes so as to repair link breakages. ODMRP is a mesh-based protocol that provides alternative paths to adapt to topology changes. Control messages are flooded periodically to refresh group membership and update routes, and redundant routes are exploited for data delivery, which makes ODMRP scale not well with network sizes. In DDM, each source is responsible for the maintenance of each multicast group.The list of destinations is placed in packet headers for selfrouting over an underlying unicast protocol. DDM is meant for small multicast groups operating in dynamic networks of any size. Routing over mobile ad hoc networks is complicated by the considerations of energy efficiency, while the shortest paths are not favored in routing.

DRAWBACKS

However, most of the existing results rely on the knowledge of certain global information, such as the remaining energy of all nodes and/or the minimum transmission power between every pair of nodes.The maintenance problem of similar global information is highly challenging in protocol designs because of the difficulty and cost in the maintenance of up-to-date information.

III. DEVELOPMENT OF MAXIMUM RESIDUAL ENERGY BASED MULTICAST PROTOCOL FOR LARGE-SCALE NETWORKS USING AN NOVEL APPROACH

In this Paper, we are interested in Maximum-Residual Routing, where the minimum residual energy of nodes is maximized for each multicast. The objective is to prolong the first node failure time when network topologies and data traffic may change frequently in an unpredictable way. We first propose a distributed algorithm for Maximum-Residual Multicast and prove its optimality without the considerations of node movements and control overheads. When mobility and control message collisions are taken into consideration, it is shown that every derived route remains loop-free and converges toward an optimal solution in the maximization of the minimum residual energy. Based on the proposed algorithm, we then develop a source-initiated on-demand routing protocol, referred to as Maximum- Residual Multicast Protocol (MRMP), which is adaptable to network topologies and resources that may change over time. In MRMP, no periodic control message is employed to collect routing information or repair link breakages. Neither group membership nor neighbor relationship is maintained at a node by explicit control messages. When desiring a route, a source invokes a route discovery procedure over the network, and the individual decisions of intermediate nodes form a loop-free multicast tree naturally. For the performance evaluation, the protocol was implemented over simulations were conducted extensively with parameters set based on a realistic commercial wireless device. We have very encouraging results in essential performance metrics adopted generally for routing protocol evaluation.

BENEFITS

The proofs show that the route derived by MRMA is theoretically optimal. In reality, the optimality of derived routes may not hold due to the collisions of

control messages or the movements of nodes. Nevertheless, when mobility and collisions are taken into consideration, it can be assured that every route derived during MRMA remains loop-free and converges toward an optimal solution.

MODULE DESCRIPTION

1. Routes Discovery:

Route discovery begins with a broadcast of a request message (REQ) from the source to all of its neighbors with its maximum transmission power The data frame of an REQ contains the following fields: source ID; Destination ID ; packet size; number of packets; remaining energy; estimate The pair of the first two fields is used to identify the REQs employed for a specific session. packet_size and number of_packets, respectively, denote the number of bits in a data packet and the number of packets in the session. The last two fields are used to carry the values of the remaining energy and the estimate recorded in the associated entry.

2. Route Establishment

Route establishment is to let each node (if needed) inform its predecessor of the Adjust Ratio kept in its Route so that the predecessor will use a proper power level to transmit the session. Each destination or intermediate node sends exactly one reply message (RPY) to inform its predecessor. After sending each RPY from all other nodes. Source Decides the Maximum Residual Route from the received Routes. The best path is selected based on the route energy. The maximum residual energy path is selected as best data forwarding path.

3. Data Transfer

a) Encryption: Data Transfer in the concern path should be done in a secured way. So proper Encryption standard is used to encrypt the data and is passed from the source to destination via the best route.

b) Decryption: The data to the destination is transferred in the best route as an encrypted content. At the destination the data content is received and is Decrypted using the concern Decryption standard.

IV. RESULT AND DISCUSSION

The implementation phase focuses how the engineer attempts to develop the system. It also deals with how data are to be structured, how procedural details are to be implemented, how interfaces are characterized, how the design will be translated into programming and hoe the testing will be performed. The methods applied during the development phase will vary but three specific technical tasks should always occur.

- The software design,
- Code generation, Software testing

The system group has changed with responsibility to develop a new system to meet requirements and design and development of new information system. The source of these study facts is variety of users at all level throughout the organization.

Stage of Development of a System

- Feasibility assessment
- Requirement analysis
- External assessment
- Architectural design, Detailed design
- Coding, Debugging, Maintenance

Feasibility Assessment

In Feasibility this stage problem was defined. Criteria for choosing solution were developed, proposed possible solution, estimated costs and benefits of the system and recommended the course of action to be taken.

Requirement Analysis

During requirement analysis high-level requirement like the capabilities of the system must provide in order to solve a problem. Function requirements, performance requirements for the hardware specified during the initial planning were elaborated and made more specific in order to characterize features and the proposed system will incorporate.

External Design

External design of any software development involves conceiving, planning out and specifying the externally observable characteristic of the software product. These characteristics include user displays, report formats, external data source and data links and the functional characteristics.

Internal Design Architectural and Detailed Design

Internal design involved conceiving, planning out and specifying the internal structure and processing details in order to record the design decisions and to be able to indicate why certain alternations were chosen in preference to others. These phases also include elaboration of the test plans and provide blue prints of implementation, testing and maintenance

activities. The product of internal design is architectural structure specification. The work products of internal design are architectural structure specification, the details of the algorithm, data structure and test plan. In architectural design the conceptual view is refined.

Detailed Design

Detailed design involved specifying the algorithmic details concerned with data representation, interconnections among data structures and packaging of the software product. This phase emphasizes more on semantic issues and less synthetic details.

Coding

This phase involves actual programming, i.e, transacting detailed design into source code using appropriate programming language.

Debugging

This stage was related with removing errors from programs and making them completely error free.

Maintenance

During this stage the systems are loaded and put into use. They also get modified accordingly to the requirements of the user. These modifications included making enhancements to system and removing problems.

V. CONCLUSION AND FUTURE ENHANCEMENT

An energy-efficient routing protocol for secure data transmission in WBAN is suggested in this paper. By building a maximum benefit function that takes into account a number of different factors, including the residual energy, transmission efficiency, available bandwidth, and the hops to sink, the protocol dynamically chooses the next hop node with good state. Additionally, based on the importance of the data, it dynamically modifies the weights of each parameter. In addition to ensuring the effective and reliable routing transmission of various priority data, it can also balance the network's energy usage, enhance node energy utilization efficiency, and eventually extend the network's lifetime. In comparison to minimal hop-routing protocols and proposed multi-hop routing protocols, the proposed protocol performs well in terms of network performance, network longevity, energy efficiency, and reliable transmission of emergency data.

SCOPE FOR FUTURE ENHANCEMENT

From the perspective of future work, we plan to further optimize the parameter selection in the maximum benefit function to make it more reasonable and perfect. In addition, we will use a better algorithm or simulation to determine the specific value of the weight, and set reasonable weight values for different priority data to satisfy the QOS requirements of different data, thus achieving better network performance.

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A Study on Cloud Computing- Basic and Services

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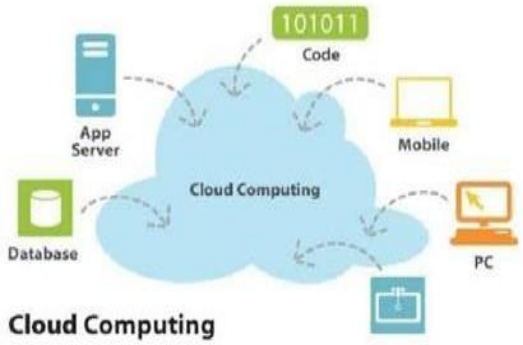
ABSTRACT- In short, cloud computing is "a model for enabling convenient, on- demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or services provider interaction." Cloud computing is a computing model of providing IT resources, such as application, infrastructure, and platform in the form of service by using Internet. Cloud Computing provides infrastructure for computing and processing of all types of data resources and adopted to deal with the large amounts of data.

Keywords: TCP/IP, URL, HTTP, API, JDK, DDM

I. INTRODUCTION

Cloud is a parallel and distributed computing system consisting of a collection of inter-connected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements (SLA) established through negotiation between the service provider and consumers. Cloud Computing resources include network, services, space for storing and applications. The term cloud computing is basically used to explain the center of data available on Internet for the users. It is a large network of powerful server which is used to provide services to the people. In today's era of cloud computing, it is totally based on Internet. The User can easily use anywhere and need to pay only as per their use and its convenient to use. The setup of cloud computing doesn't need any infrastructure. We are also aware that Cloud computing has become so popular as blogger are also using it. In most of scenario, most of tech companies is using cloud and, in survey, it made it clear that in upcoming years, cloud computing is going to be used more and more at large scale. In our daily life, we are also using cloud computing in the form of Gmail, iCloud, dropbox or Netflix or Mx-player, etc. Developing cloud is an efficient role for increment of business. Anyone with a suitable Internet connection and a standard browser can access a cloud application. User of the cloud only care about the service or information they are accessing - be it from their PCs, mobile devices, or anything else connected to the Internet - not about the underlying details of how the cloud works.



HISTORY

Cloud computing has a rich history that extends back to the 1960s, with the initial concepts of time-sharing becoming popularized via Remote Job Entry (RJE). The "data center" model, where users submitted jobs to operators to run on mainframes, was predominantly used during this era. The expression cloud computing became more widely known in 1996 when the Compaq Computer Corporation drew up a business plan for future computing and the Internet. The company's ambition was to supercharge sales with "cloud computing-enabled applications". The business plan foresaw that online consumer file storage would most likely by commercially successful. As a result, Compaq decided to sell server hardware to internet service providers.In the 2000s, the application of cloud computing began to take shape with the establishment of Amazon Web Services in 2002, which allowed developers to build applications independently. Other milestones during this decade include the introduction of the Amazon Simple

Storage Service, known as Amazon S3, and the Amazon Elastic Compute Cloud (EC2) in 2006, Google's release of the beta version of Google App Engine in 2008, and NASA's development of the first open-source software for deploying private and hybrid clouds the same year.The following decade saw the launch of various cloud services. In 2010, Microsoft launched Microsoft Azure, and Rackspace Hosting and NASA initiated an open-source cloud-software project, OpenStack. IBM introduced the IBM SmartCloud framework in 2011, and Oracle announced the Oracle Cloud in 2012. In December 2019, Amazon launched AWS Outposts, a service that extends AWS infrastructure, services, APIs, and tools to customer data centers, co-location spaces, or on-premises facilities.Since the global pandemic of 2020, cloud technology surged in popularity due to the level of data security it offers and the flexibility of working options it provides for all employees, notably remote workers.

Characteristics of Cloud Computing:

1. Cloud computing is user centric
2. Cloud computing is task-centric
3. Cloud computing is powerful
4. Cloud computing is accessible
5. Cloud computing is intelligent
6. Cloud computing is programmable

TYPES OF CLOUDS

Cloud computing have categorized in to following parts:

- Private cloud
- Public cloud
- Hybrid cloud
- Community cloud

Private cloud:

It is commonly called as corporate or internal cloud. Private cloud is essentially owned by one group or one people with high level firewall security. Private clouds are distributed systems that work on a private infrastructure and providing the users with dynamic provisioning of computing resources. Private cloud is basically preferred due to having some large workload with confidential documents, financial data and etc.

Public cloud:

It is an on-demand computing service managed by third party organizer and distributed or shared with so many organizations with the help of public internet. these services are available as pay-as-you- go billing mode. They offer solutions for minimizing IT infrastructure costs and act as a good option for handling peak loads on the local infrastructure. A public cloud is meant to serve multiple users, not a single customer.

Hybrid cloud:

Hybrid Clouds are a composition of two or more clouds (private, community or public) that remain unique entities but are bound together offering the advantages of multiple deployment models. Hybrid cloud is a heterogeneous distributed system resulted by combining facilities of public cloud and private cloud. Hybrid Cloud are also called heterogeneous clouds.

Community cloud:

A Community Cloud is designed to meet the needs of a community. Such communities involve people or organization that has shared interests. This includes industrial groups, research groups, standards groups, and so on. Community clouds are distributed systems created by integrating the services of different clouds to address the specific needs of an industry, a community, or a business sector.

CLOUD COMPUTING SERVICES

Cloud services provide a wide range of services delivered over Internet as per demand. Cloud services are completely maintained by Cloud computing service providers. They are directly provided to the customers so that they don't have the need of a company to host any applications. When a cloud computing is recognized, the development of cloud technology is based on requirements. Our own global cloud network consisting of more than 2,16,000 applications acceleration services in over 120 countries.

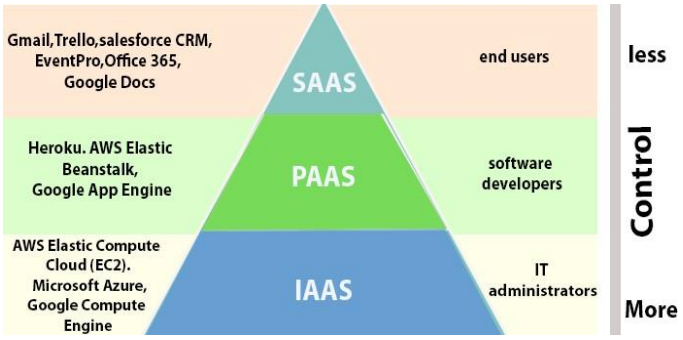
Generally, three most common and popularly known services are:

A. IaaS
B. PaaS
C. SaaS

IaaS: (Infrastructure-as-a-Service) IaaS is known as Infrastructure- as-a-Service. It is most common cloud computing model emerged in 2010. IaaS is a way of distributing Cloud Computing Infrastructure- Servers, Storage, Network and Operating Systems- as an on- demand Service. IaaS are online service, which provides us high level API for various low-level details of network. This service is the most common on demand service which was provided to the user for another outsourced platform. The entire services are being controlled by cloud itself and the resources will be shared to multiple users.

PaaS: (Platform-as-a-Service): PaaS is often called as Platform-as- a-Service. A computing platform that allow the designing of web applications quickly and easily without the complexity of buying and maintaining the software and infrastructure is defined as Platform as a Service. It is a user friendly and permit users to use Platform and deploy software or apps in cloud. It is a popular service for performing development and deployment. The Important thing in PaaS is that it's easily accessible anywhere through a web-browser.

SaaS: (Software-as-a-Service) SaaS is usually referred as Software-as-a-Service. This model has the feature which permit end- user to use computer as a service. In SaaS, the appliances which we run are going to be on cloud. User can access SaaS application on any device.



CHALLENGES AND OPPORTUNITIES OF CLOUD COMPUTING

Cloud Computing, an emergent technology, has placed many challenges in different aspect of data and information handling. Some of the are Security & Privacy, Portability, Interoperability, Reliability & Availability and Computing Performance. Some notable issues faced while using Cloud Computing are slow data migrations, security challenges in cloud computing, extensive troubleshooting, application downtime, migration agents, and cutover complexity.

Cloud Computing is a system of database and software, typically operated in data centers and warehouses. It enables users and businesses to access digital information over the internet from anywhere, rather than having physical servers in a network closet in a back office. There are a number of technological drivers that are affecting the way interaction design is currently evolving. Even more than artificial intelligence and virtual and augmented reality, cloud computing has become the new norm for information technology (IT) in all kinds of companies.

	Obstacle	Opportunity
1	Availability/Business Continuity	Use Multiple Cloud Providers
2	Data Lock-In	Standardize APIs; Compatible SW to enable Surge or Hybird Cloud Computing
3	Data Confidentiality and Auditability	Deploy Encryption, VLANs, Firewalls
4	Data Transfer Bottlenecks	FedExing Disks; Higher BW Switches
5	Performance Unpredictability	Improved VM Support; Flash Memory; Gang Schedule VMs
6	Scalable Storage	Invent Scalable Store
7	Bugs in Large Distributed Systems	Invent Debugger that relies on Distributed VMs
8	Scaling Quickly	Invent Auto-Scaler that relies on ML; Snapshots for Conservation
9	Reputation Fate Sharing	Offer reputation-guarding services like those for email
10	Software Licensing	Pay-for-use licenses

PROS AND CONS OF CLOUD COMPUTING

Advantages

- Lower-Cost Computers for Users
- Improved Performance
- Lower IT Infrastructure Costs
- Fewer Maintenance Issues
- Lower Software Costs
- Instant Software Updates
- Increased Computing Power
- Unlimited Storage Capacity
- Increased Data Safety
- Improved Compatibility Between Operating

Systems
- Improved Document Format Compatibility
- Easier Group Collaboration
- Universal Access to Documents
- Latest Version Availability
- Removes the Tether to Specific Devices

Dis-Advantages
- Requires a Constant Internet Connection
- Doesn't Work Well with Low-Speed Connections
- Can Be Slow
- Features Might Be Limited
- Stored Data Might Not Be Secure
- Problem will arise If Data loss occurs

CONCLUSION

Today cloud computing is top of mind with IT companies around the world. Cloud computing has the potential of offering enormous benefits for companies that use it for the deployment and scaling of IT for business processes. This paper concluded the Introduction part of Cloud computing, about its History and its Characteristics. In this paper, it is concluded that there are mainly three services provided:

1.) SaaS (Software-as-service)
2.) PaaS (Platform-as-service)
3.) IaaS (Infrastructure-as-service).

We have discussed that how all these services working, challenges & opportunities and Pros and Cons of Cloud Computing.

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Image Processing Technology in Agriculture

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Abstract- The development of agriculture in China has been substantially aided by the development of image processing technologies. It is simple for people to comprehend the significance of image processing technology for agricultural development by presenting the application status of image processing technology in agriculture and its impact on agricultural production value. This research examines how image processing technology is used in agriculture on the basis of that information. Firstly, this paper analyzes the application of image processing technology in agricultural field. Secondly, in order to highlight the application effect of image processing technology in agricultural field, this paper applies image processing technology and traditional machine recognition technology to crop pest detection, and analyzes their effects. The results showed that the recognition rate of the traditional machine recognition technology was 65%, 71%, 74%, 63%, 64% and 62% respectively. The results show that the recognition rate of this method is 86%, 89%, 91%, 83%, 78% and 79%, respectively. It can be seen that the detection method of image processing technology is better in the detection of crop diseases and insect pests.

Keywords: Image Processing Technology, Agricultural Field, Crop Pest Detection, Application Status

1. INTRODUCTION

Digital image processing technology was first applied in 1920. Since the introduction of batland's cable image transmission system, this technology has directly reduced the time of a picture transmitted from the Atlantic side from more than one week to three hours [1-2].

With the rapid development of computer, image processing technology has been further developed [3-4]. Image is an important source for human to obtain and exchange information. The application of image analysis and processing has gradually involved every aspect of human work and life. With the expansion of the scope of human activities and the endless emergence of scientific theories, the development of this technology is also advancing by leaps and bounds, and its application fields are constantly expanding, and its great achievements are also accumulating day by day [5-6].In the past, the efficiency of manual operation was very low and it was difficult to control the trend of crop growth [7]. In the process of crop growth, according to work experience, the staff found that observing the growth of crops can obtain the information of soil, water and air humidity, and improve the later work pertinently, so as to make the crops grow normally and improve the overall output value [8]. Image processing technology started late in the field of agriculture, but with the rapid development of science, digital image processing technology is also more applied to agriculture, such as pesticide detection of vegetables, pest control of crops, growth trend detection of crops, color classification of crops, etc., digital image processing technology plays an indispensable role [9-10]. Therefore, it is of great significance to analyze the application status of image processing technology in agricultural field for the development of agricultural introduce four kinds of image processing technology methods: image denoising, image correction, image segmentation and image feature extraction.

In addition, this paper analyzes the application status of image processing technology in agricultural field. In addition, in order to highlight the application effect of image processing technology in agricultural field, the image processing technology and traditional machine recognition technology are applied to crop pest detection respectively, and their effects are analyzed. The experimental results show that the detection method using image processing technology is better.

Image processing technology refers to the methods and means of image denoising, correction, segmentation, and feature extraction and so on.

Image Denoising

Due to the influence of equipment and external factors in the process of image acquisition and transmission, noise is introduced and the image signal is polluted. In image processing and analysis, denoising is a classic and basic problem. The common image noise includes salt and pepper noise and Gaussian white noise.

Assuming that the salt and pepper noise level is s, s ∈ [0,1], pixel α has a 1-s probability to keep its true color I (α) unchanged, and each s / 2 probability becomes the maximum value dmax or the minimum value dmin, and the mathematical expression is as follows (1):

$$d_{min}, s / 2$$

Image Correction

Image skew is mainly due to the deviation of scanning layout in the process of acquisition, and image skew correction is the process of recovering the image that does not conform to the standard before processing the image. In view of the different technology of each person, it is very common to have different effects of images in the process of image acquisition, especially the image tilt. For image skew, if there is no relevant tilt correction before processing, it will bring great interference to the final automatic recognition. Firstly, the image is analyzed and the degree of image skew is obtained. Then, according to the obtained tilt angle, the same angle is rotated in the original coordinate to realize the image correction. At present, there are projection method, nearest neighbor method, Hough transform, Radon transform and soon.

Image Segmentation

Image segmentation is an important problem in image analysis and one of the difficulties in image processing. At the same time, image segmentation is the first step in the process of image processing. After segmentation, the retention and display of image features have a profound impact on the subsequent image processing. It can be said that image segmentation will directly affect the results of image analysis and processing, and appropriate image segmentation will lay a good foundation for the final image processing.

Image Feature Extraction

In the process of image feature extraction, it is assumed that the pixel (x, y) in the image is integrated, and the sum of all pixels above the pixel is represented by sub integration system, then the calculation formula is as follows:

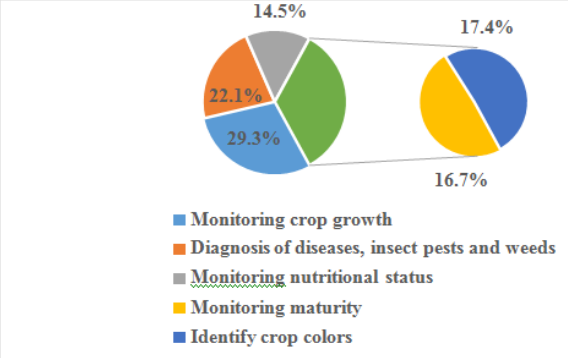


Figure 1. Proportion of application of image processing technology in various fields of Agriculture

2. Research Design

In order to highlight the application effect of image processing technology in agricultural field, this paper applies image processing technology and traditional machine recognition technology respectively to crop pest detection, and analyzes their effects.

Subjects

In this paper, two crops of the same size were selected as the experimental objects. The growth of crops in the two fields was similar, and they were in the same region, and other situations were also roughly the same.

Test Object

The purpose of this experiment is to detect the crop pests. In this paper, the pests and diseases were selected as the detection objects, including the bean leaf roller, the bean leaf borer, the flame noctuid, the blue gray butterfly, the bean gray butterfly and the alfalfa armyworm.

Detection Index

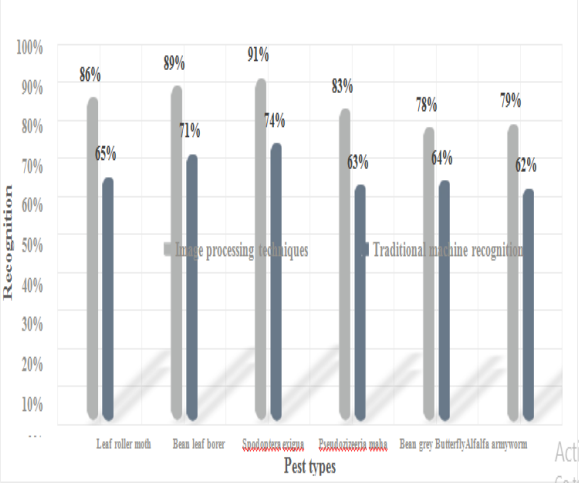
In this paper, the recognition degree of the two methods is taken as the detection index. The higher the recognition degree is, the better the detection effect is.

Application Analysis of Image Processing Technology in Agricultural Field

In this paper, the application of image processing technology in agricultural field is analyzed, and the results are shown in Table 1 and Figure 1.

Table 1. Application of image processing technology in agriculture

Application	Function analysis
Monitoring crop growth	Accurate judgment of crop growth state
Diagnosis of diseases, insect pests and weeds	Ensure the healthy growth of crops
Monitoring nutritional status	Replenish water and nutrition in time
Monitoring maturity	Improve production efficiency
Identify crop colors	Classification of crops



In order to study the application effect of image processing technology in agricultural field, the traditional machine recognition technology and image processing technology detection method are used to detect crop diseases and insect pests, and the application effect of the two methods is compared.

Image processing technology is widely used in agriculture. This paper analyzes the common applications of image processing technology in agriculture. According to Table 1 and Figure 1, the current application of image processing technology in agricultural field is mainly used to monitor crop growth, diagnose diseases and insect pests, monitor nutritional status, monitor maturity and identify crop color. Among them, 29.3% is used to monitor the growth of crops, which is mainly used to accurately judge the growth status of crops. The proportion of diagnosis of diseases, insect pests and weeds is 14.5%. It is used to supplement water and nutrition for crops in time. The proportion of application in monitoring crop maturity is 16.7%, and its application purpose is to improve theproduction efficiency of crops. 17.4% of the crop color was used for crop color recognition, and its application purpose was to classify crops. Next, this paper introduces this in detail.

Monitoring crop growth

Generally speaking, computer vision technology can be widely used in the whole process of plant growth, monitoring plant growth and development process, if abnormal conditions are found; it is helpful to solve the problem as quickly as possible. In the process of monitoring, the main objects are crop leaf thickness, rhizome length and water content, and the relevant data are recorded in detail. Combined with the final data, we can make a comprehensive judgment on the production of crops; combined with the images of crop fruits, we can check whether the fruits are mature, lack of nutrition and water at any time.

Diagnosis of diseases, insect pests and weeds In order to ensure the healthy growth of crops, in addition to providing the nutrients needed for their growth in time, it is also necessary to deal with the diseases, pests and weeds that affect the growth of crops. In the past, the low output value of agriculture has a lot to do with this aspect of work. With the emergence of image processing technology, its role has been continuously applied to agricultural work, which liberates the tedious statistical work of crops and greatly simplifies the work difficulty of personnel.

Through image processing to predict the problems that may exist in the early stage of crop growth, so that the staff can carry out preventive work.

3. Monitoring nutritional status

In the process of crop growth, real-time images of crop leaves and rhizomes can be collected by image processing technology, and the situation of crop leaf size and rhizome thickness can be monitored. Through the monitoring data, compared with the normal state of crop related data, in order to check whether there is lack of crop nutrition and other issues, in order to timely develop an effective remediation plan, ensure the normal growth of crops, provide sufficient water and nutrition.

In this paper, six kinds of diseases and insect pests were selected as the detection objects, namely, the bean leaf roller, the bean leaf borer, the flame armyworm, the blue gray butterfly, the bean gray butterfly and the alfalfa armyworm. It can be seen from Table 2 and Figure 2 that the recognition degree of the two different detection methods in the detection of crop diseases and insect pests has certain differences. Among them, the recognition rate of the traditional machine recognition technology is 65%, 71%, 74%, 63%, 64% and 62% respectively. In addition, the recognition rate of this method was 86%, 89%, 91%,83%, 78% and 79%, respectively. From the recognition data of the two detection methods, the detection method using image processing technology can detect diseases and pests more effectively.

4. Conclusions

In order to achieve the modernization of agriculture level, digital image processing technology is widely applied in all facets of agriculture. Despite a late start, the use of image processing technologies in Chinese agriculture still produced positive outcomes. In this essay, the use of image processing technology in agriculture was examined, and its effects were researched. This study demonstrates the primary applications of image processing technology in agriculture, which are as follows: monitoring crop growth, diagnosing diseases and insect pests, diagnosing diseases and insect pests, monitoring maturity and recognizing crop color.

In addition, the application of image processing technology in the field of agriculture has achieved good results, which promotes the development of agriculture.

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An Ingenious strategy for Credit card Fraud detection

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Abstract- The identification of credit card fraud is the most common problem in the modern day. The growth of e-commerce platforms and online transactions is to blame for this. Credit card fraud typically takes place when a card is stolen and used for any unauthorized activity, or even when a fraudster uses the card's information for his own gain. In the present world, there are numerous credit card problems. To spot fraudulent behavior, credit card fraud detection technology was developed. This project's main area of interest is machine learning algorithms. Both the Random Forest and Adaboost algorithms are used. The results of the two algorithms are based on many criteria such as F1-score, accuracy, precision, recall, and more. On the basis of the confusion matrix, the ROC curve is plotted. Comparing the Random Forest and Adaboost algorithms, the method with the highest accuracy, precision, recall, and F1-score is regarded as the ideal approach for use in fraud detection.

Keywords - ROC curve, Random Forest, Adaboost, and illegal use of credit cards.

I. INTRODUCTION

With increasing fraud in government agencies, businesses, the financial sector, and many other institutions, credit card fraud is a growing threat in the modern world. The current world's dependency on the internet is what's causing an increase in credit card fraud transactions, but it's not just online purchases that have gone up. The results of using data mining techniques[6] to identify these credit card scams are not very precise.

The only way to reduce these losses is to identify the fraud with the help of effective algorithms, which is a promising strategy for less credit card frauds. The financing corporation issues a credit card in response to the rising internet usage[Figure1]. We can borrow the money if we have a credit card. Any of the uses for the money are acceptable. When it comes to the card's issuance,the requirement is that the cardholder repay both the original amount borrowed and any additional fees they agreed to pay.

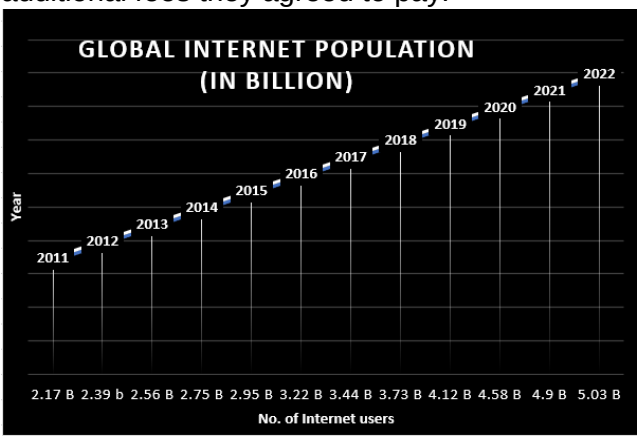


Fig.1 Growth of Internet users

When someone else uses your credit card without your permission in your place, it is referred to as credit card fraud. Without taking the original physical card, fraudsters can carry out any illicit transactions by stealing the PIN or account information from the credit card. We could determine whether the new transactions are genuine or fraudulent using the credit card fraud detection. The card, such as a credit card

or debit card, may be used in the fraud that is performed.

In this instance, the card itself serves as a source of fraud in the transaction. To gain products without paying money or to obtain an unlawful fund may be the motivation behind the crime. Fraudsters often choose to target credit cards. The reason is that a lot of money can be made quickly without incurring many risks, and even a crime may not be discovered for several weeks Given how frequently people use the internet today, there may be many opportunities for fraudsters to use credit cards fraudulently. The majority of fraud cases that are now active are on e-commerce websites. People are increasingly interested in buying products online these days rather than travelling to a store to do so. As a result, the number of e-commerce sites is growing, which increases the risk of credit card fraud. Therefore, in order to prevent such credit cardfrauds, we must identify the optimal method for doing so.

II. RELATED WORK

Both machine learning [1][2] and deep learning[7] techniques are used in the research on credit card fraud detection. In this section, we build on the work that was done at two distinct points: The strategies that are available to handle the imbalanced data, as well as I the procedures that are easily accessible for fraud detection.Unbalanced data' s can be handled using a variety of ways. They are (a) classification techniques, (b) sampling techniques, and (c) techniques-like procedures. Support vector machine (SVM), decision trees, logistic regression, gradient boosting, K-nearest neighbour, etc. are a few machine learning methods used for detecting credit fraud.A variety of techniques[10] for credit card fraud detection have been studied in 2019 by Yashvi Jain, Namrata Tiwari, Shripriya Dubey, and Sarika Jain. These techniques include support vector machines (SVM), artificial neural networks (ANN), Bayesian networks, hidden markov models, K-Nearest Neighbors (KNN) fuzzy logic systems, and decision trees. They note in their research that the SVM, decision trees, and k-nearest neighbour algorithms provide medium accuracy.

Out of all the techniques, fuzzy logic and logistic regression have the lowest accuracy. A high detention rate is provided by neural networks, naïve bayes, fuzzy systems, and KNN. At the medium level, the Logistic Regression, SVM, and decision trees provide a high detection rate. The Nave Bayesian Networks and ANN are two algorithms that outperform each other across the board. Training these is highly expensive. There is a significant flaw in each algorithm. The disadvantage is that these algorithms don't produce the same outcome in all kinds of settings. With one sort of dataset, they perform better and with another, they perform poorly.

Class imbalances as well as other problems including concept drift and verification latency has been addressed by Andrea et al. Additionally, they disclosed the most crucial output matrix that can be utilised to detect credit card fraud. A systematic model and an efficient learning technique are also included in the work achievement to address the processes of "verification delay" and "warning and feedback." Additionally, they stated that, based on their research, the accuracy of the warnings was the most crucial element [13].In order to identify credit card fraud with higher accuracy rates, Chee et al. used twelve standard models and hybrid approaches that make use of AdaBoost and majority voting techniques [16]. Both data from the real world and model data were used to measure them. The advantages and disadvantages of the methods were described and assessed. The Matthews Correlation Coefficient Metric was used as the output metric (MCC). Noise was added to the data to test the algorithms' resilience. Additionally, they have demonstrated that the increased noise had no impact on the outcome of the majority vote. The investigation was conducted in an extremely unbalanced with the exception of precision, paper data [14] demonstrate that KNN shows exceptional sensitivity, specificity, and MCC efficiency.

In research [15], costs associated with fraud detection and a lack of adaptability were cited as obstacles. The price of fraud and the price of prevention should be considered when establishing a programme. When the algorithm is exposed to various fraud types and routine transactions, it is unable to adapt. It is critical to understand the performance metric because effectiveness will vary depending on the problem's specifications and description [16].

III. PROPOSED WORK

This paper's primary goal is to use algorithms like the Random Forest and Adaboost algorithms to categorise the transactions in the dataset that have both fraud and non-fraud transactions.

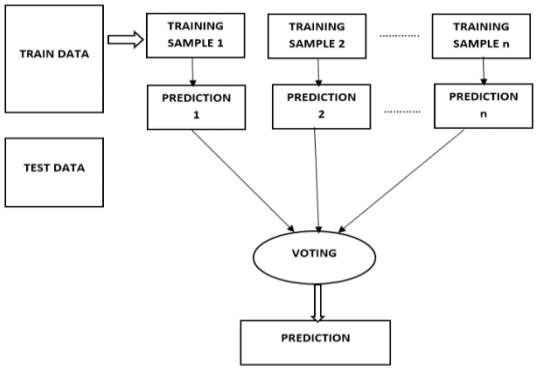
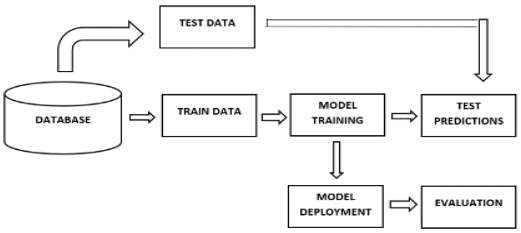


Figure 2. Process Flow

The algorithm that best detects credit card fraud transactions is then chosen by comparing the performance of the two algorithms. The data splitting, model training, model deployment, and evaluation criteria are all included in the process flow for the credit fraud detection problem shown in Figure 2.

A. RANDOM FOREST ALGORITHM

One of the popular algorithms for supervised learning is Random Forest [Figure 3]. Both classification and regression can be accomplished with this. But categorization issues are the main use for this technique. A forest is typically made up of trees, and the Random Forest method constructs decision trees on the sample data and extracts predictions from each of the sample data in a similar manner. In that case, the Random Forest algorithm is an ensemble approach. Because this technique averages the results, it decreases over-fitting



compared to single decision trees.

Figure 3. Random Forest Algorithm

Steps for Random Forest Algorithm

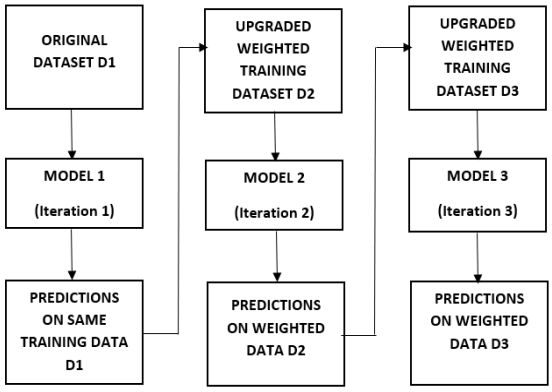
1. Choose some sample data at random from the trained Kaggle credit card fraud dataset.
2. The Decision Trees that are used to categorise the cases into fraud and non-fraud cases are now formed using the sample data that was generated at random.
3. The Decision Trees are created by separating the nodes; the root node is the node with the most information gained, and it categorises fraud situations from non-fraud instances.
4. After the majority vote, the decision trees may produce a value of 0, indicating that these are not fraud situations.
5. In the end, we determine the F1 score, recall, accuracy, and precision for both fraud and non-fraud cases.

B. ADABOOST ALGORITHM

One of the ensemble strategies is boosting. By using weaker classifiers as a starting point, this algorithm creates stronger classifiers. This can be accomplished by employing a weak model in the series to build a strong model. A model is initially created using the training data. By fixing the faults that the first model represented, the second model is then constructed from the first model. Iteratively, this process is carried out until the maximum number of models are added or the entire training dataset is accurately predicted. One of the most effective boosting algorithms created for the binary classification was called Adaboost.

Adaboost is short for adaptive boosting. When teaching weak learners, it works best. The many weak classifiers are combined into a strong classifier using the Adaboost boosting approach [Figure 4]. Short decision trees can be employed with the Adaboost algorithm. The way the Adaboost is built is in such a way that after the nodes and the tree have been made, each instance's performance of the tree is examined. A weight is also given. More importance is placed on the training data that is challenging to forecast. The Adaboost algorithm is a potent classifier that performs admirably on both straightforward and challenging issues. This algorithm's main drawback is that it is highly sensitive to noisy data.

Figure 4. Adaboost Algorithm



STEPS FOR ADABOOST ALGORITHM

1. The credit card fraud dataset from Kaggle is used to train. Pick a few samples of the data at random.
2. Sequentially develop decision trees for identifying fraud and non-fraud instances using the sample data generated at random.
3. The start formation of the decision trees. This can be achieved by classifying the fraud and non-fraud situations and separating the node based on which has the largest information gain.
4. Next, determine the error rate, performance, and updated weights for the transactions that were mistakenly labelled as fraud and non-fraud.
5. After performing a majority vote, the decision trees may produce an output that identifies nonfraud situations.
6. The decision trees may produce 1, which signifies that the case involves fraud.
7. Lastly, we determine the F1-score, recall, accuracy, and precision for both fraud and non-fraud situations.

IV. EVALUATION AND RESULT ANALYSIS

A. DATASET

The dataset, which contains information on credit card fraud, was obtained from a European credit card provider. The Kaggle website provided the dataset. The information contains all of the transactions that cardholders made in September of 2013. The two-day transactions are included in the dataset. There are 492 fraudulent transactions among the 284,807 total transactions in the data set. Only 0.172% of all transactions are comprised of these fraudulent transactions. The PCA transformation turns the input variable-containing dataset into numerical values. For purposes of confidentiality, this is done. Time and amount are not PCA transformable features. The number of seconds that have passed between the current transaction and the initial transaction is represented by the class "Time." The money transaction is represented by the class "Amount." Class, another crucial aspect, indicates whether or not the transaction is fake. A fraud transaction is indicated by the number 1 and a non-fraud transaction by the number 0.

B. EVALUATION CRITERIA

We must analyse parameters like accuracy, precision, recall, and F1-score in order to compare different methods. There is also a graphic of the confusion matrix. A 2*2 matrix makes up the confusion matrix. There are four outputs in the matrix: TPR, TNR, FPR, and FNR. From the confusion matrix, metrics like sensitivity, specificity, accuracy, and error rate can be calculated. Then, we can anticipate what will work best to uncover credit card fraud.

1. True Positive Rate, or the number of fraudulent transactions that the system even flags as fraudulent, is the result of the confusion matrix.
2. True Negative Rate, which is the proportion of valid transactions that the system even recognises as such.

3. False Positive Rate, which is the percentage of legal transactions that are incorrectly labelled as fraud.
4. Transactions that are fraudulent but are mistakenly categorised as legal are known as false negative rates.

C. RESULT ANALYSIS

For both techniques, the ROC curve and the confusion matrix are presented. The dataset produces various results when used with various methods. First, we use the dataset for the random forest model. The outcomes are as follows.

```
Accuracy = 0.9990743400683073
              precision    recall  f1-score   support

           0  0.99938202 0.99969091 0.99953644     93825
           1  0.78195489 0.64197531 0.70508475       162
```

Figure 5. Output for Random Forest

The evaluation criteria are described in Figure 5. The precision, recall, and F1-score are the same for cases of non-fraud and different for situations of fraud.

```
Confusion Matrix on train data
[[190464    120]
 [    26    210]]
Confusion Matrix on test data
[[93811    65]
 [   14    97]]
```

Figure 6. Confusion Matrix for Random Forest

According to the confusion matrix [Figure 6], there are 190490 true positives and 0 false positives for the train data, whereas there are 330 false negatives. In the test data, there were 93818 true positives, 37 false positives, 7 true negatives, and 125 false negatives. At this time, the Adaboost algorithm is being used with the dataset. The outcomes are produced in a manner that is comparable to the Random Forest Algorithm.

```
Confusion Matrix on train data
[[190490      0]
 [     0    330]]

Confusion Matrix on test data
[[93818    37]
 [    7   125]]
```

Figure 7. Output for Adaboost

According to the evaluation standards [Figure 7], the F1-score, recall, and other evaluation metrics differ substantially in fraud cases, but only little in non-fraud cases.

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00     93825
           1       0.95      0.77      0.85       162

    accuracy                           1.00     93987
```

Figure 8. Confusion Matrix for Adaboost

According to the confusion matrix [Figure 8], there are 190464 true positives and 120 false positives for the train data, while there are only 26 true negatives and 201 false negatives. In the test data, there were 93811 true positives, 65 false positives, 14 true negatives, and 97 false negatives.

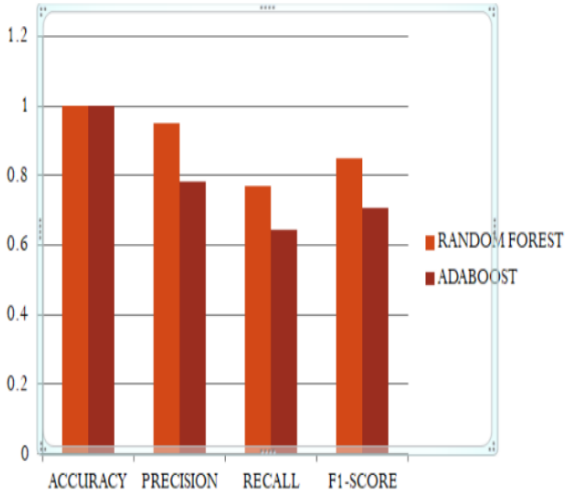


Figure 9. Comparison of Algorithms

Now, [Figure9] compares the random forest with the adaboost algorithms. Although the precision, recall, and F1-score of the two algorithms are different, they have the same accuracy. The algorithms using random forests have the best precision, recall, and F1-score.

V. CONCLUSION

Although there are many ways to detect fraud, it cannot be argued that this particular algorithm detects fraud totally. Our research leads us to the conclusion that the accuracy of the Random Forest and the Adaboost is comparable. The Random Forest algorithm surpasses the Adaboost algorithm when precision, recall, and the F1-score are considered. As a result, we infer that the Random Forest approach is more effective at detecting credit card fraud than the Adaboost approach.

FUTURE WORK

It is evident from the data above that a variety of machine learning techniques are applied to identify fraud, however we can see that the outcomes are unsatisfactory. Therefore, in order to accurately detect credit card fraud, we would like to employ deep learning techniques.

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Smart Healthcare Monitoring System Based on Internet of Things

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***Abstract* - Internet of Things in healthcare is the key performer for providing better medical facilities to the patients and assists the doctors and hospitals as well. The proposed system consists of various medical devices such as sensors and web based or mobile based applications which communicate via network connected devices which helps to monitor and record patients' health oriented data and medical information. The outcome ofthe proposed paper is to build a system to provide world-class medical aid to the patients in the remotest areas with no hospitals. In their areas, by connecting the internet and grasping information about their health status via the wearable devices provided in the kit. To record the patient's heart rate, blood pressure using a raspberry pi microcontroller. The system would be very smart to intimate the patient's family members and their doctor about the patient's current health status and full medical information in case any medical emergency arises. The collected information can be used to analyze and predict chronic disorders or other diseases such as heart attacks in preliminary stage. The data mining techniques will provide the approach for decision making.**

Keywords: Internet of Things, IoT in Healthcare, Patient Monitoring, Raspberry Pi, Smart Health Monitoring.

1. INTRODUCTION

The Internet of things is the inter-connection of devices, apps, sensors and network connectivity. That enhances these entities to gather and exchange data. The quality of Internet of Things in the healthcare system is the constant monitoring a patient through checking various parameters and infers a good result from the history of such constant monitoring. Many such devices equipped with medical sensors are present in the ICUs now-a-days. There could be instances where the doctor couldn't be alerted in time when there is an emergency, despite of 24 hours of monitoring. There might be hurdles in sharing the data and information with the specialist doctors and the concerned family members and relatives.

This paper demonstrates a Remote Health Monitoring System which is controlled by Raspberry pi. Raspberry Pi is a small payment card-sized single-board microcontroller.

In this paper, a system is designed to constantly monitor the essential parameters such as heart rate, blood pressure and body temperature. This information is stored on a cloud server database and can be displayed through an online website or mobile application by authorized personnel only.

The main objective of this system is to update the data through online and send an alert to the doctors for any abnormality and also predict if the patient having any disease. The former is accomplished by using MySQL db module to link Raspberry pi to the database whereas the latter is achieved by the combination of Raspberry Pi and GSM module and the web interface.

The Objectives of the paper can be summarized as following:

- Obtain the real-time medical information about apatient via IoT.
- Process and classify the information about the patient.
- To interpret and predict any disease or disorder in the preliminary stage itself using the data mining techniques which will provide the better approach for decision making.
- To provide Internet of Things based healthcare solutions at anytime and anywhere.

2. RELATED WORK

A number of researchers have proposed various models for IoT in Healthcare and the prediction of various types of diseases using various techniques. This part focuses on the work done in the same area.

Ahn et al. [1] implemented a system for measuring the physiological signals in sitting position such as ECG and BCG by using a smart chair that senses the non-constrained bio-signals. That can be monitored using a monitoring system.

Almotiri et al. [2] proposed a system of m-health which uses mobile devices to collect real-time data from patients in and store it on network servers connected to internet. Enable theaccess by certain specific clients.

This data is used for the medical diagnosis of patients and is achieved by using a number of wearable devices and body sensor network.

Barger et al. [3] made a smart house facility using a sensor network to monitor and track the movements of the patient. The primary objective is to check if their system is capable to outsmart the behavioral patterns.

Chiuchisan et al. [4] proposed a framework to prevent the threats to patient in smart ICUs. The proposed system intimates the patient's relatives and doctors about any inconsistency in their health status and also about the atmosphere of the room, so that the necessary precautionary measures can be taken.

Dwivedi et al. [5] developed a framework in order to secure the clinical information has to be transmitted over the internet. Electronic Patient Record (EPR) systems are a multi-layered healthcare information system framework. which is a combination of Public Key Infrastructure, Smartcard and Biometrics technologies.

Gupta et al. [6] proposed a model which measures and records ECG and other essential health parameters. Raspberry Pi is a immense use for the hospitals and patients as well as their family members.

Gupta et al. [7] present an approach using Intel Galeleo development board. That collects the various data from doctors and uploads it to the database. The system checks patients health parameters.

Lopes et al. [8] proposed a framework based on IoT for the disabled people. This IoT technologies in healthcare segment can be benefitted them.

Nagavelli and Rao [9] proposed a novel method to predict the severity of the sickness from the patient's medical record using mining based statistical approach.

Sahoo et al. [10] studied the healthcare management system. The large amount of patient data is generated from various reports. They further analyzed the health parameters to predict the future health conditions of the patient and they use a cloud based big data analytic platform to achieve the same using the means of probability. System Architecture is shown in fig 1.

SYSTEM ARCHITECTURE

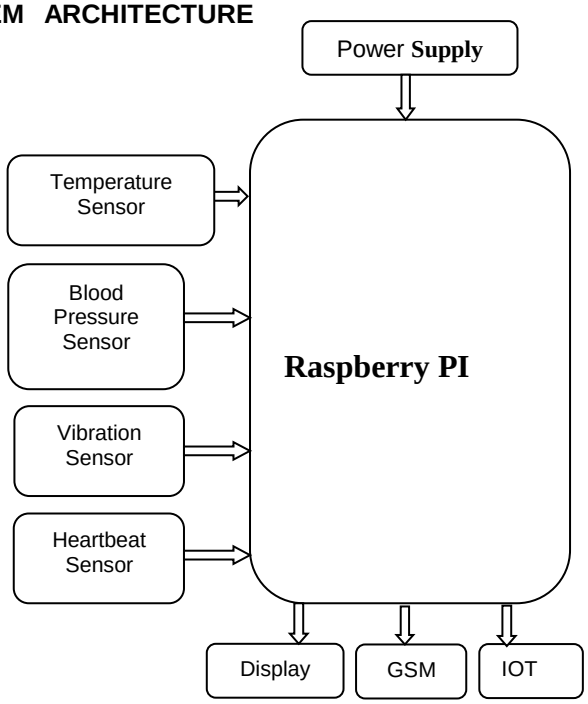

Figure 1. System Architecture

3. PROPOSED METHODOLOGY

In this paper, propose an automatic system to monitor patient's body temperature, heart rate, body movements and blood pressure. Further, extend the existing system to predict if the patient is suffering from any chronic disorder or disease using the a variety of health parameter and various other symptoms that are obtained by the system.

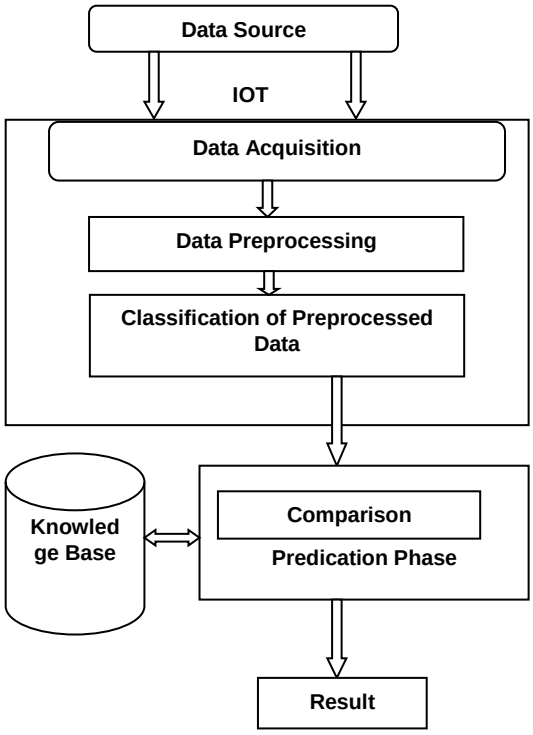

Figure 2. Proposed Methodology

The above figure depicts how to retrieve the information about patient health status by monitoring various parameters. It uses the same information to predict if the patient is suffering from any kind of chronic disorder or other such disease.

In level-1, unprocessed data from various IoT devices is obtained and stored on the server. These devices include various sensors such as temperature sensor, vibration sensor, BP sensor and pulse sensor. Since some of the sensors give analog output which cannot be used by raspberry pi. So, first convert the analog values into digital form using convertor IC. Write the code in python that reads the values from the sensors and update them into the database at regular intervals.

In level-2, the relevant information is obtained as a result from the data stored by filtering, classifying and categorizing it. This information is the patient's real-time health data and symptoms that the patient has. This information will be further used in the next level to predict if the patient is suffering from any kind of disease. This helps to make the system smart and efficient.

In level-3 the analysis/predication phase, use the data mining techniques to predict the type and nature of the disease or the disorders for which the system was designed. Using artificial intelligence can further improvise the system by making it smarter. Hence, can infer the disease or disorder by using the existing knowledge base and categorize the result in various categories such as Ideal, Normal, and with Symptoms etc.

4. PROPOSED SYSTEM MODULES

a. Health Monitoring Section
b. Emergency Alert Section
c. Health Status Prediction System
d.

a. Health Monitoring Section

This module comprises of the hardware components of the system that makes it IoT enabled and is used to record the health parameters of the patient using various sensors. Here, Raspberry pi acts as a central server to which all the sensors are connected through the GPIO pins or using MCP3008 analog-to-digital convertor if their output is in the analog form as raspberry pi works only on digital signals. The pi reads the real-time values and updates them to MySQL database which is then used to display them on the web interface.

b. Emergency Alert Section

This module particularly deals with the steps to be taken after an abnormality is detected in the health of patient. Set up certain threshold values in the program, if it crossed will trigger an alert in the form of email/SMS to the patients family/doctor. The various values used are:

Table 1: Threshold Values

Component	Normal Range
Blood Pressure	80-120 mm Hg
Body Temperature	36.1-37.2C
Heart Rate	60-100 beats/min

c. Health Status Prediction System

This is one of the most important modules of the system. In this module, the patients' health data is recorded by system along with any symptoms. It is done by asking a few simple questions and compare it with the existing knowledge base to predict if any disease/disorder.

5. IMPLEMENTATION

In the proposed system, patient's body temperature, heart rate, body movements and blood pressure reading results that are being monitored by the system. The various sensors are placed on the patient's body and they take the readings and send the corresponding signal to the raspberry pi. The Raspberry Pi is a credit card-sized single-board computer that operates on Linux OS. Here, various sensors are used to measure the patient's body temperature, heart rate, Blood Pressure and their respective results are sent to the database via Raspberry Pi and can be monitored from anywhere worldwide through the internet facilitated via GSM module. The programming in Raspberry Pi is done in python language and it sends the data related to the patients' health to the server connected via Internet. The details can be easily accessed online by proper authentication and health status of the patient can be monitored.

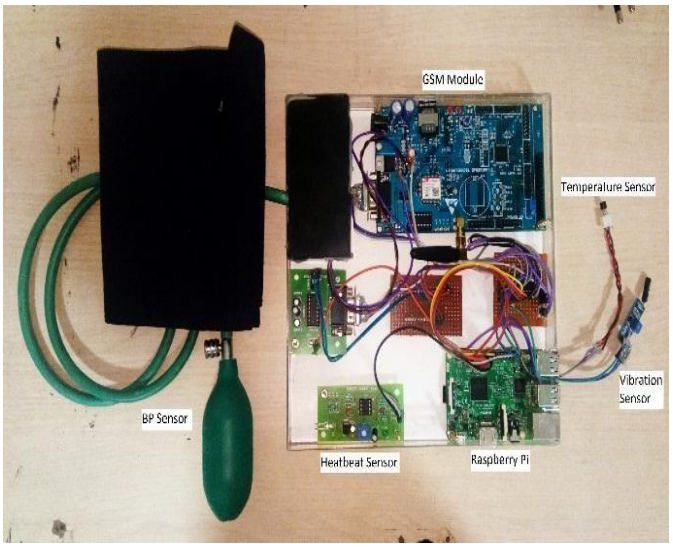

Fig. 3. Experimental Setup

The various Components to be used in system are:

A. Raspberry Pi

The Raspberry Pi is a bank card size microcontroller with the features of a small pc. It is extremely popular for development purposes because it offers the entire Linux server and peripheral device connectivity on a single chip. It is very cost-effective. The GPIO pins available on the board are used for the input/output purpose and can be programmed as per the need. The Raspberry Pi and IoT together prove to be a pioneer innovation technology in healthcare system.

B. Temperature Sensor

For measuring the temperature, LM35 sensor has been used. Which is an IC sensor used to measure the temperature with the help of the analog output. The LM35 is an IC temperature sensor with an output voltage which is proportional to the Celsius temperature.

Fig. 4. Raspberry Pi & Temperature Sensor

A. Heartbeat Sensor

The heart rate is measured using a pair of LED and LDR and a microcontroller and it works on the fundamentals of optoelectronics. The infrared radiation is emitted by IR led and the infrared light is reflected by the surface. The intensity of radiation generated electron-hole pair which in turn produces leakage current. This current thus generated is sent through a resistor to obtain the proportional voltage.

Fig. 5. Heartbeat Sensor

Thus, the greater is the intensity of the incident ray, the larger value of voltage flowing across resistor will be obtained. The heart rate is measured by placing the tip of forefinger upon the sensor. Once the circuit senses the pulse, an LED will start blinking along with your pulse. The output is sentto a circuit or a micro-controller to measure the heart beatrate in BPM.

B. Vibration Sensor

The vibration sensor used to senses the shaking of the surrounding and here, to monitor whether the patient is shivering so that proper aid can be given.

Fig.6. Vibration Sensor

The two contacts of sensor don't touch each other. Any external force, these two contacts touch each other and when the force is removed the sensor terminals separate. The on-board blue LED visually indicates communication online and activation.

C. BP Sensor

For measuring the blood pressure, used a manual blood pressure monitor instead of a digital one as it is cheaper. It is commonly known as a sphygmomanometer and the kit consists of an arm cuff, a squeeze bulb to inflate the cuff, stethoscope and a sensor to read the pressure. Blood pressure is measured by air pressure sensor. The readings are in the form of electrical signals. These readings are also converted to digital form to be read by the Raspberry Pi.

Fig. 7. BP Sensor

D. MCP3008

The MCP3008 is a low cost 8-channel 10-bit analog to digital converter. This chip is a great option if one needs to read simple analog signals, like from a temperature or light sensor.

Fig. 8. MCP3008

E. GSM Module

The GSM module used in this paper is GPRS/GSM Quad band Module (SIM900) which offers GPRS connection to proposed system, and includes the SIM900 communication module from SIMCom. This module can accept any type of sim card having its own unique number. The same can be used to send messages, make calls or create sockets to provideinternet connectivity.

The data from the above sensors is constantly updated in MySQL database which is linked to the web UI using the python code. The

patient can log in and monitor their health status at any time. The system is made smart to trigger a SMS/Email alert via the proper gateways which assure an efficient delivery of the message. Also, the values from these sensor in combination with various other symptoms which are asked from user based on initial diagnosis is used to predict the disease. Using the data mining technique through the programming logic and is displayed as a result of analysis along with the details of a doctor for the disease in their area.

6. RESULT

The result of Health Monitoring system is of extreme use to patients and doctors as well. The patient can check their health status anytime from the comfort of their homes. This can be done by using the proposed system whose result are brought in online and can be seen from anywhere around the world. Since it is a prototype model, the proposed system shows the real time values of various health parameters and emulates how the same can be implemented in the real world. The doctors can also use the log of the patient body condition to study and determine the effect of medicine. The smart prediction module predicts the disease of the patient. By asking them for various symptoms based on the previous symptom. The final conclusion is made after at least 3-4 symptoms are identified. The result is most accurate if more and more symptoms are identified.

7. CONCLUSION AND FUTURE WORK

In this paper, an automatic system that guarantees a constant monitoring of various health parameters and prediction of any kind of disease or disorder that prevents the patient from the pain of paying frequent visits to the hospitals. The proposed system can be set-up in the hospitals and massive amount of data can be obtained and stored in the online database. Even the results can be made to be accessed from mobile through an application.

The system can be further improved further by adding artificial intelligence system components to facilitate the doctors and the patients. The data, consisting medical history of many patients' parameters and corresponding results, can be explored using data mining, in search of consistent patterns and systematic relationships in the disease. For instance, if a patient's health parameters are changing in the same pattern as those of a previous patient in the database, the consequences can also be estimated. If the similar patterns are found repeatedly, it would be easier for the doctors and medical researchers to find a remedy for the problem.

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PARTIAL DIFFERENTIAL EQUATIONS APPLICATION IN MEDICAL FIELD FOR BLOOD PRESSURE AND VELOCITY

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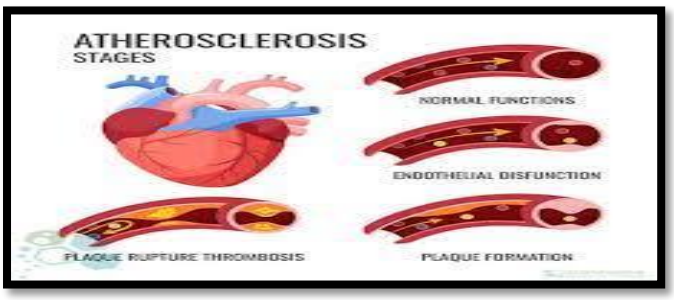
Abstract - Arteriosclerosis means hardening of the arteries and usually affects all human as part of the aging process. Atherosclerosis, in which fatty deposits (plages) develop in the walls of medium-sized large arteries, is the most common type of arteriosclerosis. Numerous factors, including high blood pressure, diabetes and high levels of cholesterol in the blood, may contribute to this development. Hemodynamic aspects such as disturbed blood flow, low wall shear rate and wall stear stress. Characteristics of blood flow play a critical role in the development and progression of disease. Modeling of arterial wave propagation broaders our knowledge about the function of the cardiovascular system, provided a mean to diagnose disorders and predicts the outcome for medical treatments. In this study, we will focus on the physical and mathematical modelling of pulse wave propagation based on fluid principles.[1]

Keywords: **B**lood, biological, blood flow.

1. INTRODUCTION

Biomechanics is one of the primogenitor in the field of cardiovascular to provide effective forecast and treatments. In Biomechanics, the study of bio-fluid mechanics is essential due to its capability of modelling biological occurrence. In this Study we are analysing mathematical models of blood flows in the arteries in order to establish the relevance pertinent and application of biomechanics in biological systems. Especially, we glance the relationship between fat and blood flow in stenosis arteries.[1]



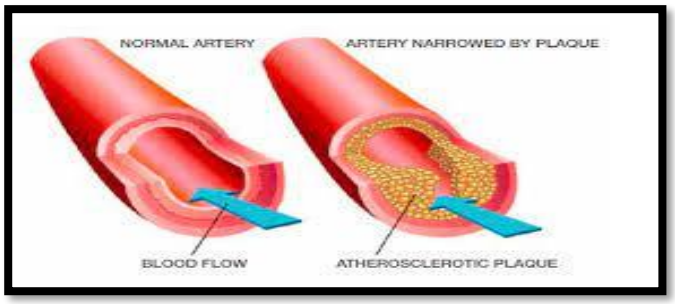


Fig:1 Over view of a normal artery and a discussed artery, fatty deposit will cause blood clot

2. PARTIAL DIFFERENTIAL EQUATIONS OF BLOOD PRESSURE AND VELOCITY

Consider a portion of the artery or capillary with cross – sectional area, the blood flows from position y to y+dy, dy being the small change in the position for a linear flow. Applying the principles of the conservation of momentam and conservation of mass to recover the Euler's Continuity Equation[1].

Conservation of mass for an incompressible fluid:

$$\frac{\partial A}{\partial t} + \frac{\partial (Av)}{\partial x} = 0 \qquad (1)$$

Conservation of momentum:

$$A\,\frac{\partial v}{\partial t} + Av\frac{\partial v}{\partial x} = -\frac{1}{\rho}\frac{\partial}{\partial x}[(p-p_e)A] \qquad (2)$$

Combining (1) and (2), we yield the following system of equation:

$$v\frac{\partial A}{\partial z} + S\frac{\partial V}{\partial z} + \frac{\partial A}{\partial t} = 0$$

$$\frac{\partial v}{\partial t} + v\frac{\partial v}{\partial z} = -\frac{1}{\rho}\frac{\partial p}{\partial z} \qquad (3)$$

A = cross sectional area of the tube;
v= velocity;
p = pressure inside the artery or capillary

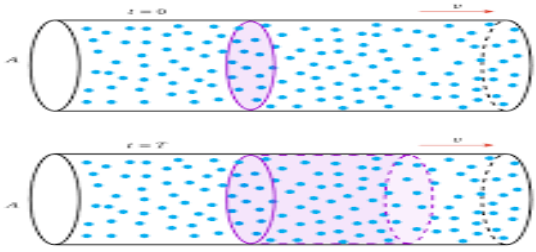


Fig:2 Portion of artery with blood flow between position 'y' and position 'y+dy' cause blood clot

After a series of mathematical computations, we obtain the wave equation.

The main systems of equations for the flow of blood through artery or capillary are below:

$$\left.\begin{aligned}\frac{\partial^2 v}{\partial t^2} &= C_0^2 \frac{\partial^2 v}{\partial x^2}\\ \frac{\partial^2 p}{\partial t^2} &= C_0^2 \frac{\partial^2 p}{\partial x^2}\end{aligned}\right\} \quad \text{and} \quad \text{where } c^2 = \frac{A}{\rho}\frac{\partial A}{\partial t}$$

The above two equations represent wave equations for velocity and pressure in blood flow.[1]

3.BERNOULLI'S EQUATION

Considering the arteries as pipes of varying cross section with blow-flowing as a fluid, [1] we can compute Bernoulli's equation and relate the pressure of blood to it's speed and elevation. The pipes are not necessarily uniform Bernoulli's equation for blood flow can be written

$$P + \frac{1}{2}\rho v^2 + \rho gh = \text{constant}$$

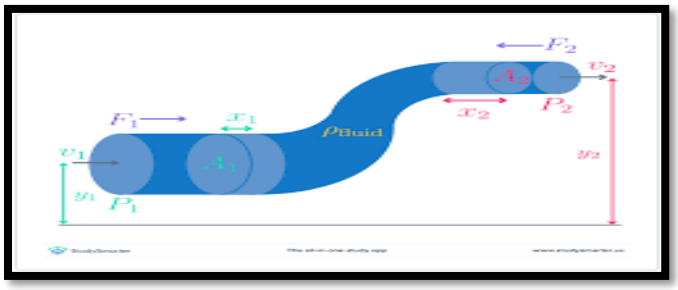


Fig:3 Blood flow through a pipe with varying cross sections

Where p is the pressure, v is the blood velocity, ρ is the density of blood and ε is elevation.

$$\varepsilon = \varepsilon(t); \quad \varepsilon = \varepsilon(x)$$
$$v = v(t); \quad v = v(x)$$
$$p = p(t); p = p(x)$$

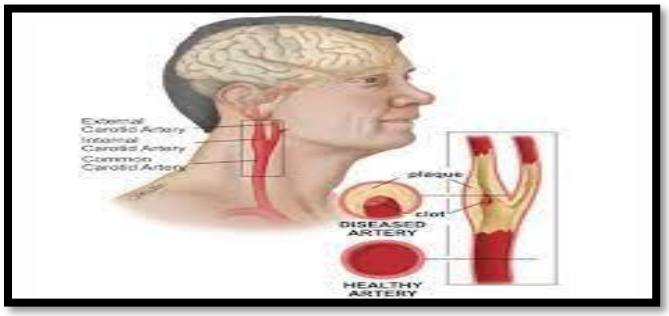


Fig.4 The Schematic representation of normal and abnormal carotid

Taking the first partial derivative of Bernoulli's equation with respect to t:

$$\frac{\partial p}{\partial t} + \rho v \frac{\partial v}{\partial t} + \rho\, g \frac{\partial \varepsilon}{\partial t} = 0 \qquad (6)$$

Taking the second derivative of Bernoulli's equation with respect to t:

$$\frac{\partial^2 p}{\partial t^2} + \rho \frac{\partial}{\partial t}\left(v \frac{\partial v}{\partial t}\right) + \rho g \frac{\partial^2 \varepsilon}{\partial t^2} = 0 \qquad (7)$$

For an ideal case of a constant velocity,

i.e $v = constant$ in time regardless of the pressure

$$\frac{\partial v}{\partial t} = 0 \text{ and } \frac{\partial^2 v}{\partial t^2} = 0$$

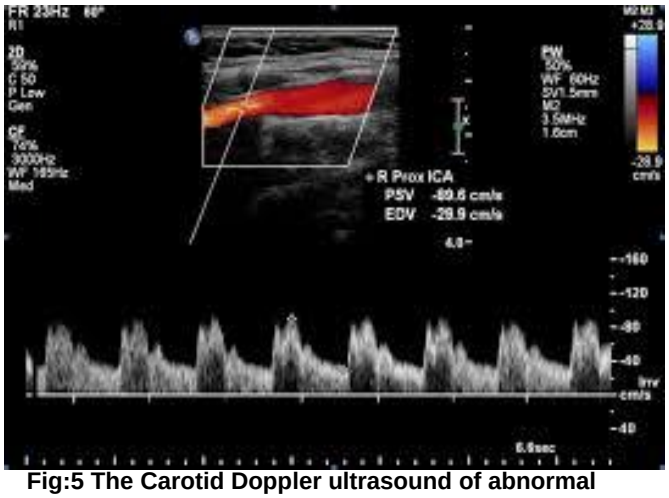


Fig:5 The Carotid Doppler ultrasound of abnormal carotid artery

Moreover, the velocity is a linear function of time. From these we obtain,

$$v = \alpha t$$
$$\Rightarrow \frac{\partial v}{\partial t} = \alpha = \text{constant}$$

From (7),

$$\Rightarrow \frac{\partial^2 p}{\partial t^2} + \rho \frac{\partial}{\partial t}(\alpha t.\alpha) + \rho \frac{v}{t}\frac{\partial^2 \varepsilon}{\partial t^2} = 0$$
$$\Rightarrow \frac{\partial^2 p}{\partial t^2} + \rho\, \alpha^2 + \rho \frac{v}{t}\frac{\partial^2 \varepsilon}{\partial t^2} = 0$$
$$\Rightarrow \frac{\partial^2 p}{\partial t^2} + \rho\, \alpha^2 + \rho \frac{v}{t}\frac{\partial^2 \varepsilon}{\partial t^2} = 0$$
$$\Rightarrow \frac{\partial^2 p}{\partial t^2} + \rho \frac{v}{t}\frac{\partial^2 \varepsilon}{\partial t^2} = -\rho\, \alpha^2$$
$$\Rightarrow \frac{\partial^2}{\partial t^2}\left(p + \rho \frac{v}{t}\varepsilon\right) = -\rho\, \alpha^2$$
$$\Rightarrow \frac{\partial^2}{\partial t^2}(p + \rho g \varepsilon) = -\rho\, \alpha^2$$

On integrating, we have

$$\Rightarrow \frac{\partial v}{\partial t}(p + \rho g \varepsilon) = -\rho\, \alpha^2 t + \gamma$$
$$\Rightarrow (p + \rho g \varepsilon) = -\rho\, \alpha^2 \frac{t^2}{2} + \gamma t + \beta \qquad (8)$$

At t=0, the equation (8) becomes,

$$p_0 + \rho g \varepsilon_0 = \beta$$
$$\Rightarrow \Delta p + \rho g \Delta h) = -\rho\, \alpha^2 \frac{t^2}{2} + \gamma t$$

If v varies like a sine wave,

$$V = A \sin(\omega t + \emptyset)$$
$$\frac{\partial v}{\partial t} = A\omega \cos(\omega t + \emptyset)$$
$$\frac{\partial^2 v}{\partial t^2} = -\omega^2 v$$

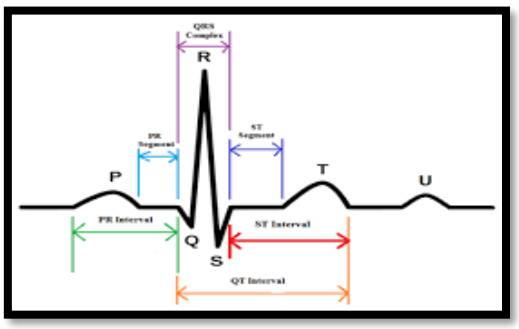


Fig. 6. The schematic representation of a cardioelectrogram (ECG)

In fig.6, we have a basic ECG where P wave, QRS complex, and T wave are at their normal positions. If we have any deviations from these positions, the patient has a high risk of getting any cardiovascular disorders. In fig. 4, we have the illustration of carotoid arteries. As the part of aging process and unhealthy diet, the plague builds up on the wall of carotid arteries. It restrict the movement of blood fluid and lead to many complications later. In fig.5, we have a depiction of Doppler ultrasound for pre-heart attack patients. The accumulated plague is denoted with the blood color in the Doppler ultrasound.[1]

4.CONCLUSION

Finally we conclude arteriosclerosis means hardening of the arteries and usually affects all human as part of the aging process. The numerous factors, including high blood pressure, diabetes and high levels of cholesterol in the blood, may contribute to this development. Hemodynamic aspects such as disturbed blood flow, low wall shear rate and wall stear stress is compared with other techniques.

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SECURING DATA STORAGE IN CLOUD COMPUTING

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Abstract - Demand services to its clients are provided by Cloud computing. Data storage is one of the primary services provided by cloud computing. Cloud service provider hosts the data of data owner on their server. The user can access their data from these servers. Consider data, owners and servers are different identities, the paradigm of data storage brings up many security challenges. An independent mechanism required to make sure that data is correctly hosted in to the cloud storage server. In this paper, discuss the different techniques that are used for data storage security on cloud.

Keywords: Cloud computing, Data storage, Cloud storage server.

1. INTRODUCTION

Cloud computing is the combination of many pre-existing technologies that have matured at different rates and in different contexts. The goal of cloud computing is to allow users to take benefit from all these technologies. Many organizations are moving into cloud because it allows the usersto store their data on clouds and can access at anytime from anywhere. Data breaching is possible in cloud environment, since data from various users and business organizations lie together in cloud. By sending the data to the cloud, the data owners transfer the control of their data to a third person that may raise security problems. Sometimes the Cloud Service Provider (CSP) itself will use/corrupt the data illegally.

Security and privacy stands as major obstacle on cloud computing i.e. preserving confidentiality, integrity and availability of data. A simple solution is to encrypt the data before uploading it onto the cloud. This approach ensures that the data are not visible to external users and cloud administrators but has the limitation that plain text based searching algorithm are not applicable. In this paper, to discuss the security flaws in data storage and themechanisms to overcome it.

2. CLOUD STORAGE

Cloud storage is one of the primary use of cloud computing. Define cloud storage as storage of the data online in the cloud.

A cloud storage system is considered as a distributed data centres, which typically use cloud-computing technologies and offers some kind of interface for storing and accessing data. When storing data on cloud, it appears as if the data is stored in a particular place with specific name.

There are four main types of cloud storage:

A. Personal Cloud Storage:

It is also known as mobile cloud storage. In this type storage, individual's data is stored in the cloud, and he/she may access the data from anywhere.

B. Public Cloud Storage:

In Public cloud storage the enterprise and storage service provider are separate and there aren't any cloud resources stored in the enterprise's data centre. The cloud storage provider fully manages the enterprise's public cloud storage.

C. Private Cloud Storage:

In Private Cloud Storage the enterprise and cloud storage provider are integrated in the enterprise's data centre.

In private cloud storage, the storage provider has infrastructure in the enterprise's data centre that is typically managed by the storage provider. Private cloud storage helps resolve the potential forsecurity and performance concerns while still offering the advantages of cloud storage.

D. Hybrid Cloud Storage:

It is a combination of public and private cloud storage where some critical data resides in the enterprise's private cloud while other data is stored and accessible from a public cloud storage provider.

3. CHARACTERISTICS OF CLOUD COMPUTING

There are five characteristics of cloud computing.

A. On-demand self-service :

The first one is on-demand self-service, where a consumer of services is provided the needed resources without human intervention and interaction with cloud provider.

B. Broad network access :

The second characteristic is broad network access, which means resources can be accessed from anywhere through a standard mechanism by thin or thick client platforms such mobile phone, laptop, and desktop computer.

C. Resource pooling :

Resource pooling is another characteristic, which means the resources are pooled in order for multi- tenants to share the resources. In the multi-tenant model, resources are assigned dynamically to a consumer and after the consumer finishes it, it can be assigned to another one to respond to high resource demand.

Even if the resources are assigned to customers on demand, they do not know the location of these assigned resources. Sometimes they know the location at a high-level abstraction, such as country, state, and data centre. Storage, processing, memory and network are the kind of resources that are assigned.

D. Rapid elasticity :

Rapid elasticity is another characteristic, which means that resources are dynamically increased when needed and decreased when there is no need.

E. Measured service :

Also, one of characteristics that a consumer needs is measured service in order to know how much is consumed.

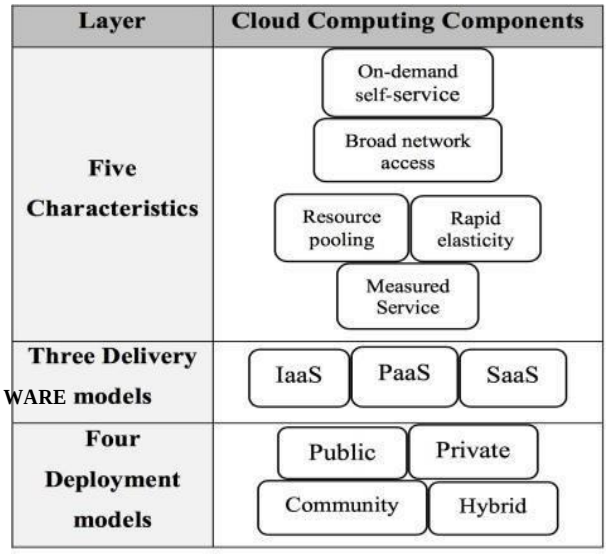

Fig. 1. Cloud Environment Architecture

4. ENCRYPTED DATA STORAGE FOR CLOUD

Since data in the cloud is placed anywhere, it is important that the data be encrypted. Using the secure co-processor as part of the cloud infrastructure to enable efficient encrypted storage of sensitive data. By embedding a secure co-processor (SCP) into the cloud infrastructure, the system can handle encrypted data efficiently. Partsof the proposed instrument in Fig 2.

Basically, SCP is tamper-resistant hardware capable of limited general-purpose computation. For example, IBM 4758 CryptographicCoprocessor (IBM) is a single-board computer consisting of a CPU, memory and special-purpose cryptographic hardware contained in a tamper- resistant shell, certified to level 4 under FIPS PUB 140-1. When installed on the server,

it is capable ofperforming local computations that are completely hidden from the server. If tampering is detected, then the secure co-processor clears the internal memory.

Since the secure coprocessor is tamper-resistant, one could be tempted to run the entire sensitive data storage server on the secure coprocessor. Pushing the entire data storage functionality into a secure co-processor is not feasible due to many reasons.

First of all, due to thetamper-resistant shell, secure co-processors have usually limited memory (only a few megabytes of RAM and a few kilobytes of non-volatile memory) and computational power [Smith, 1999]. Performance will improve over time, but problems such as heat dissipation/power use (which must be controlled to avoid disclosing processing) will force a gap between general purposes and secure computing.

Another issue is that the software running on the SCP must be totally trusted and verified. This security requirement implies that the software running on the SCP should be kept as simple as possible.

To encrypt the sensitive data sets using the randomprivate keys. Be able to alleviate the risk of key disclosure and to use tamper-resistant hardware to store some of the encryption/decryption keys (i.e., a master key that encrypts all other keys).

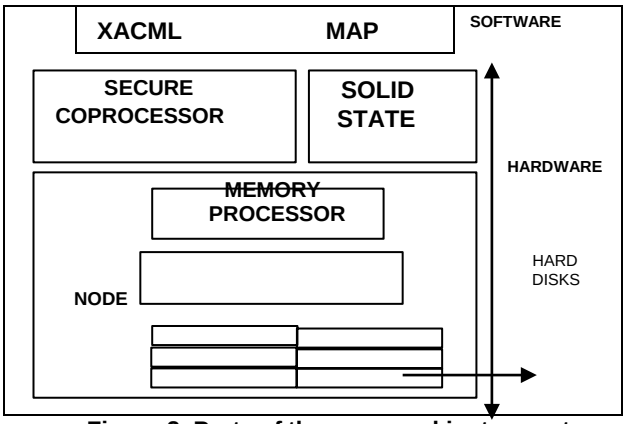

Figure 2. Parts of the proposed instrument

5. SECURITY AND PRIVACY ISSUESIN DATA STORAGE

Cloud Computing allows the users to store their data on the storage location maintained by a third party. Once the data is uploaded into the cloud the user loses its control over the data and the data can be tampered by the attackers.

The attacker may be an internal(CSP) or external. Unauthorized access is also a common practice due to weak access control. The protection of information arises the following challenges:

The security and privacy issues related to data storage are confidentiality, integrity and availability.

A. Confidentiality

The major dispute in cloud computing is confidentiality. Data confidentiality means accessing the data only by authorized users and is strongly related to authentication.

In another way confidentiality means keeping users data secret in the cloud systems. As we are storing the data on a remote server and transferring the control over the data to the provider here arises the questions such as:

For ensuring confidentiality, cryptographic encryption algorithms and strong authentication mechanisms can be used. Encryption is the process of converting the data into a form called cipher text that can be understood only by the authorized users.

Encryption is an efficient technique for protecting the data but have the obstacle that data will be lost once the encryption key is stealed algorithms. Blowfish is a fat and simple encryption algorithm. The above encryption techniques have the limitation that for searching the data from the file, the entire file has to be decrypted.

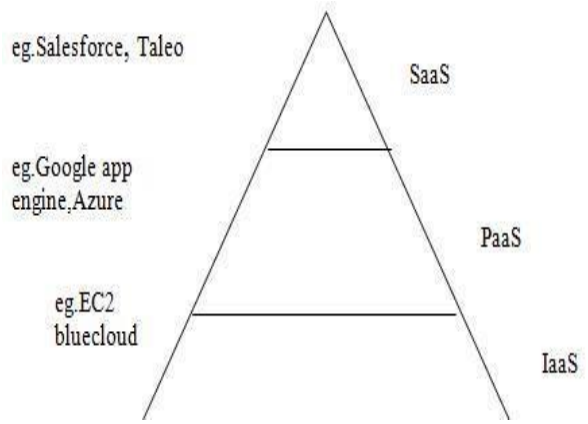

Figure 3. Symmetric encryption

It is a time consuming process and thus searchable encryption was introduced. Searchable encryption allows build an index for the file containing the keywords and is encrypted and stored along with the file, so that while searching the data only the keywords are decrypted rather than the entire file and search is made on it.

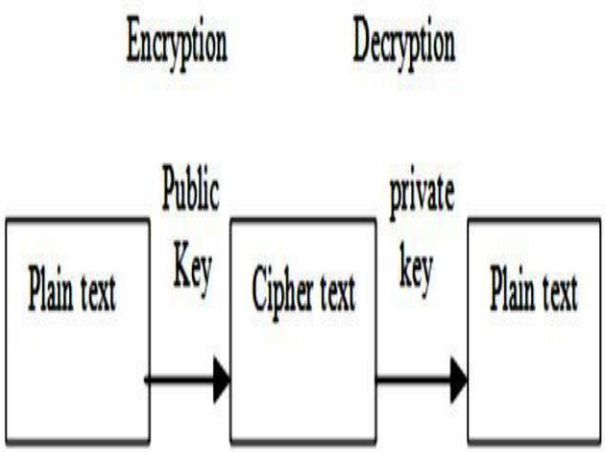

Figure 4. Asymmetric encryption

B. Integrity

Another serious problem faced by cloud computing is integrity. Integrity of data means to make sure that the data has not been changed by anunauthorized person or in an unauthorized way.

It is a method for ensuring that the data is real, accurate and safeguarded from unauthorized users. As cloud computing supports resource sharing, there is a possibility of data being corrupted by unauthorized users. Digital Signatures can be used for preserving the integrity of data. The simple way for providing integrity is using Message Authentication Code(MAC).

C. Availability

Availability refers to being available and accessible to authorized users on demand.

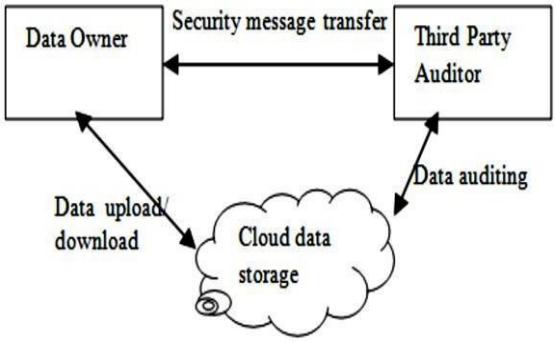

Fig. 5. Remote auditing mechanism

6. CONCLUSION

Cloud computing enable the users to store their data in remote storage location. But data security is the major threat in cloud computing. Due to this many organizations are not willing to move into cloud environment. To overcome this, confidentiality, integrity, availability should be encapsulated in a CSP's Service-Level Agreement (SLA) to its customers. Otherwise ensure that any sensitive information is not put into a public cloud and if any it is to be stored in encrypted form. Effective auditing mechanisms also can be used for providing data integrity.

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Concealed Weapon Detection by Image Processing

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Abstract- The improvement of public safety, including the security of public assets like airports and buildings, is hampered by the identification of weapons concealed beneath a person's clothing. In places with controlled entry, such as airports, the entrances to sensitive facilities, and public events, manual screening processes for spotting concealed weapons, such as handguns, knives, and explosives, are prevalent. When it is unable to direct the flow of individuals through a planned procedure, it is occasionally useful to be able to spot concealed weapons from a standoff distance. The United States' Air Force Research Laboratory was in charge of the concealed weapon detection (CWD) program, which was launched in 1995 to solve this issue. It was sponsored by the National Institute of Justice. The ultimate objective is the deployment of automatic concealed weapon detection and recognition. It is a technological challenge that calls for cutting-edge image processing and sensor technology. The issue also poses difficulties on a legal level. To view objects under people's clothing, a variety of sensors based on various phenomenologies are being developed, together with image processing support.

Keyword: Image Processing, digitizer, CWD

I. INTRODUCTION

A representation of real scene refers to a two dimensional light intensity in F(x, y) where x, y, denote spatial coordinates and value of F at any point is proportional to brightness of image at that point. Digital image are made up of hundreds or thousands of millions of tiny squares called picture elements or just called pixels.Digital Image Processing refers to processing of digital images through digital computer.

It is the field in which various techniques as per requirements are used in processing a given digital image to obtain better visualization. These methods are chiefly meant for

1) Improvement of pictorial information for human interpretation and analysis and
2) Processing of scene data for autonomous machine perception. Elements of a digital image processing system must be able to divide an image into picture elements, address each individually, measure gray level of image at each pixel, quantize and store.

The system which process digital image must have two pieces of special input/output equipment an image digitizer and an image display device. Since computers work with numerical data rather than pictorial data an image must be converted to numerical form before processing. This is called Digitization.

ELEMENTS OF A DIGITAL IMAGE PROCESSING SYSTEM

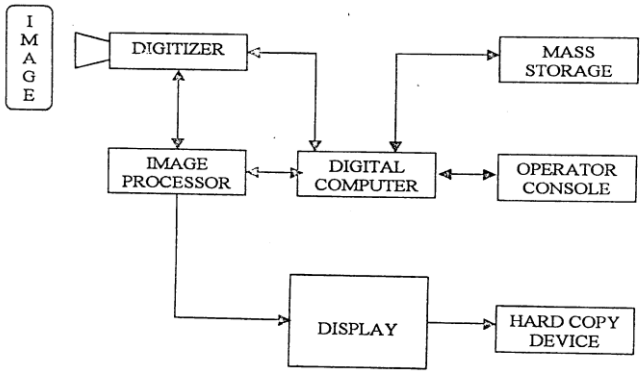

Figure 1.Elements of a digital image processing system

Image processor is heart of any image processing system. An image processor consists of a set of hardware modules that performs four basic functions. A digitizer converts an image into a numerical representation suitable for input into digital computer. Digital computers with virtual addressing capability make disc peripheral storage available to user as if it were main memory. This is of critical importance because digital images utilize large amounts of memory during processing. General storage devices are Magnetic discs, Magnetic tapes and optical discs. Monochrome and color television monitors are the principal display devices used in modern image processing systems. One of the applications of image processing is concealed weapon detection which is a essential technology. Consider the image processing architecture for concealed weapon detection.

Concealed Weapon Detection

In this architecture the input can be multisensor (MMW+IE, MMW+EO, MMW+IR+EO) or only MMW data the output can take several forms it can be as simple as a processed image / video sequence.

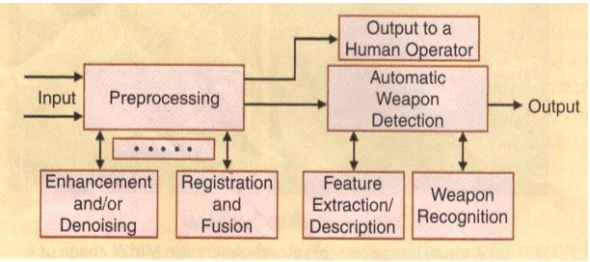

Figure 2.Image Processing Architecture for CWD

2. FUNCTION OF IMAGE SENSORS

As said digital image is composed of pixels, ′a′ sensor focuses light on to pixels and intakes the reflected amount of light from each pixel that is stores these charge. Then the charges digitized and converted into numbers. These numbers are used for analyzing the image. This is known as charge coupled device. Later developments are made imaging systems developed for CWD applications are active and require certain forms of illumination. Proximity is also a essential fact as it is required in some applications.

3.PASSIVE MILLIMETER WAVE IMAGING SENSORS

Passive millimeter wave (MMW) sensors measure the apparent temperature through the energy that is emitted or reflected by sources. The output of the sensors is a function of the emissivity of the objects in the MMW spectrum as measured by the receiver. Clothing penetration for concealed weapon detection is made possible by MMW sensors due to the low emissivity and high reflectivity of objects like metallic guns. In early 1995, the MMW data were obtained by means of scans using a single detector that took up to 90 minutes to generate one image. Figure shows a visual image of a person wearing a heavy sweater that conceals two guns made with metal and ceramics. The radiometric image clearly shows both firearms. This system collects up to 30 frames of MMW data. Figure (a) and (b) shows the visible and second-generation MMW image of an individual hiding a gun underneath his jacket. It is clear from detection purposes; the quality of the video sequence must be improved.

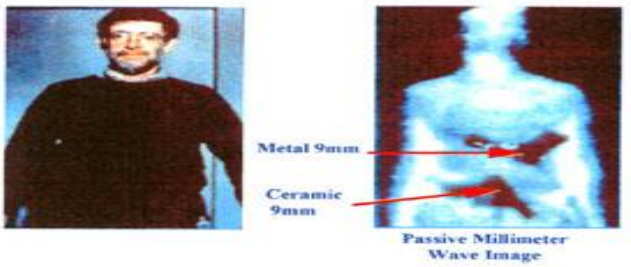

Figure 3. Visible and second-generation MMW image

4.CWD THROUGH IMAGE FUSION

By fusing passive MMW image optical (EO) image, more complete information can be obtained; the information can then be utilized to facilitate concealed weapon detection. On addition fusion of an EO image and its corresponding MMW image may facilitate reorganization of a concealed weapon by locating the human subjects hiding the object. This demonstrates the benefit of image fusion for the CWD application, which integrates complementary information from multiple types of sensors.

Figure 4.a) Image (Visual), b) Image (MMW), c) Fused Image

Figure (a) shows an image taken from a regular CCD camera and figure (b) shows a corresponding MMW image if these two images are provided alone it is difficult to recognize the weapon concealed underneath person clothing. If a fused image is presented, a human operation is able to respond with higher accuracy.

5.IMAGE FUSION

Image fusion is to take the average of the source images last this can produce undesirable results such as a decreasing contrast the advanced image fusion methods involve multi resolution image decomposition based on wavelet transform.

6.PREPROCESSING

Before an image or video sequence is presented to a human observer for operator assisted weapon detection or fed into an automatic weapon detection algorithm, it is desirable to preprocess the images or video data to maximize their exploitation. The preprocessing steps included in this section are enhancement and filtering for the removal of shows, wrinkles, and other artifacts.

Enhancement and Denoising

Denoising of video sequences can be achieved temporarily or spatially. First, temporal denoising is achieved by motion compensated filtering, which estimated the motion trajectory of each pixel and then conducts a 1-0 filtering along the trajectory. This reduces the blurring effect that occurs when temporal filtering is performed without regard to object motion between frames for additional denoising and object enhancement, the technique employs a wavelet transform method that is based on multiscale edge representation computed by wavelet transform which provides more flexibility and selectivity with less blurring.

A denoised and enhanced image is reconstructed from the modified edges by the inverse wavelet transform. The frame was then specially denoised and enhanced by the wavelet transform method.

Clutter Filtering

It is used to remove unwanted details such as shadows, wrinkles, imaging artic rafts etc. that are not needed in the final image for human observation and can adversely affect the performance of the automatic recognition state. For the purpose morphological filters gave been employed.

Processing Toward Automatic Weapon Detection

After processing the image/video scanners can be displayed for operator assisted weapon detection are fed into weapon detection. Towards this aim several steps are required, including object extraction, shape description and weapon recognition.

Object Extraction

It is an important step towards automatic recognition of a weapon regardless of the image fusion step involvement. Segmentation procedure is applied successively to MMW video signals for CWD applications.

Shape Description

The task of shape description is to depict the extracted shapes effectively to facilitate the recognition stage that follows. In general, it is not known how the shapes appear in the observed frame. They could be rotated with an angle and / or scaled in size and / or shifted in position. Therefore, the algorithms to be considered should be rotation, scale and translation invariant. Shape descriptors based on computers, Fourier descriptors and moments are capable of being invariant to an objects translation, scale, and rotation and have been used for concealed weapon detection applications.

Compactness

A dimensionless measure of shape compactness or circularity, c is defined as $C = P^2 / A$. Where, P is the length of the region perimeter and A is the area of the region. Compactness provides a measure of contour complexity versus area enclosed.

In addition, it measures how circular or elongated the object is A shape with rough contour including several incursion with have a high value of C, including low compactness. This quantity is independent of rotation, scale and translation.

Edge Detection

Edge detection is a general name for a class of routines and techniques that operate on an image and result in a line drawing of the image. The lines represented changes in values such as cross sections of planes, intersections of planes, textures, lines, and colors, as well as differences in shading and textures. Some techniques are mathematically oriented, some are heuristic, and some are descriptive. All generally operate on the differences black and white the gray levels of pixels or group of pixels through marks or thresholds. The final result is a line drawing or similar representation that requires much less memory to be stored, is much simpler to be processed, and saves in computation and storage costs. Edge detection is also necessary in subsequent process, scene as segmentation and object recognition. Without edge detection, it may be impossible to find overlapping parts, to calculate features such as a diameter and an area of to determine parts by region growing.

Thresholding

Thresholding is the process of dividing an image into different portions by picking a certain grayness level as a threshold, comparing each pixel value with the threshold, and then assigning the pixel to the different portions, depending on whenever the pixels grayness level is below the threshold or above the threshold value. Thresholding can be performed either at a single level or at multiple levels, in which the image is processed by during it into layers each with a selected threshold.

Weapon Recognition

In this section, we describe a standard pattern recognition approach to distinguish the shapes representing weapons from those representing weapons according to shape descriptors adopted. First two shape libraries are constructed from known weapon and non-weapon images. Each shape is run through selected shape description algorithms.

For the known weapon shapes, pictures of different kinds of handguns are digitalized and corresponding reference library, data are obtained by running the shape characterization algorithms on these images. For the known non weapon shapes basic synthesized geometric shapes are considered. This one circle, sources and rectangles in several sizes and rotated positions. Library two data are obtained from these synthetic shapes.

7. CONCLUSION

Image techniques based on a combination of sensor technologies and processing will potentially play key role in addressing the concealed weapon detection problem. However MMW cameras alone cannot provide useful information alone. By integrating the complementary information from sensors a more effective CWD system is expected. Next a survey of image processing techniques being developed to achieve the goal is done. Specifically topics such as MMW image / video enhancement filtering, registration, fusion, extraction, description and recognition were discussed.

One critical issue is the challenge of performing detection at a distance with high probability of detection and low probability of false alarm. Another difficulty to be surrounded is forging portable multisensors instruments.

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Prime Labeling of Some Split Graph and Some Combination Graphs

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ABSTRACT

If the vertices of a graph H = (V, E) with p vertices may be labeled with specific positive numbers that do not exceed p so that the marks of any pair of adjacent vertices are relatively prime, the graph is said to concede prime labeling. A prime graph is one where H concedes prime labeling. In this study, we investigate graph classes' prime labeling. In particular, we discussed the prime labeling of the split graphs of the ladder, brush, and gear graphs (Lp, Bp, and Gp). Similarly, we looked at several combination graphs' prime labeling.

Keywords: Ladder graph, Brush graph, Gear graph, Spider graph, Prime labeling, Split graph of a graph H.

1. INTRODUCTION

The learning of ascendancy in graph theory is fastest growing area and it comes as a result of learn of some special games. We consider only undirected, finite and simple connected graph for labeling of graphs. H = (V, E) with the vertex set and edge set. The number of elements of V, denoted as |V| and number of elements of E denoted as |E|. Spl (L_p), Spl (B_p), Spl (G_p) denotes the Split graph of the Ladder graph, Brush graph and Gear graph respectively. Also we introduce the combination of Tree and one copy of Star graph and the combination Spider graph and one copy of Star graph.

The idea of prime labeling began with Entringer and was presented in a paper by Tout, Dabbouchy and Howalla [2].

Entringer guessed that all trees have a prime labeling. Haxell, Pikhuriko and Taraz [7] demonstrated that all enormous trees are prime graph.

Numerous analysts have considered prime graphs, for instance in Fu.H.C and Huany.K.C [4] has demonstrated that the way P_n on n vertices is a prime graph. In [6] Ganesan.V et al demonstrated that the Split graph of the way P_n concedes prime labeling. In [8], [9] Dr.V.Ganesan and S.Lavanya demonstrated that Spl(Cn) is a prime graph and also demonstrated that Spl[CT(m,n)]. For most recent study on graph labeling, we allude to [5] (Gallian J.A. 2017). For different graph hypothetical documentations and phrasing we follow J.A.Bondy and U.S.R.Murthy [1]. For definitions, I referred some published paper [8], [9].

2. MAIN RESULTS

Algorithm 2.1: Split graph of Ladder graph is a Prime graph

Step: 1

Let H = L_p is the Ladder graph on 2p vertices. Let $q_1, q_2, \ldots, q_p$ be vertices of one Path and $r_1, r_2, \ldots, r_p$ be the vertices of another Path. Vertex set of Ladder graph is

$V(H) = \{q_1, q_2, \ldots, q_p; r_1, r_2, \ldots, r_p\}$

and edge set is

$E(H) = \{q_p q_{p+1}, r_p r_{p+1} / 1 \le l \le (p-1)\} \cup \{q_p r_p / 1 \le l \le p\}$.

Also $|V(H)| = 2p$ and $|E(H)| = 3p - 2$.

Let H* = Spl(L_p) be the Split graph of L_p. Then $q_1', q_2', \ldots, q_p'$ and $r_1', r_2', \ldots, r_p'$ be new vertices corresponding to each vertices of $q_1, q_2, \ldots, q_p$ and $r_1, r_2, \ldots, r_p$ respectively.

Step: 2

Clearly $|V(H^*)| = 4p$ and $|E(H^*)| = 9p - 6$.

Define $h : V(H^*) \rightarrow \{1, 2, \ldots, 4p\}$ as follows

$h(q_l) = l$ for $1 \le l \le p$
$h(r_l) = p + l$ for $1 \le l \le p$
$h(q_l') = 2p + l$ for $1 \le l \le p$
$h(r_l') = 3p + l$ for $1 \le l \le p$

Step: 3

Itemize the different types of edges in H* in which we have to check the relative prime of end points of each type of edges. Namely

(i) q_lq_{l+1} for $1 \le l \le p-1$
(ii) r_lr_{l+1} for $1 \le l \le p-1$
(iii) r_lr_{l+1}' for $1 \le l \le p-1$
(iv) q_lq_{l+1}' for $1 \le l \le p-1$
(v) q_lr_l for $1 \le l \le p$
(vi) r_lq_l' for $1 \le l \le p$
(vii) q_lr_l' for $1 \le l \le p$
(viii) $r_l'r_{l-1}$ for $1 \le l \le p$
(ix) $q_l'q_{l-1}$ for $1 \le l \le p$

Among the nine types of edges, we need to check only the relative prime of edges of type r_lq_l', q_lr_l', $r_l'r_{l-1}$, $q_l'q_{l-1}$ for $1 \le l \le p$, r_lr_{l+1}', q_lq_{l+1}' for $1 \le l \le p-1$.

Step: 4

In this step, we check the relative prime of each pair of vertices r_lq_l', q_lr_l', $r_l'r_{l-1}$, $q_l'q_{l-1}$, r_lr_{l+1}', q_lq_{l+1}' of the labeled graph H* obtained in step - 2.

If $\gcd(h(r_l), h(q_l')) = 1$
$\gcd(h(q_l), h(r_l')) = 1$
$\gcd(h(r_l'), h(r_{l-1})) = 1$
$\gcd(h(q_l'), h(q_{l-1})) = 1$
$\gcd(h(r_l), h(r_{l+1}')) = 1$ and
$\gcd(h(q_l), h(q_{l+1}')) = 1$ then the graph H* admits prime labeling.

If $\gcd(h(r_l), h(q_l')) \neq 1$ (or)
$\gcd(h(q_l), h(r_l')) \neq 1$ (or)
$\gcd(h(r_l'), h(r_{l-1})) \neq 1$ (or)
$\gcd(h(q_l'), h(q_{l-1})) \neq 1$ (or)
$\gcd(h(r_l), h(r_{l+1}')) \neq 1$ (or)
$\gcd(h(q_l), h(q_{l+1}')) \neq 1$ then we have to do the following step - 5.

Step:5

Suppose gcd of each pairs of vertices is not equal to 1 then select all those pairs of vertices for which are not relatively prime and encircle each pairs within a circle.

Now, exchange the labels of vertices. The procedure is repeated until all such pairs are exhausted. Now, the newly labeled graph admits prime labeling.

$H^* = Spl(L_p)$ admits prime labeling.

Thus, Split graph of Ladder graph L_p is a prime graph.

Algorithm 2.2 : Split graph of Brush graph is a Prime graph

Step: 1

Let $H = B_p$ is the Brush ($p \ge 2$) graph on 2p vertices. The Brush graph B_p($p \ge 2$) can be constructed by path graph P_n ($n \ge 2$) by joining the Star graph $K_{1,1}$ at each vertex of the path. That is $B_p = P_n + n\,K_{1,1}$.Vertex set of Brush graph is $V(H) = \{q_1, q_2, \ldots, q_p; r_1, r_2, \ldots, r_p\}$ and edge set is $E(H) = \{r_lr_{l+1} / 1 \le l \le (p-1)\} \cup \{q_lr_l / 1 \le l \le p\}$. Also $|V(H)| = 2p$ and $|E(H)| = 2p-1$.

Let $H^* = Spl(B_p)$ be the Split graph of B_p Then $q_1', q_2', \ldots, q_p'$ and $r_1', r_2', \ldots, r_p'$ be new vertices corresponding to each vertices of $q_1, q_2, \ldots, q_p$ and $r_1, r_2, \ldots, r_p$ respectively.

Step: 2

Clearly $|V(H^*)| = 4p$ and $|E(H^*)| = 6p-3$.

Define $h : V(H^*) \rightarrow \{1,2,\ldots,4p\}$ as follows

$h(q_l) = 4p-1$ for $1 \le l \le p$
$h(r_l) = 4p-3$ for $1 \le l \le p$
$h(q_l') = 4p-2$ for $1 \le l \le p$
$h(r_l') = 4p$ for $1 \le l \le p$

Step: 3

Itemize the different types of edges in H* in which we have to check the relative prime of end points of each type of edges. Namely

(i) r_lr_{l+1} for $1 \le l \le p-1$
(ii) r_lr_{l-1}' for $2 \le l \le p$
(iii) r_lq_l for $1 \le l \le p$
(iv) r_lq_l' for $1 \le l \le p$
(v) $r_l'q_l$ for $1 \le l \le p$
(vi) r_lr_{l+1}' for $1 \le l \le p$

Among the six types of edges, we need to check only the relative prime of edges of type r_lr_{l+1},for $1 \le l \le p-1$and r_lr_{l+1}' for $1 \le l \le p-1$.

Step: 4

In this step, we check the relative prime of each pair of vertices r_lr_{l+1} and r_lr_{l+1}' of the labeled graph H* obtained in step - 2.

If $\gcd(h(r_l), h(r_{l+1})) = 1$ and
$\gcd(h(r_l), h(r_{l+1}')) = 1$ then the graph H* admits prime labeling.

If $\gcd(h(r_l), h(r_{l+1})) \neq 1$ (or)
$\gcd(h(r_l), h(r_{l+1}')) \neq 1$ then we have to do the following step - 5.

Step:5

Suppose gcd of each pairs of vertices is not equal to 1 then select all those pairs of vertices for which are not relatively prime and encircle each pairs within a circle.

Now, exchange the labels of vertices. The procedure is repeated until all such pairs are exhausted. Now, the newly labeled graph admits prime labeling.

$H^* = Spl(B_p)$ admits prime labeling.

Thus, Split graph of Brush graph B_p is a prime graph.

Algorithm 2.3 : Split graph of Gear graph is a Prime graph

Step: 1

Let $H = G_p$ is the Gear graph on $(2p + 1)$ vertices. Vertex set of Gear graph is $V(G_p) = \{c, q_1, q_2, \ldots, q_p ; r_1, r_2, \ldots, r_p\}$ and edge set is $E(G_p) = \{cq_l / 1 \le l \le p\} \cup \{q_l r_l / 1 \le l \le p\} \cup \{r_l q_{l+1} / 1 \le l \le p - 1\} \cup \{r_p q_1\}$. Also $|V(G_p)| = 2p + 1$ and $|E(G_p)| = 3p$.

Let $H^* = Spl(G_p)$ be the Split graph of G_p. Then $c', q_1', q_2', \ldots, q_p'$ and $r_1', r_2', \ldots, r_p'$ be new vertices corresponding to each vertices of $c, q_1, q_2, \ldots, q_p$ and $r_1, r_2, \ldots, r_p$ respectively.

Step: 2

Clearly $|V(H^*)| = 4p + 2$ and $|E(H^*)| = 9p$

Define $h : V(H^*) \rightarrow \{1, 2, \ldots, (4p + 2)\}$ as follows

$h(c) = 1$
$h(c') = 2$
$h(q_l) = 2l + 1$ for $1 \le l \le p$
$h(r_l) = 2l + 2$ for $1 \le l \le p$
$h(q_l') = 2(p + l) + 1$ for $1 \le l \le p$
$h(r_l') = 2(p + l) + 1$ for $1 \le l \le p$

Step: 3

Itemize the different types of edges in H^* in which we have to check the relative prime of end points of each type of edges. Namely

(i) cq_l for $1 \le l \le p$
(ii) $q_l r_l$ for $1 \le l \le p$
(iii) $r_l q_{l+1}$ for $1 \le l \le p - 1$
(iv) $r_p q_1$
(v) $c'q_l$ for $1 \le l \le p$
(vi) cq_l' for $1 \le l \le p$
(vii) $q_l r_l'$ for $1 \le l \le p$
(viii) $r_l' q_{l+1}$ for $1 \le l \le p - 1$
(ix) $r_p' q_1$
(x) $q_l' r_l$ for $1 \le l \le p$
(xi) $r_p q_1'$
(xii) $q_{l+1}' r_l$ for $1 \le l \le p - 1$

Among the twelve types of edges, we need to check only the relative prime of edges of type $q_l r_l'$, $q_l' r_l$, for $1 \le l \le p$ and $r_l' q_{l+1}$, $q_{l+1}' r_l$ for $1 \le l \le p - 1$.

Step: 4

In this step, we check the relative prime of each pair of vertices $q_l r_l'$, $q_l' r_l$, $r_l' q_{l+1}$ and $q_{l+1}' r_l$ of the labeled graph H^* obtained in step - 2.

If $\gcd(h(q_l), h(r_l')) = 1$
$\gcd(h(q_l'), h(r_l)) = 1$
$\gcd(h(r_l'), h(q_{l+1})) = 1$ and
$\gcd(h(q_{l+1}'), h(r_l)) = 1$ then
the graph H^* admits prime labeling.

If $\gcd(h(q_l), h(r_l')) \ne 1$ (or)
$\gcd(h(q_l'), h(r_l)) \ne 1$ (or)
$\gcd(h(r_l'), h(q_{l+1})) \ne 1$ (or)
$\gcd(h(q_{l+1}'), h(r_l)) \ne 1$ then
we have to do the following step - 5.

Step:5

Suppose gcd of each pairs of vertices is not equal to 1 then select all those pairs of vertices for which are not relatively prime and encircle each pairs within a circle.

Now, exchange the labels of vertices. The procedure is repeated until all such pairs are exhausted. Now, the newly labeled graph admits prime labelling.

$H^* = Spl(G_p)$ admits prime labeling.

Thus, Split graph of Gear graph G_p is a prime graph.

Theorem 2.1:

The split graph of $RE_{m,n}$ is a neighborhood prime graph.

Proof:

Consider the simple $RE_{m,n}$ graph. Whose vertex is $\{v, v_1, v_2, \ldots, v_m, u_1, u_2, \ldots, u_{2n}\}$. Let $\{v', v_i' ; 1 \le i \le m, u_i' ; 1 \le i \le 2n\}$ be newly added vertices for the vertices of $RE_{m,n}$ to form $spl(RE_{m,n})$.

Then $G = spl(RE_{m,n})$ vertex and edge sets are given below

$V[G] = V[spl(RE_{m,n})] = \{v, v_i ; 1 \le i \le m\} \cup \{u_i ; 1 \le i \le 2n\} \cup \{v', v_i' ; 1 \le i \le m\} \cup \{u_i' ; 1 \le i \le 2n\}$

E[G] = E[spl($RE_{m,n}$)] = {vv_i / $1 \le i \le m$} U {vu_{2i-1} / $1 \le i \le n$} U {$u_{2i-1}u_{2i}$ / $1 \le i \le n$} U {$v'v_i$ / $1 \le i \le m$} U {$v'u_{2i-1}$ / $1 \le i \le n$} U {$u_{2i-1}u_{2i}'$ / $1 \le i \le n$} U {vv_i' / $1 \le i \le m$} U {vu_{2i-1}' / $1 \le i \le n$} U {$u_{2i-1}'u_{2i}$ / $1 \le i \le n$}

Clearly

|V[spl($RE_{m,n}$)]| = 2m + 4n + 2 & |E[spl($RE_{m,n}$)]| = 3m + 6n

Now define a labeling f : V[spl($RE_{m,n}$)] → {1, 2, …, (2m+4n + 2)}

such that

f (v)	=	1
f (v')	=	2
f (u_{2i-1}')	=	2i + 2 for $1 \le i \le n$
f (u_{2i-1})	=	2i + 1 for $1 \le i \le n$
f (v_i)	=	2n+2i+1 for $1 \le i \le m$
f (v_i')	=	2n + 2i +2 for $1 \le i \le m$
f (u_{2i}')	=	(2m + 2n + 2) + 2i for $1 \le i \le n$
f (u_{2i})	=	(2m + 2n + 2) + (2i – 1) for $1 \le i \le n$

We claim that f is a prime labeling.

gcd{ f (v), f (v_i')} = gcd{1, 2n + 2i + 2} for $1 \le i \le m = 1$

gcd{ f (v), f (u_{2i-1}')} = gcd{1,(2i+2)} for $1 \le i \le n = 1$

gcd{ f (v), f (v_i)} = gcd{1, (2n + 2i + 1)} for $1 \le i \le m = 1$

gcd{ f (v), f (u_{2i-1})} = gcd{1, 2i + 1} for $1 \le i \le n = 1$

gcd{ f (u_{2i-1}'), f (u_{2i})} = gcd{(2i + 2), (2m + 2n + 2i + 1)} for $1 \le i \le n = 1$

gcd{ f (u_{2i}), f (u_{2i-1})} = gcd{(2m + 2n + 2i + 1), (2i + 1)} for $1 \le i \le n = 1$

gcd{ f (u_{2i-1}), f (u_{2i}')} = gcd{(2i + 1), (2m + 2n + 2i + 2)} for $1 \le i \le n = 1$

gcd{ f (v'), f (v_i)} = gcd{2, (2n + 2i + 1)} for $1 \le i \le m = 1$

gcd{ f (v'), f (u_{2i-1})} = gcd{2, (2i + 1)} for $1 \le i \le n = 1$

Hence f is total prime labeling.

Therefore, the graph Spl[$RE_{m,n}$] is a Prime graph.

Illustration 2.1:

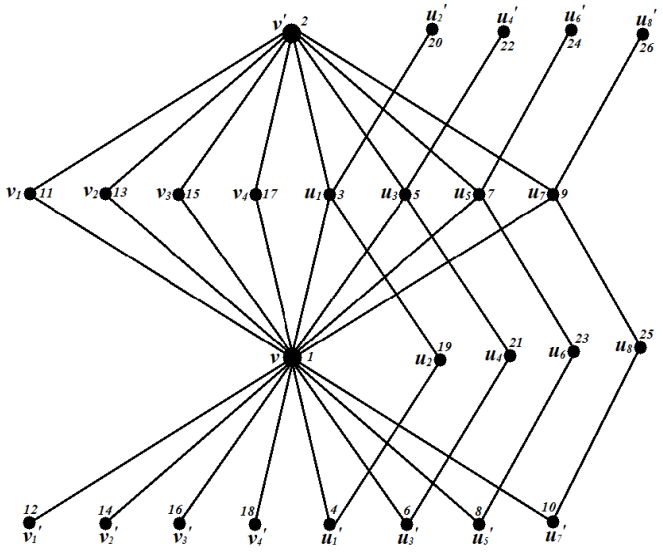

Fig.1 Prime Labeling of Spl[$RE_{m,n}$]

Theorem 2.2:

The graph F_n Θ K_1 is a Prime graph.

Proof:

Let G be the friendship graph with vertices {v_1, v_2, …, v_n}. Let u_i be the new vertex joined to v_i in G ($1 \le i \le n$). The resulting graph is G_1 (i.e.,) F_n Θ K_1. Now the vertex set is

$V(G_1) = V(F_n \Theta K_1) = \{v_1, v_2, \ldots, v_{2n+1}, u_1, u_2, \ldots, u_{2n+1}\}$ and edge set is

$E(G_1) = E(F_n \Theta K_1) = \{v_1v_i / 2 \le i \le 2n+1\} \cup \{v_{2i}v_{2i+1} / 1 \le i \le n\} \cup \{v_iu_i / 1 \le i \le 2n+1\}$.

Here |V(G)| = 4n + 2.

Define a labeling

f : V(F_n Θ K_1) → {1, 2, …, (4n + 2)} such that

f (v_i)	=	2i – 1	for	$1 \le i \le n$
f (u_i)	=	2i	for	$1 \le i \le n$

Clearly gcd{ f (v_1), f (v_i)} = 1

gcd{ f (v_{2i}), f (v_{2i+1})} = 1

and gcd{ f (v_i), f (u_i)} = 1 for all i.

Hence f admits prime labeling.

Therefore, the graph F_n Θ K_1 is a prime graph.

Illustration 2.2:

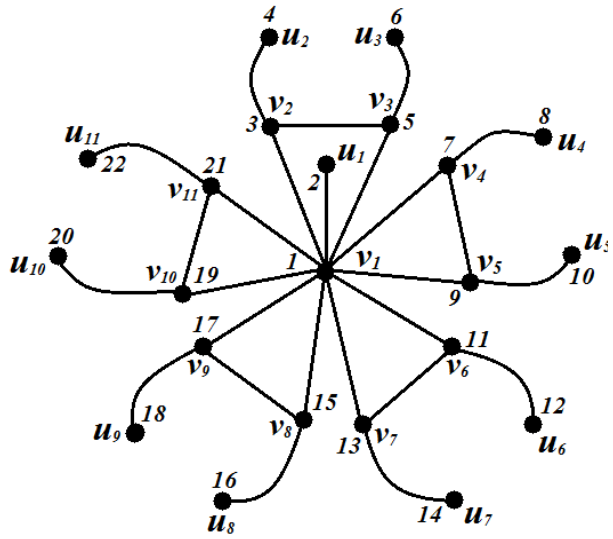

Fig.2 Prime Labeling of F_5 Θ K_1

Theorem 2.3:

The graph B_n Θ K_1 is a Prime graph.

Proof:

Let G be the Brush graph with vertices $\{u_1, u_2, \ldots, u_n, v_1, v_2, \ldots, v_n\}$. Let u_i' be the new vertex joined to u_i, $1 \le i \le n$ and v_i' be the new vertex joined to v_i, $1 \le i \le n$. The resulting graph is G_1 is denoted by B_n Θ K_1. Now the vertex set and edge set is,

$V(G_1) = V(B_n \Theta K_1) = \{u_1, u_2, \ldots, u_n, v_1, v_2, \ldots, v_n, u_1', u_2', \ldots, u_n', v_1', v_2', \ldots, v_n'\}$ and

$E(G_1) = E(B_n \Theta K_1) = \{u_iv_{i+1} / 1 \le i \le n-1\} \cup \{u_iv_i / 1 \le i \le n\} \cup \{u_iu_i' / 1 \le i \le n\} \cup \{v_iv_i' / 1 \le i \le n\}$

Here $|V(B_n \Theta K_1)| = 4n$.

Define a labeling $f : V(B_n \Theta K_1) \rightarrow \{1, 2, \ldots, 4n\}$ such that

$f(u_i) = 4i - 1$ for $1 \le i \le n$

$f(v_i) = 4i - 3$ for $1 \le i \le n$

$f(v_i') = 4i - 2$ for $1 \le i \le n$

$f(u_i') = 4i$ for $1 \le i \le n$

Clearly

$\gcd\{f(u_i), f(u_{i+1})\} = 1$

$\gcd\{f(u_i), f(v_i)\} = 1$

$\gcd\{f(u_i), f(u_i')\} = 1$

and $\gcd\{f(v_i), f(v_i')\} = 1$

for all i.

Hence f admits prime labeling.

Therefore, the graph B_n Θ K_1 is a prime graph.

Illustration 2.3:

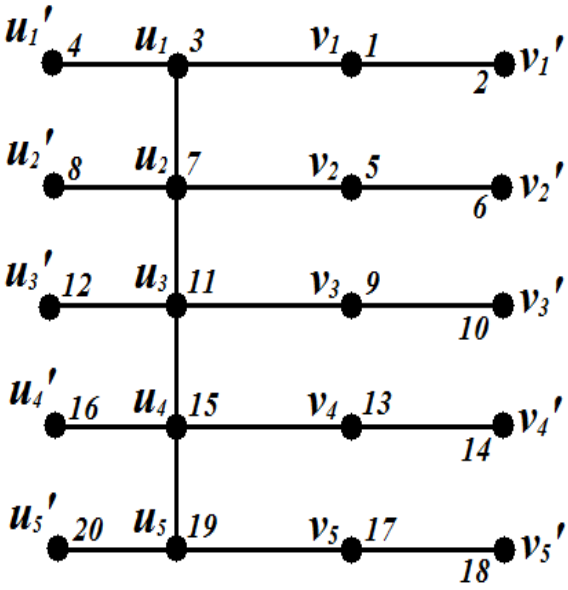

Fig.3 Prime Labeling of B_5 Θ K_1

Theorem 2.4:

The graph L_n Θ K_1 is a Prime graph.

Proof:

Let G be the Ladder graph with vertices $\{u_1, u_2, \ldots, u_n, v_1, v_2, \ldots, v_n\}$. Let u_i' be the new vertex joined to u_i, $1 \le i \le n$ and v_i' be the new vertex joined to v_i, $1 \le i \le n$ in G. The resulting graph is G_1 is denoted by L_n Θ K_1. Now the vertex set and edge set is,

$V(G_1) = V(L_n \Theta K_1) = \{u_1, u_2, \ldots, u_n, v_1, v_2, \ldots, v_n, u_1', u_2', \ldots, u_n', v_1', v_2', \ldots, v_n'\}$ and $E(G_1) = E(L_n \Theta K_1) = \{v_iv_{i+1}, u_iu_{i+1} ; 1 \le i \le n-1\} \cup \{u_iv_i, u_iu_i', v_iv_i' ; 1 \le i \le n\}$

Here $|V(L_n \Theta K_1)| = 4n$.

Define a labeling $f : V(L_n \Theta K_1) \rightarrow \{1, 2, \ldots, 4n\}$ such that

$f(u_i) = 4i - 3$ for $1 \le i \le n$

$f(v_i) = 4i - 1$ for $1 \le i \le n$

$f(u_i') = 4i - 2$ for $1 \le i \le n$

$f(v_i') = 4i$ for $1 \le i \le n$

Clearly

$\gcd\{f(v_i), f(v_{i+1})\} = 1$

$\gcd\{f(u_i), f(u_{i+1})\} = 1$

gcd{ f (u_i), f (v_i)}= 1
gcd{ f (u_i), f (u_i')} = 1
and gcd{ f (v_i), f (v_i')} = 1
for all i.

Hence f admits prime labeling.

Therefore, the graph L_n Θ K_1 is a prime graph.

Illustration 2.4:

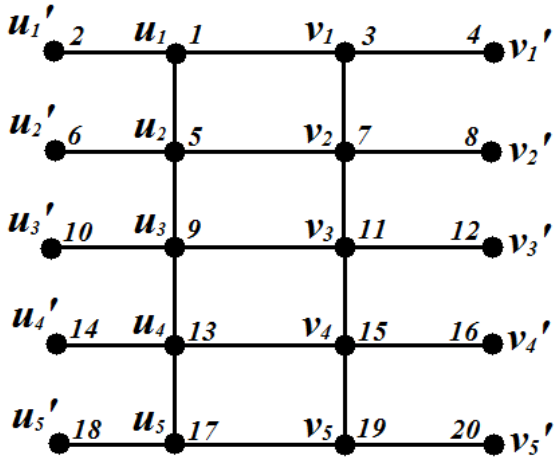

Fig.4 Prime Labeling of L_5 Θ K_1

3. Prime labeling of combination of tree with one copy of a star graph

Theorem 3.1

The combination of T_3 * S_p is a prime graph. Where T_3 is a Tree on three vertices and S_p is a star graph with (p + 1) vertices (p ≥ 2)

Proof:

Let T_3 be a tree with vertex set V(T_3) = {a, b, c} and edge set E(T_3) = {(ac) U (cb)} and let S_p be the star graph with (p + 1) vertices, here by giving the labels v_1, v_2, …, v_p continuously starting from one pendent vertex till the last pendent vertex and putting the label v_{p+1} for the centre of S_p. From this we get the following vertex set and edge set, that as follows,

V(S_p) = {v_1, v_2, …, v_p, v_{p+1}}
E(S_p) = {$v_{p+1}v_l$ / 1 ≤ l ≤ p}

To form the graph T_3 * S_p the vertex v_1 of S_p is joined (merged) with the vertex ‘a’ of T_3 and labeled as v_1. Thus we get (p + 3) vertices and (p + 2) edges.

Now consider the name of labels of ‘b’ and ‘c’ changed as v_{p+2} and v_{p+3} respectively.

Define h : V (T_3 * S_p) → {1, 2,…, (p + 3) } as follows

h(v_{p+l}) = l for 1 ≤ l ≤ p
h(v_l) = 3+ l for 1 ≤ l ≤ p

Clearly the labels are distinct

Also gcd (h(v_{p+1}), h(v_l)) = 1
for 1 ≤ l ≤ p
gcd (h(v_1), h(v_{p+1}) = 1
for 1 ≤ l ≤ 3
and gcd (h(v_{p+3}), h(v_{p+2})) = 1

Therefore, h admits prime labeling.

Hence the combination of T_3 and one copy of a star graph is prime graph.

Theorem 3.2

The combination of T_4 * S_p is a prime graph. Where T_4 is a Tree on four vertices and S_p is a star graph with (p + 1) vertices (p ≥ 2)

Proof:

Let T_4 be a tree with vertex set V(T_4) = {a, b, c, d} and edge set E(T_4) = {(ab) U (bc) U (ad)} and let S_p be the star graph with (p + 1) vertices, V(S_p) = {v_1, v_2, …, v_p, v_{p+1}} and E(S_p) = {$v_{p+1}v_l$ / 1 ≤ l ≤ p}

To form the graph T_4 * S_p, the vertex v_{p+1} of S_p is joined (merged) with the vertex ‘a’ of T_4 and labeled as v_{p+1}. Thus we get (p + 4) vertices and (p + 3) edges. Consider the name of the labels of ‘b’, ‘c’ and ‘d’ are changed as v_{p+2},v_{p+3} and v_{p+4} respectively.

Define h : V (T_4 * S_p) → {1, 2,…, (p + 4) } as follows

h(v_{p+l}) = l for 1 ≤ l ≤ 4
h(v_l) = 4+ l for 1 ≤ l ≤ p

Clearly the labels are distinct

Also gcd (h(v_{p+1}), h(v_{p+4})) = 1
gcd (h(v_{p+1}), h(v_{p+2})) = 1
gcd (h(v_{p+2}), h(v_{p+3}) = 1
and gcd (h(v_{p+1}), h(v_l)) = 1
for 1 ≤ l ≤ p

Therefore, h admits prime labeling.

Hence the combination of T_4 and one copy of a star graph is prime graph.Prime labeling of combination of tree with one copy of a Spider graph

Theorem 4.1:

The combination of spider graph with one copy of a star graph is a prime graph. i.e., $S_{m,2}$ * S_p is a prime graph. Where $S_{m,2}$ is a spider graph on 2m+1 and S_p is a star graph with (p + 1) vertices (p ≥ 2)

Proof:

Let v_1, v_2, …,v_{2m+1} be the vertices of the spider graph $s_{m,2}$ with the label v_1 denoting the center and v_2, v_4, …, v_{2m} referring the outer vertices and v_3, v_5, …, v_{2m+1} representing the inner vertices.

The center of star S_p is connected with the vertex v_{2m} and the other p vertices of S_p are

named by giving the labels v_{2m+2}, v_{2m+3}, …, v_{2m+n}continuously starting from one pendent vertex till the last pendent vertex.

The new graph formed is denoted by $S_{m,2} * S_p$ and it is a tree with (2m + p + 1) vertices and (2m + p).

Define $h : V (S_{m,2} * S_p) \rightarrow \{1, 2, \ldots, (2m + p + 1)\}$ as follows

$v_1 = 2m + 1$

$v_{2m} = 1$

$v_l = l - 1$

$3 \leq l \leq 2m + 1$ (for odd l)

$= l + 1$

$2 \leq l \leq 2m - 1$ (for even l)

And $v_{(2m+1)+l} = (2m+1)+l$

for $1 \leq l \leq p$

Clearly the labels are distinct

Hence the combination of spider graph with one copy of a star graph is a prime graph.

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Advancement of Cloud Computing

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ABSTRACT

One of the newest themes in the information industry, cloud computing is regarded as massively scalable, an on-demand adjustable resource computing architecture. It provides clients with complete access to scalable, dependable resources with high performance in a distributed cloud architecture as opposed to a dedicated cloud infrastructure. Everything is offered to clients as a utility service through the internet. The cloud is essential to storing the unpredictable data produced by these IoT-tagged objects and is a step towards green computing because it eliminates setup and installation steps by allowing cloud clients to access hardware resources distributed across multiple platforms. energy efficiency, a decrease in overheating, and reduced power usage in cloud environment differentiates it from the traditional computing, which greatly proves to be eco-friendly.

Keywords: Cloud Computing, On-demand, Distributed, Dedicated, Utility, Eco-friendly EnergyOptimization.

I.INTRODUCTION

Due to the dynamic nature of academic research, there are many distinct definitions, frameworks, and conceptual terminology that have been proposed by various writers. According to the definition provided by Gartner, "Cloud computing" is a type of computing in which many external customers may use flexible and varied information technology-enabled capabilities as a service. Due to its ubiquity and agility, both medium and large-scale emerging and developingtechnologies are embracing the cloud. The cloud is a paradigm where everything provided to the cloud client is treated as a service. It is also regarded as a utility computing model that provides a wide range of services to the users on-demand and in a distributed manner. An According to NIST's definition, "cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with little management effort or service provider interaction."

II. CLOUD COMPUTING EVOLUTION

The most difficult challenge for large corporations and organizations to remain in the commercial market was to purchase these essential resources due to their high cost and upkeep. However, the idea of shared access to resources emerged when it became clear that it was not possible for organizations to do so.The idea of shared access to a single computing system emerged in order to avoid the expense of purchasing separate machines because it was not financially feasible for organizations to purchase these essential resources due to high maintenance costs. This made it the most difficult task for large companies and organizations to remain in the business market. Evolution in Information Technology is not an abrupt change; rather, it is a gradual evolution that offers many benefits to businesses and organizations. The Virtual Machine (VM) operating system, introduced by IMB in 1970, allowed businesses and organizations to run their operations simultaneously on multiple systems, each with its own memory and processing power. This marked the beginning of the development of a new technology known as virtualization, which was created through the collective cooperation of various computing platforms, including centralized, parallel, cluster, distributed, and grid computing. It is a method of distributing software where clients may access hosted programs via a fast internet connection from a third-party supplier.

PLATFORM-AS-A-SERVICE (PAAS):

It is a middle layer that provides freedom and a framework for developers to create their own apps, deploy them, and enable clients inside of their business to access the resources IaaS (infrastructure as a service): The infrastructure is the most important of the three service models since it is necessary for an organization to launch its services on the internet ina cloud platform, make those services available to clients, and enable the seamless operation of its applications.

III.CLOUD COMPUTING DEPLOYMENT MODELS

PUBLIC CLOUD:

The software, hardware, and bandwidth are given by the service provider and are scalable, making the cloud services simpler to install, less expensive, or even free. Users can only utilize the services in which they are interested.

PRIVATE CLOUD:

As the term implies, only an organization is responsible for running and maintaining its services and infrastructure. The services are only made available after valid authentication, andthe security of the client's data is prioritized. Community Cloud: In this case, an organization that is of common interest to each member of a community whose demands are similar shares its cloud resources with them.

HYBRID CLOUD:

It combines two or more cloud deployment paradigms, such as public, private, and community, to enable resource sharing, multi-tenancy, and mobility of cloud applications.

IV.CLOUD COMPUTING CHARACTERISTICS

ON-DEMAND SELF-SERVICE:

Computing resources, such as server time and network storage, can be automatically provided by a consumer unilaterally as needed.

MEASURED SERVICE:

Companies may avoid making significant upfront infrastructure investments thanks to public cloud service providers like Amazon, enabling small businesses to afford the workloadsthey need.

BROAD NETWORK ACCESS:

Features that encourage usage by various thin or thick client platforms (such as mobile phones, tablets, laptops, and workstations) are accessible across the network.

RAPID ELASTICITY:

Capabilities may be elastically provided and released, grow swiftly outward and inward corresponding with demand dynamically.

RESOURCE POOLING:

Resources like storage, servers, memory, Processing Unit, Network and virtual machines may be shared and consumed by multi-tenant manner with dynamically provisioning and de-provisioning of resources.

V.NIST CLOUD COMPUTING ACTORS

The NIST based reference model of cloud computing defines the primary players, their activities and roles, essentialities, uses, features and standards of each participant in cloud paradigm. It specifies five key actors in cloud architecture i.e., cloud consumer, cloud supplier, cloud carrier, cloud auditor and cloud broker.Every individual participant is an entity that participates in any cloud-based transaction, processor, performs activities in cloud computing.The architectural structure of cloud is the mix of cloud services and deployment models with pre-defined basic elements of cloud reference model are given in the below-mentioned cloud reference model. Some of the entities based on involvement in cloud computing are as

CLOUD PROVIDER:

An entity or an organization that plays role in making any cloud service available to the required party.

CLOUD CONSUMER:

An entity or an organization that is responsible for maintaining a commercial connection employs services from Cloud Providers.

CLOUD BROKER:

Relationships between the other participants are facilitated by an entity in charge of the use, performance, and delivery of cloud services.

CLOUD CARRIER:

It facilitates connection and the movement of cloud services between cloud providers and cloud consumers.

CLOUD AUDITOR:

A person who is capable of independently evaluating cloud services, information system operations, performance, and implementation's security.

VI.WHY CLOUD COMPUTING

When using a cloud computing service, clients may access their resources remotely from anywhere in the world in a dispersed fashion. They can also easily and comfortably upload and download important documents to and from a cloud server to their physical workstation while they are on the road.What would happen if users of social media platforms like Facebook, Twitter, WhatsApp, Instagram, Snap Chat, and WeChat had to store their updated statuses, photos, and videos on their own physical devices? In a similar situation, users of balance sheets would haveto store their emails on their personal computers and mobile devices, which would likely result in storage space issues. Cloud hence provides them with limitless cloud storage where they may keep the information without any problem, making it the solution to this bad predicament.With some web applications, clients may access, update, or delete their resources whenever they want, allowing them to manage workloads appropriately. Due to its effectiveness as a method of computing and expanding the list of advantages, the cloud is being used by the majority of businesses, organizations, and small- and large-scale enterprises. The most exciting aspect of cloud computing is its pay-as-you-grow feature, which only charges for used and accessed services and allows clients to hold resources and release them at any time when no longer required. The cloud computing characteristics give clients on-demand services that they can use and release at their discretion.

They can also manage their resources remotely from anywhere on the planet with high-speed bandwidth networks.

SECURE STORAGE MANAGEMENT:

In order to prevent unauthorized editing, the data saved and accessed via the cloud is given access to a highly secure authentication method.

PAY AS YOU GROW:

The cloud client is free to pay for just the services that are really used and can contractand increase the resources as needed. The rented service is subject to charges.

SUSTAINABILITY:

Its viability One of the intriguing aspects of the cloud ecosystem is its longevity; it will always be diverse and productive.

RELIABLE:

Cloud computing is a dependable paradigm for computing where clouds may trust anddepend on the services provided by clouds as reliability.

SCALABILITY:

The auto-scaling techniques allow resources to be scaled up and down at any moment.

UTILITY COMPUTING:

Offers services and infrastructure are rented to cloud clients just as needed, charging in accordance with the services used while making optimal use of resources to save expenses.

AVAILABILITY:

Cloud technology has the advantage of being accessible around-the-clock. Every firm chooses the cloud as their first option for commercial operations because of its availability characteristic. The existence of clouds is essential to e-commerce behemoths like Amazon, Flipkart, Snapdeal, and others.

VII.CLOUD COMPUTING ADVANTAGES

The adoption of cloud computing should be a top priority since it offers a wide range of advantages and is an alluring and fascinating paradigm. Several of the benefits include

DESIRABLE COSTS:

SCALABLE STORAGE:

When customers use cloud platforms, storage is no longer a restriction, and they are no longer needed to purchase bulky and expensive hardware components like servers and storage devices, etc. Scalability is a distinctive characteristic of cloud computing, because customers themselves dynamically provide resources inside the real-time slice.

SOFTWARE COMPATIBILITY:

Typically, a limited number of software manufacturers and versions are supported by cloud services. Hundreds or thousands of separate client environments exchange software in a public cloud, which is a shared environment. In order to uphold the well specified software standards, software as a service companies supply their clients with suitable software.

MOBILITY:

Mobility gives the cloud access to "on the go" functionality. Customers may access their apps and other resources from different devices including cellphones, tabs, computers, etc., making it simple to run clouds from anywhere in the world.

BANDWIDTH:

High-speed bandwidth is particularly crucial for the cloud's seamless operation and interruption-free operation because it is connected to the internet. This function can only be used if cloud service providers give their customers access to high-speed bandwidth, which enables the transfer of large amounts of data.The speed and bandwidth issues are considerably better than before because of the networks' improvements. a disaster recovery plan and backup: The days of clients storing their crucial data on tape backups are long gone. Cloud suppliers give their customers platforms that store backup data, allowing them to easily restore their lost data at any moment in emergency scenarios.

VIII.CLOUD COMPUTING LIMITATIONS

Since both programs and papers need an Internet connection, access to the resources is not possible without a high-speed internet connection. Cloud computing has certain drawbacks, including the inability to function without an internet connection. Lack of technical help, such as when a cloud provider's server is down, might hinder one's ability to advance with their task. Insufficient Internet speed and reliability prevent you from using cloud services. One of the worst possible outcomes of cloud computing is account hacking. Malicious software is a legitimate SaaS, and when used maliciously, it can destroy and corrupt a cloud client's critical data without being noticed. Data Breeching, which may be deadly, is another typical occurrence in cloud computing. Other shortcomings of cloud computing include insecure APIs, misuse of cloud services, denial-of-service attacks, and insufficient caution. Concerns about QoS arise because, despite the cloud's very beneficial characteristics for its customers, QoS is not effectively maintained.

IX.CONCLUSION

Cloud computing is a new trend that combines a number of previously popular computer technologies, including virtualization, multi-tenancy, the internet, networking, operating systems, hardware, and software. The integration maximizes the use of these technologies. It is establishing itself in all facets of life and enabling both small and large-scale businesses and organizations by giving them access to a platform where they may operate their operations for the lowest possible costs while reaping the greatest rewards. As the adage "two sides of a coin" goes, cloud computing has positive aspects but also comes with a number of difficulties, some of which are proving to be devastating and endangering the users' crucial data. Because the data in cloud vendors' datacenters is so sensitive, complete security measures must be offered. Many people are interested in learning more about some of the intriguing capabilities, such as load balancing, scalability and energy optimization.

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ROLE AND DESIGN CONSIDERATION OF ENERGY AWARE SERVICE LEVEL AGREEMENTS IN CLOUD COMPUTING ENVIRONMENT

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ABSTRACT

Management and allocation of resources becomes very much vital for reducing the energy consumption in the cloud environment. A carefully designed Service Level Agreement (SLA) can play a crucial role in management of cloud energy efficiency and contributing to the over-all energy consumption. The SLA can make both customer and service provider as equal stake-holders for energy efficient design; hence the roles and responsibilities of each must be defined. Energy Aware SLA extends the existing SLA agreements to include energy and carbon aware parameters. One of the optimization challenges for reducing the data center energy requirements is to keep servers well utilized. During the peak hours a substantial amount of energy is essential to process and execute the services by the cloud provider, and the significance of Energy Aware SLA is noticed in this case. In This paper authors discussed about the design of energy aware SLA along with the futuristic challenges.

Keywords: Energy Consumption, Cloud Environment, Service Level Agreement, Energy Efficiency, Data Center, Cloud Provider.

I. INTRODUCTION

Service level agreements are the contract between customers and cloud providers. They are proposed via the suppliers to create a concerning availability and excellence of services to the customers. SLAs also enclose and define the performance metrics, uptime, throughput, response time. Customers are requested to read SLAs first before access the services provide by a service provider. A good SLA includes the correct definitions of the services required by the customers and illustrates the levels of service to use several qualities such as accessibility, serviceability, behavior, procedures, invoicing, and pricing connected through infringement of such qualities. However, the contributors offered a variety of the service level agreements that has guided to several dissimilar descriptions of cloud SLA [1-3].

A Service Level Agreement (SLA) is a formal, negotiated document that defines in quantitative and perhaps qualitative terms the service being offered to a customer". Any metrics included in a SLA should be capable of being measured on a regular basis for review purposes. This kind of review can be of great help in measuring the quality of service and improving customer satisfaction [3].

SLA creates a common understanding of Quality of Service (QoS), priorities and responsibilities between the customer and service provider. It can cover many aspects, such as performance of services, customer care, billing, service provisioning, penalties etc. A Service Level Agreement denotes the service realities to be offered in requirements of metrics approved through the entire social gathering, and values on behalf of infringes the anticipations [2-3]. Service Level Agreements perform like a guarantee in support of customers, is able to extra contentedly shift the corporation to the cloud computing. Consequently, enterprise can reduce the preservation and managerial rates via rental fee of the information technology communications as of cloud sellers. Correspondingly, end-users influencing the cloud in favor of entering individual facts as of all over the place, as well in support of transporting exposed behavior with no dealing costly software and hardware [4]. Present cloud computing suppliers contain a number of datacenters into dissimilar positions above the Internet, so that the user requirements can be met in the best possible way across the globe. With

the purpose of establishing the best possible position in support of hosting application services attain logical QoS scales. Additionally, the cloud suppliers are not capable toward forecasting the environmental sharing the end-users overwhelming the services. Therefore, the load management has to happen mechanically, sharing the services should vary within respond toward modifies into stack performance. Fig. 1, describes the utility driven internetworking of clouds arbitrated by cloud exchange. This structural design contains the service customers, brokering and suppliers, service managers. With the purpose of supports, the function-oriented clouds and internetworking [1], application provisioning [30], and workload immigration [5].

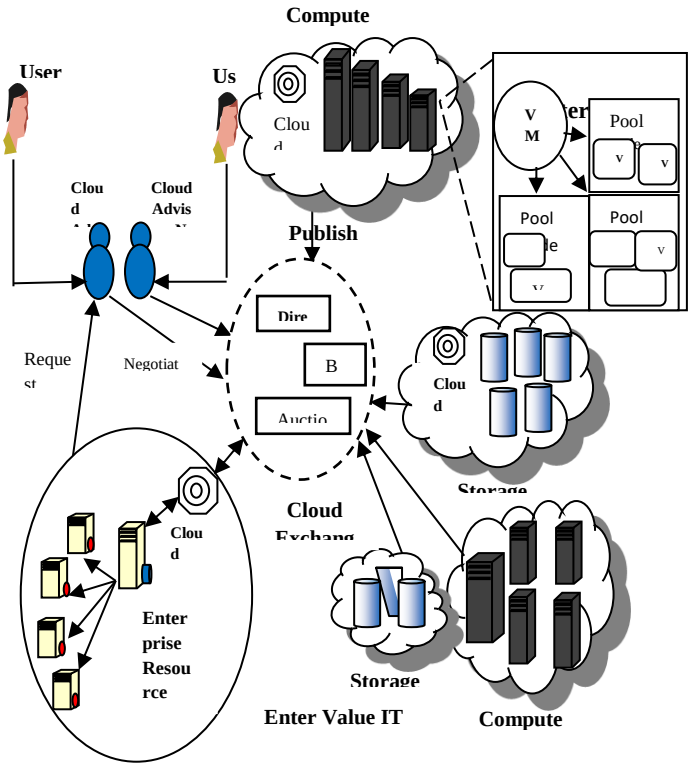

Fig. 1: Cloud Manager in the Cloud Network [1]

In Fig 1, this type of structural design provided a significant performance and financial benefits to improve the capability of SaaS suppliers' together QoS scales in favor of customers and provide enhanced service through optimizing assignment and service level. They are improving the highest consignment management and lively system growth capability of all cloud associated via permitting them to vigorously attain extra resources as of inter-networking. Fig 3, described the participation module of this structural design with cloud manager Responsibilities of the cloud manager are presented in the subsequent significant behavior, first is providing the services together infrastructure and platform scale toward the clouds inter-networking and second is monitoring the application implementation in excess of the life cycle, managing to the approved SLAs are supplied [4-5] [17].

II. SERVICE LEVEL AGREEMENTS LIFE CYCLE

The essential characteristics of SLAs life cycle are controlling the service anticipations as well as units' liabilities along with the operational resolution. Service level agreements allow connecting units toward concurs on, will the revisit service be provided, how will it distributed along with who will liable in support of implementation, accomplishment, possible unsuccessful, confidentially features. The purpose is that services are distributed concurrence to highest excellence points (like locate with the equivalent QoS aspects). Precise requirements have been increased through the number of schemes during cloud environmental [26]. Google [6], [7] placed service level agreements with methods to implement them between the foremost tests, whereas other cloud supplier, solitary cloud, emphasized to [8-10] "Much good work has been completed on SLAs and the entire business model around the cloud, but much remains"; Forrester declared with the purpose of "SLAs are crucial when sending critical data offsite [10], while Accenture research analysts also set management and supervision of SLAs amongst the main challenges in cloud computing [11]"; the necessity in support of appearance of grainy requires within service level agreements have been emphasized via a ordinary specialist on VMware [12]; through the essential scheme owner, customers (during sponsorship grouping) increasing the information with the aim of "SLAs are weighted heavily in the provider's favor, leading to the vendor's liability being limited". Consignment is generally extra possible of the customer toward the acknowledge service level agreement violations inform the service supplier. The purpose is to offer the indication of service level agreement life cycle shared investigate

outcome to deal with the necessities declared via suppliers, forecaster, specialists, and customers. Following are the contributing performers, phases, and roles engaged in SLA life cycle [7] [13].

A. CONTRIBUTING PERFORMER

The below mentioned is the main factor for the contributing performer-

CUSTOMER

Included in the service level agreement lifecycle, customers offer in the direction of unit to acquire services as a result symbols the service level agreement by the equivalent service supplier. Customer can be the end users or not. The needs of a customer during the service level agreement lifecycle are a big tool to correlate the service necessities. Main objective of the customers is to get on offer the service toward end-users by the precise point of excellence [8, 9] [13-15].

DEVELOPER

All the services required by customer must be developed in accordance with the requirement of customer. This performer consults to the appliance developer. Whereas the objective is to increase the service, including the service level agreement lifecycle, offer essential knowledge concerning the service. Service developer is a single performer through appliance precise information. Therefore, knowledge provides towards possible enslavements (during the situation of complex service to contain of minute service mechanism) in addition to concert individuality of the appliance [8], [9] [13-15].

PROVIDER/SUPPLIER

Within the service level agreement life cycle, the service provider objective is to provide an expected service to the customer. Whereas the developer utilized via the provider, service developer performed the service improvement, otherwise its alteration in favor of cloud surroundings. The provider entity symbolizes the service level agreement containing lofty point periods by customer. Though, provider can mark the service level agreement through the platform provider acquiring the platform in support of increasing the appliance otherwise utilizing added structure, example authorize administration [8-10] [13-15].

PLATFORM

In the service level agreement lifecycle, the platform supplier objective provides the platform in support of the service improvement to the supplier. Platform provider responsibility can be essential, when the suppliers are not organizing the appliance taking place an infrastructure supplier however simply contracts by the platform supplier. Service level agreements consist of small point periods, example supply constraints, [8, 9] [13-15].

INFRASTRUCTURE

In the SLA lifecycle, the infrastructure provides the technical infrastructure in support of the exploitation as well as service implementation. Infrastructure provider marks the service level agreements together with small point periods through the service or platform suppliers [8, 9] [13-15].

B. SLA LIFECYCLE PHASES

The life cycle variations affect toward services during the service-oriented design environment as explained through fig. 2.

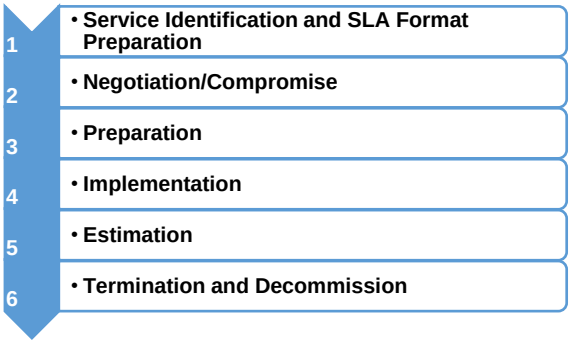

Fig. 2: Life Cycle of SLA [16]

1) *Service Identification and SLA Format Preparation:* This is the first step in SLA Lifecycle and consists of the classification of service customer requirements and classification of suitable service individuality. It also proposes the specified service implementation surrounding and comes out with a service level agreement format. This step basically deals on identifying and mapping the services to the individual customers and generating the patterns on which these services can be documented. Some researchers have also stated that this step should be predecessor to the SLA Lifecycle [18-20].

2) *Negotiation/Compromise:* This level of the lifecycle deals in specifying the values for each service parameter in a very much measurable manner. Then costs for the services (imposed on the customer) as well as the cost for SLA violation (imposed on the service provider) are defined. This phase also defines the reports and the periodicity at which the reports are to be provided to the customer.

3) *Preparation:* The specific services are prepared by the service provided so as to match the parameters set in the SLA (lifecycle phase 1 & 2). The services are organized as per the utilization needs of the customer. This type of level can necessitate the resources redesign, to sustain service implementation so as to gather service level agreement parameter.

4) *Implementation:* This level becomes the real service procedure, where the services are actually executed. This level consists of service implementation as well as examining, real time exposure, service excellence confirmation, real time service level agreement infringement procedure.

5) *Estimation:* The estimation phases consist of the estimation of both the services and documentation. There are two specific estimations in this:

I. Service level agreement estimation as well as quality of service so as to find the consumer satisfaction towards these. Quality of service, customer agreement, probable developments, changing necessity is periodically assessed.

II. Overall services are judged to see their matching the promised level as well for the purpose of internal assessment. Any needs for the service realignment in terms of the operations and goals are estimated in this phase. Evaluation of the services support processes is also done in this phase.

6) *Termination and Decommission:* This phase defines the end of the service level agreement. Service destruction comes because of the agreement termination or agreement infringement. With the termination of SLA, a customer may leave the service provider permanently or may look for other services.

C. ROLES

Service level agreement plays a significant role in the cloud environment to manage the expectations of customer as well as service contributor for the completion of the objective. Following points are considered for evaluation of a good cloud SLA life cycle [21].

a) Identify Roles and Responsibilities: Cloud customer must be conscious about the role and responsibilities specified in the SLA. Customer must be able to classify the each and every actor affected in cloud computing environment. The customer also understands the all activities of actors and clearly defines the requirement and preferred service levels. Who is responsible for what is the main idea behind defining the roles and responsibilities.

b) Estimate business level policies: What are policies that may affect the business strategy of the customer? The policies in SLA are mutually dependent on each other. So before espouse the cloud provider, customer should carefully evaluate not only all the data policies but also business policies of the cloud provider. These policies directly involve cloud customer.

c) Identify Critical Performance Objectives: The performance must be documented appropriately in SLA. It must be satisfying the requirements of the customer and service provider and all critical objectives must be identified from the SLA.

d) Identify disaster recovery plan: Natural and artificial disaster can have an adverse effect on the cloud customer's business. So, to avoid this from the customer undue losses through disaster, cloud provider organizes the suitable DR (disaster recovery) plan. The DR plan is differing according to each organization. In case of natural disaster, various cloud SLAs don't provide assurance. So, before taking the services of any cloud provider, the customer should clearly mention / understand the concern regarding DR with the provider, such as:

- How outage is defined
- What coverage the redundancy level to minimize violations
- What is the incident plan through a disaster etc

e) Identify the exit process: There must be exit clause in every SLA, mention the cause responsible for early on termination and the responsibilities of the customer and service provider. Exit process is very much important, when the customer want to move from one service provider to another service provider.

III. ENERGY EFFICIENT SLA DESIGN

A good SLA describes the performance target of client's requirement, the convenience of a provider, assured availability, and the measurement & reporting mechanisms [21]. A complete description of the SLA components described as: ***Purpose:*** It includes the all the goals that needs to be attained

LIMITATIONS

It includes the basic procedures or steps to make certain requested level of services are offered.

AUTHENTICITY PERIOD

It includes the operation time of SLA.

SCOPE

It includes those services will be distributed to the customers and which will not be covered in the SLA.

PARTIES

It indicates the providers and customer with their respective roles.

SERVICE-LEVEL OBJECTIVES (SLO)

It includes the service levels on which both parties (providers and customers) agree upon.

PENALTIES

It includes the penalties causes, if the delivered service is not achieving the SLO or is below the performance level.

OPTIONAL SERVICES

It includes the services which are not mandatory but might be needed.

ADMINISTRATION

It includes the processes assuring the accomplishment of SLO and the connected organizational responsibilities for managing these processes.

One major goal of the Cloud computing is to make more efficient on-demand provisioning of information offering, elasticity and quickness in managing information technology resources. However, organizing and functioning application in a cloud is able to support attaining rapidity, scalable, sustain an elasticity platform. SLA based Energy-aware efficiency use the accessible resource prudently through resting certain works within a prepared method toward attain higher energy consumption through reducing result on effectiveness along with the essential systems' accessibility. SLAs become a main part of a customer-based services [22].

As shown in Fig. 3, cloud computing includes the Energy-aware SLAs with the aim of making the cloud environment further ecological.

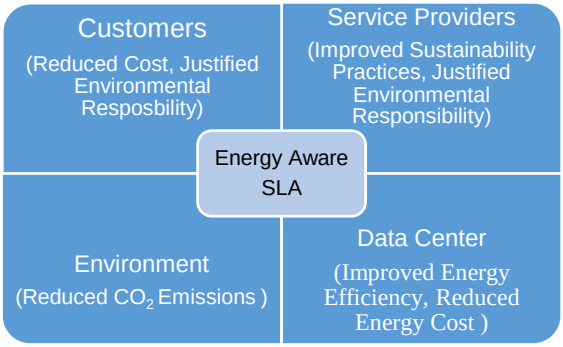

Fig. 3: Energy-aware Service Level Agreement [22]

Data center work within Energy-aware manner along with the similar instant assured the different constant of QoS on behalf of the information technology client. The cloud suppliers can contain in addition to propose a latest position of environmental service, which provide currently. A latest position will include the customer through particular SLA that is able to describe like Energy-aware SLA [23]. Where energy is used to perform the everyday jobs nearby is particular otherwise within additional method. There know how to declare to accessible energy is designate proficiently particularly throughout the highest load instants that is the key center [l] [26].

Energy-aware service level agreement enlarges an accessible service level agreement including energy and carbon aware parameters. As make use of Energy-aware service level agreement soothing in assured work is completed within a uniform approach attaining maximum quantity of energy utilization through reducing outcome on the system's effectiveness as well as accessibility. As datacenters energy provisions has improved extraordinarily within very last sometimes. There is an only optimization difficult task on behalf of minimizing the energy provisions are maintaining server's better use. Total money expends through customers as well data centers on behalf of the energy necessities are along with enhancing gradually [20] [24].

Throughout the highest point the maximum quantity of energy became essential practicing with executing works through cloud supplier; at this point move toward the importance with

Energy-aware service level agreement that became energy-efficient service level agreement. Which identify assured necessities toward supplier ask having the low backside precedence works in support of few times which became for the duration of highest instant that will sequentially decrease energy utilization. In addition, CO_2 emissions bounce is too particular within contract in order that accessible energy is consumed within a proficient method as well through decreasing total money on the part of customer as well as on the part of supplier [18-20].

Energy-aware service level agreement specified via the customer like XML folder toward cloud supplier wherein with the aim of proficiently utilize energy particularly on highest load phase via provisionally holdback assured works [2]. Declare as small precedence is reserved into keep for few instant. In support of some points prepared: initially works are selected the precedence in term of metrics (duration of work, later deadline work etc). Once precedence became complete, the small precedence works are reserved to seize on instant the highest load that will be particular through cloud supplier [24, 25]. Throughout highest instant the single works by precedence-1 is put forward the adviser. Since outcome the higher precedence works is capable of utilizes sufficient energy as of accessible energy. When the highest instant become more, additional works become acceptable to start again. Lastly compute total energy consumption as well as verified by threshold number that become particular within Energy-aware service level agreement as well CO_2 emissions bounce is particular within service level agreement is verified [14] [15] [8].

When specified threshold become desecrated the Energy-aware also become desecrated. There is focused only over the two precedence create the last precedence on behalf of development works in the highest instant. There works through precedence-1 is put forward toward adviser along with implemented. While others work become silenced till precedence-1 works completed through the implementation, formerly this is finished implemented next works become permissible to start again backside. Thus power computed within the periods the whole job finished within specific quantity of instant along with energy being computed as of the power number that is acquired previously. As power consumed is computed as well as to facilitate the energy consumption is also computed. The CO_2 emission is selected to compute although contract by model the CO_2 emission will be nothing in defaulting. When computation is completed the number become traverse to verify by the Energy-aware service level agreement threshold numbers. In addition, when threshold number becomes surpassed Energy aware service level agreement become desecrated furthermore when Energy-aware service level agreement is not satisfied. Therefore, SLA is agreement based process and Energy aware service level agreement become additional toward usual service level agreement through a few Energy aware constraints [2] [7].

IV. FUTURISTIC CHALLENGES

The Key concern of SLA Design is the QoS (Quality of Service). To manage the quality of service in cloud environment is very difficult due to dissimilar appliance developer. With the purpose of vigorously generating service in excess of networks toward the shape numerous task flows and various suppliers, quality of service has become very much important. While, inconsequence service excellence characteristic as: throughput, turnaround, wait, storage/recollection, network bandwidth etc. Every service is closely interconnected, dissimilar difficulties addressing and satisfying the quality of service necessities within active surroundings. The numbers of procedures and plans demands increasing in support of maintain the services excellence characteristics among customers as well as in support of cover up them like a service level agreement component. Biggest issue is that when business is not gathering the QoS values during nowadays aggressive cloud surroundings. Therefore, the lot of effort is essential to particularly cover up the features within service level agreements. There will be need to add together the QoS and the service level agreement phrase and circumstances.

Another challenging reason is the resource allocations between end user to have a day by day increasing demand of resource depend on the appliance handling mold. Changeable requirements need the management taking place the data center resource throughout Internet. Resource allocations objective is applied in support of a few particular cloud suppliers are able to optimize quality of service appliances in addition develop resources consumption, and energy effectiveness [26]. Therefore, optimize

quality of service constraints are able to calculate the response instant, gap, resources, message delay, and also measures efficiency of resource allocation to end-users. Following are some challenges related with energy efficient resource allocation plan:

I. Selecting task consignment form with intervention connecting dissimilar task consignment, like resources handling, power consumption, performance.
II. To the resource provision and deployment on running instant via assessing federal opportunity, internetworking, uniform resource of datacenter.
III. To improve the profit utilization, network ease of access, energy effectiveness, decrease within instant required improving as of some unsuccessful.
IV. To improve the cloud resource, instruments, methods through appraising along with the well modification cloud platform design.

To increase the behavior and the return on investment through evaluating appliance inter-enslavement making easy resources strengthening.

V. CONCLUSION

Now days cloud-based services growing day by day, SLAs are becoming more inclusive. However, the increasing demands for deployment of next generation services are putting up various challenges associated the energy efficiency. In the cloud data centers, energy efficiency can only be maintained with the effective power aware resource management. This in turn can be lead the accessible resource management structures that determine the scalability concern in periodic and reactive optimization procedures. Therefore, to share the responsibility of cloud energy efficiency, the SLA should be effectively designed to support different aspect of energy efficient design and safeguard the rights and preferences of different stakeholders.

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NUMERICAL STUDY OF HEAT TRANSFER IN NATURAL CONVECTION BOUNDARY LAYER FLOW OF NON-NEWTONIAN FLUIDS

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ABSTRACT

Heat transfer in natural convection boundary layer flow of Non-Newtonian fluids past a wedge is numerically studied. The velocity distribution and the temperature variations for three different non-Newtonian fluid models namely, Powell-Eyring fluid, Prandtl-Eyring fluid and Williamson fluid are studied through the extended form of numerical method 'Satisfaction of Asymptotic Boundary Conditions Technique' (SABCT). The mutual comparison between these three different fluid models is made with their graphical representation. Temperature distribution for three different physical situations; Isothermal wedge flow; Flow with constant heat flux at the edge of boundary layer; heat generating due to high velocity flows. It is observed that a velocity and temperature variation in Powell-Eyring is considerably higher than these in Prandtl-Eyring and Williamson fluids [1].

KEY WORDS: Natural Convection, Non Newtonian Fluid, Prandtl Number, Powell Eyring fluid, Williamson fluids.

1. INTRODUCTION

The laminar forced convection heat transfer of incompressible Falkner-Skan flows from an isothermal wedge has been studied very extensively. Exact solutions of the transformed similarity energy equation were obtained by Pohlhausen (1921) and Eckert (1942), for fluids which have Prandtl numbers in the range $0.1 \leq Pr \leq 15$. The exact integral equation can be calculated approximately by a series expansion of the stream function or of the stream wise velocity component. Light hill (1950) approximated the velocity profile in the thermal boundary layer as a linear function of the transverse distance.

Light hill's analysis is asymptotically exact for the case of extremely large Prandtl number. To obtain an accurate solution for finite values of Prandtl number, Spalding (1958) extended Lighthill (1950) approximation by taking account of the quadratic term, which describes the curved profile. Further extensions were developed by Spalding (1958), Evans (1961) and Evans (1962) using a more precise stream function in the thermal boundary layer to provide accurate solutions for fluids in a wider range of Prandtl numbers. An improved Lighthill (1950) analysis has also been given by Chao (1972). He has also reported asymptotic expansion of heat transfer rates for very large [Stewartson (1964) and Narasinha et al. (1966)] and very small [Morgan et al. (1958), Sparrow et al. (1958) and Goddard et al. (1966)] Prandtl numbers. [1]

Fluids with non-linear stress – strain relationship is known as non-Newtonian fluid. These types of fluids are found to be of great commercial importance. They are handled extensively by chemical industries, namely plastic and polymer. Biological & Biomedical devices like homodialyser make use of the rheological aspects of non-Newtonian fluids. The wide usage and application of these fluids in various industrial fields have prompted modern researchers to explore extensively in the field of non-Newtonian fluids. [1]

There are several types of non-Newtonian fluids models proposed by Bird et al. (1960), Lee and Ames (1950) and Skelland (1967). Non-Newtonian viscoinelastic fluids are most versatile and they are correctly reduces to Newtonian behaviour for low and high shear rates.

The current research on the boundary layer flows of non-Newtonian fluids treat these type of models almost extensively [1].

NATURAL CONVECTION

Natural convection is a mechanism, or type of heat transport, in which the fluid motion is not generated by any external source (like a pump, fan, suction device, etc.) but only by density differences in the fluid occurring due to temperature gradients. In natural convection, fluid surrounding a heat source receives heat, becomes less dense and rises. The surrounding, cooler fluid then moves to replace it. This cooler fluid is then heated and the process continues, forming convection current; this process transfers heat energy from the bottom of the convection cell to top. The driving force for natural convection is buoyancy, a result of differences in fluid density. Because of this, the presence of a proper acceleration such as arises from resistance to gravity, or an equivalent force (arising from acceleration, centrifugal force or Coriolis force), is essential for natural convection. For example, natural convection essentially does not operate in free-fall (inertial) environments, such as that of the orbiting International Space Station, where other heat transfer mechanisms are required to prevent electronic components from overheating.

Natural convection has attracted a great deal of attention from researchers because of its presence both in nature and engineering applications. In nature, convection cells formed from air raising above sunlight-warmed land or water are a major feature of all weather systems. Convection is also seen in the rising plume of hot air from fire, oceanic currents, and sea-wind formation (where upward convection is also modified by Coriolis forces). In engineering applications, convection is commonly visualized in the formation of microstructures during the cooling of molten metals, and fluid flows around shrouded heat-dissipation fins, and solar ponds. A very common industrial application of natural convection is free air cooling without the aid of fans this can happen on small scales (computer chips) to large scale process equipment [1].

NON NEWTONIAN FLUID

A non-Newtonian fluid is a fluid whose flow properties differ in any way from those of Newtonian fluids. Most commonly the viscosity (measure of a fluid's ability to resist gradual deformation by shear or tensile stresses) of non-Newtonian fluids is dependent on shear rate or shear rate history.

However, there are some non-Newtonian fluids with shear-independent viscosity that nonetheless exhibit normal stress-differences or other non-Newtonian behaviour. Many salt solutions and molten polymers are non-Newtonian fluids, as are many commonly found substances such as ketchup, custard, toothpaste, starch suspensions, paint, blood, and shampoo. In a Newtonian fluid, the relation between the shear stress and the shear rate is linear, passing through the origin, the constant of proportionality being the coefficient of viscosity. In a non-Newtonian fluid, the relation between the shear stress and the shear rate is different, and can even be time-dependent. Therefore, a constant coefficient of viscosity cannot be defined.

Many people have heard of Sir Isaac Newton. He is famous for developing many scientific theories in mathematics and physics. Newton described how 'normal' liquids or fluids behave, and he observed that they have a constant viscosity (flow). This means that their flow behaviour or viscosity only changes with changes in temperature or pressure. For example, water freezes and turns into a solid at 0˚C and turns into a gas at 100˚C. Within this temperature range, water behaves like a 'normal' liquid with constant viscosity. Typically, liquids take on the shape of the container they are poured into. We call these 'normal liquids' Newtonian fluids. But some fluids don't follow this rule. We call these 'strange liquids' non-Newtonian fluids. [1]

NATURAL CONVECTION FLOW

Following Timol and Kalthia (1985), the basic equations of two-dimensional steady incompressible laminar natural convection flows all non-Newtonian viscoinelastic fluids, characterized by some special arbitrary functional relationship, past vertical flat plate, in non-dimensional form, are given by:

Continuity:

$$\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}=0$$

Momentum:

$$u\frac{\partial u}{\partial x}+v\frac{\partial u}{\partial y}=\frac{\partial}{\partial y}(\tau_{yx})+\theta$$

Energy:

$$u\frac{\partial \theta}{\partial x}+v\frac{\partial \theta}{\partial y}=\frac{1}{3\mathrm{Pr}}\frac{\partial^2 \theta}{\partial y^2}$$

The stress-strain arbitrary functional relationship under the boundary layer assumption

$$G(\tau_{yx}, \frac{\partial u}{\partial y}) = 0$$

The stress strain relationship (4) is most general and in comparison to Lee et al. (1965) and it covers wider class of non-Newtonian fluids [Timol and kalthia (1985)]. With boundary conditions at

$y = 0, \quad u = 0, \quad v = 0, \quad \theta = \theta_w, \quad y = \infty,$

$u = 0, \ \theta = 0$

Where the non-dimensional quantities used are:

$$x = \frac{Grx'}{L}; y = \frac{y'}{L}(Gr)^{1/2}(\mathrm{Re}/3)^{1/2}; u = \frac{U'}{U};$$

$$v = \frac{V'}{U}\left(\frac{\mathrm{Re}/3}{Gr}\right)^{1/2}; \tau_{yx} = \frac{\tau'_{y'x'}}{\rho U^2}\left(\frac{\mathrm{Re}/3}{Gr}\right)^{1/2}; \theta = \frac{\theta'}{T'_w - T'_\infty};$$

$$\theta_w = \frac{\theta'_w}{T'_w - T'_\infty}; Gr = \frac{L}{U^2}\bar{g}\beta(T'_w - T'_\infty); \mathrm{Pr} = \frac{UL}{s.\mathrm{Re}}$$

Introducing the stream function ψ such that

$$u = \frac{\partial \psi}{\partial y}, v = \frac{-\partial \psi}{\partial x}$$

Equation of continuity (1) gets satisfied identically equations (2), (3) and (7) gives

$$\frac{\partial \psi}{\partial y}\frac{\partial^2 \psi}{\partial x \partial y} - \frac{\partial \psi}{\partial x}\frac{\partial^2 \psi}{\partial y^2} = \frac{\partial}{\partial y}(\tau_{yx}) + \theta$$

$$\frac{\partial \psi}{\partial y}\frac{\partial \theta}{\partial x} - \frac{\partial \psi}{\partial x}\frac{\partial \theta}{\partial y} = \frac{1}{3\mathrm{Pr}}\frac{\partial^2 \theta}{\partial y^2}$$

$$G\left(\tau_{yx}, \frac{\partial^2 \psi}{\partial y^2}\right)$$

Subject to the boundary conditions at

$$y = 0; \ \frac{\partial \psi}{\partial y} = 0, \ \frac{\partial \psi}{\partial x} = 0, \ \theta = \theta_w(x)$$

$$y \to \infty; \ \frac{\partial \psi}{\partial y} = 0, \ \theta = 0$$

Following generalization dimensional analysis technique of Patel and Timol (1985) here define following group transformation

$$G_1 : \begin{cases} \bar{y} = A_1 y; \bar{x} = A_2 x \\ \bar{\psi} = A_3 \psi; \bar{\theta} = A_4 \theta; \bar{\tau}_{\bar{y}\bar{x}} = A_5 \tau_{yx} \\ \bar{\theta} = A_6 \theta_w \end{cases} \quad (4)$$

Now introducing G_1 to equations (8) to (12), to reduce one independent variable.

The constant conformally invariant property will yield following two-parameter group of transformation

$$\Gamma_1 : \begin{cases} \bar{y} = A_1^1 A_2^0 y; \bar{x} = A_1^0 A_2^1 x \\ \bar{\psi} = A_1^{-1} A_2^1 \psi; \bar{\theta} = A_1^{-4} A_2^1 \theta \\ \bar{\tau}_{\bar{y}\bar{x}} = A_1^{-3} A_2^1 \tau_{yx} \\ \bar{\theta}_w = A_1^{-4} A_2^1 \theta \end{cases} \quad (5)$$

With the associated dimensional matrix will be

$$BC = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ \cdots & \cdots \\ -4 & 1 \end{bmatrix} \quad (6)$$

Hence the following set of Pi's can be obtained.

$$\pi_1 = \frac{\psi}{x^{3/4}\theta_w^{1/4}}; \ \pi_3 = \frac{\tau_{yx}}{x^{1/4}\theta_w^{3/4}}$$

$$\pi_2 = \frac{\theta}{\theta_w} \quad ; \quad \pi = y(\theta_w / x)^{1/4} \quad (7)$$

Now for similarity requirement the boundary condition on θ i.e. boundary condition (12) may be taken as any power of x, say,

$$\theta_w = x^k \quad (8)$$

Putting Pi notations in the usual symbols, we get following generalized similarity variables.

$$\eta = yx^{\frac{k-1}{4}} \quad ; \quad f(\eta)' = \frac{\psi}{x^{\frac{3+k}{4}}} \quad (9)$$

$$h(\eta) = \frac{\theta}{x^k} \quad ; \quad H(\eta) = \frac{\tau_{yx}}{x^{\frac{1+3k}{4}}} \quad (10)$$

The above set of transformation equations (8)-(12) describing the physical situation will reduce to the following ordinary differential equation (11)

Substituting the above equations from the equations (8) – (12)

$$\frac{(1+k)}{2}f'^2 - \frac{(3+k)}{4}ff'' = H' + h$$

$$kf^{'}h-\frac{(3+k)}{4}fh^{'}=\frac{1}{3\Pr}h^{''}$$

$$F\left[x^{\frac{1+3k}{2}}H;x^{\frac{1+3k}{4}}f^{''}\right]=0$$

And

$$\text{At}\,\eta=0,\ f=0,\ f^{'}=0,\ h=1$$

$$\text{At}\,\eta\to\infty,\ f^{'}=0,\ h\to 0$$

In case of non-Newtonian viscoinelastic flows of different fluid models proposed by Timol and Kalthia (1985) the similarity solutions for the natural convection flows past a vertical plate will exist, if the relationship will be free from the independent variable x. This is possible only if $k=-1/3$ i.e. for general non-Newtonian fluid characterized by the relationship (10). Similarity solution exists if temperature at the plate wall is of the form

$$\theta_w=x^{-1/3}$$

For such case, generalized similarity transformations (21) will be

$$\eta=y/x^{1/3};\psi=f(\eta)x^{2/3};h=\theta x^{1/3};H(\eta)=\tau_{yx}$$

Under these transformations, equations (17) – (19) will come to

$$\frac{1}{3}f^{'2}=\frac{2}{3}ff^{''}=\frac{d}{d\eta}\left(\tau_{yx}\right)+h$$

$$\Pr\left(f^{'}h+2fh^{'}\right)+h^{''}=0$$

$$F\left(\tau_{yx},f^{''}\right)=0$$

With the same boundary conditions given in (20)-(21). [1]

STRESS – STRAIN RELATIONSHIP OF DIFFERENT NON–NEWTONIAN FLUIDS

3.1. POWELL EYRING MODEL:
Mathematically, Powell-Eyring model is written as

$$\tau_{yx}^{'}=\mu\frac{\partial u^{'}}{\partial y^{'}}+\frac{1}{B}Sinh^{-1}\left(\frac{1}{C}\frac{\partial u^{'}}{\partial y^{'}}\right)$$

Where B and C are constants characteristic of the model.

(18)

Introducing the non-dimensional quantities given by (6) and stream function ψ into equation (27) and simplifying, the above model becomes,

(19)

$$\rho U^2\left(\frac{Gr}{\text{Re}/3}\right)^{1/2}\tau_{yx}=\mu\frac{U}{L}\left(\frac{Gr\,\text{Re}}{3}\right)^{1/2}\frac{\partial^2\psi}{\partial y^2}+\frac{1}{B}Sinh^{-1}\left[\frac{1}{C}\frac{U}{L}\left(\frac{Gr}{\text{Re}/3}\right)^{1/2}\frac{\partial^2\psi}{\partial y^2}\right]$$

(20)

(21)

28)

Using the transformation (23) the above equation becomes

$$\rho U^2\left(\frac{Gr}{\text{Re}/3}\right)^{1/2}\tau_{yx}=\mu\frac{U}{L}\left(\frac{Gr\,\text{Re}}{3}\right)^{1/2}f^{''}+\frac{1}{B}Sinh^{-1}\left[\frac{1}{C}\frac{U}{L}\left(\frac{Gr}{\text{Re}/3}\right)^{1/2}f^{''}\right]$$

(22)

$$\frac{d\tau_{yx}}{d\eta}=\frac{f^{'''}}{3}+\frac{f^{'''}/3}{\alpha^{'}\left\{1+\beta^{'}f^{''2}\right\}^{1/2}}$$

(23)

Where

$$\alpha^{'}=\mu BC,\ \beta^{'}=\frac{fU^3}{3C^2L\mu}Gr \text{ and}$$

(24)

$$\text{Re}=\frac{\rho UL}{\mu}$$

(25)

Substituting this relation for $\frac{d\left(\tau_{yx}\right)}{d\eta}$ (26) in the equation (24), the flow equation becomes

$$\frac{1}{3}f^{'2}-\frac{2}{3}ff^{''}-3h=\frac{f^{'''}}{3}+\frac{f^{'''}/3}{\alpha^{'}\left(1+\beta^{'}f^{''2}\right)^{1/2}}$$

$$f^{'''}=\frac{\left(f^{'2}-2ff^{''}-3h\right)\left(1+\beta^{'}f^{''2}\right)^{1/2}}{\left(1+\beta^{'}f^{''2}\right)^{1/2}+1/\alpha^{'}}$$

$$\Pr\left(f^{'}h+2fh^{'}\right)+h^{''}=0$$

(27)

$$2fh^{'} + f^{'}h + \frac{1}{\Pr}h^{''} = 0$$

With boundary conditions at

$$\eta = 0,\ f = f^{'} = 0,\ h = 1;\ \eta \to \infty,\ f^{'} \to 0,\ h \to 0$$

3.2. Prandtl-Eyring Model:

Similarly the Prandtl Eyring model given in Table1

$$\tau^{'}_{y^{'}x^{'}} = \bar{A}Sinh^{-1}\left(\frac{1}{B}\frac{\partial u^{'}}{\partial y^{'}}\right)$$

(Where A and B are constants) in non-dimensional form will become:

$$\rho U^2\left(\frac{Gr}{\mathrm{Re}/3}\right)^{1/2}\tau_{yx} = \bar{A}Sinh^{-1}\left[\frac{1}{B}\frac{U}{L}\left(\frac{Gr\,\mathrm{Re}}{3}\right)^{1/2} f^{''}\right]$$

On differentiating both sides w.r.t. η and simplifying, we get,

$$\rho U^2\left(\frac{Gr}{\mathrm{Re}/3}\right)^{1/2}\tau_{yx} = \bar{A}Sinh^{-1}\left[\frac{1}{B}\frac{U}{L}\left(\frac{Gr\,\mathrm{Re}}{3}\right)^{1/2} f^{''}\right]$$

$$\tau_{yx} = \left(\frac{\mathrm{Re}/3}{Gr}\right)^{1/2}\frac{\bar{A}}{\rho U^2}Sinh^{-1}\left(\frac{1}{B}\frac{U}{L}\left(\frac{Gr\,\mathrm{Re}}{3}\right)^{1/2} f^{''}\right)$$

$$\tau_{yx} = \left(\frac{\rho UL\bar{A}}{3\mu\rho^2 U 3Gr}\right)^{1/2} Sinh^{-1}\left[\frac{U}{BL}\left(\frac{Gr\rho UL}{3\mu}\right)^{1/2} f^{''}\right]$$

$$\frac{d\tau_{yx}}{d\eta} = \left(\frac{L\bar{A}^2}{3\mu\rho U^2 Gr}\right)^{1/2}\left[\frac{1}{\left(1+\frac{U^2}{B^2L^2}\left(\frac{Gr\rho UL}{3\mu}\right)f^{''2}\right)^{1/2}}\right]\left(\frac{U}{BL}\left(\frac{Gr\rho UL}{3\mu}\right)^{1/2} f^{''}\right)^{1/2}$$

$$\frac{d(\tau_{yx})}{d\eta} = \frac{\alpha^{'} f^{'''}}{3\left(1+\beta^{'} f^{''2}\right)^{1/2}} \qquad (32)$$

Where

$$\mathrm{Re} = \frac{\rho UL}{\mu},\ \alpha^{'} = \frac{\bar{A}}{\mu B},\ \beta^{'} = \frac{\rho U^3}{3B^2L^2}(Gr) \qquad (33)$$

Combining equations (24) and (40) we get,

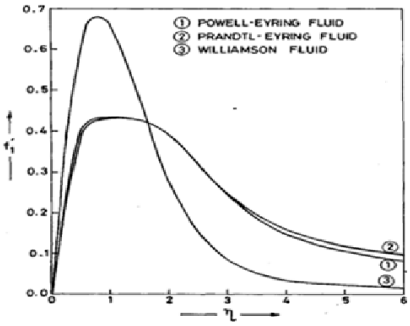
$$\frac{1}{3}\left(f^{'2} - ff^{''} - 3h\right) = \frac{\alpha^{'} f^{'''}}{3\left(1+\beta^{'} f^{''2}\right)^{1/2}}$$

$$f^{'''} = \frac{\left(1+\beta^{'} f^{''2}\right)^{1/2}\left(f^{'2} - 2ff^{''} - 3h\right)}{\alpha^{'}} \qquad (34)$$

$$2fh^{'} + f^{'}h + \frac{1}{\Pr}h^{''} = 0$$

With the boundary conditions at

$$\left.\begin{array}{l}\eta = 0,\ f = f^{'} = 0, h = 1\\ \eta \to 0,\ f^{'} \to 0, h \to 0\end{array}\right\} \qquad (35)$$



3.3. WILLIAMSON MODEL:

The Williamson model listed in Table-1 is given by:

$$\tau^{'}_{y^{'}x^{'}} = \left[\frac{\bar{A}}{B + \frac{\partial u^{'}}{\partial y^{'}}} + \mu_{\infty}\right]\frac{\partial u^{'}}{\partial y^{'}}$$

Where $\bar{A}$ and B are constants is reduced to

$$\rho U^2\left(\frac{Gr}{\mathrm{Re}/3}\right)^{1/2}\tau_{yx}=\left[\frac{\bar{A}}{B+\frac{U}{L}\left(\frac{Gr\,\mathrm{Re}}{3}\right)^{1/2}f''}+\mu_\infty\right]\frac{U}{L}\left(\frac{Gr\,\mathrm{Re}}{3}\right)^{1/2}f''$$

(40)

Here too, differentiating with respect to η gives

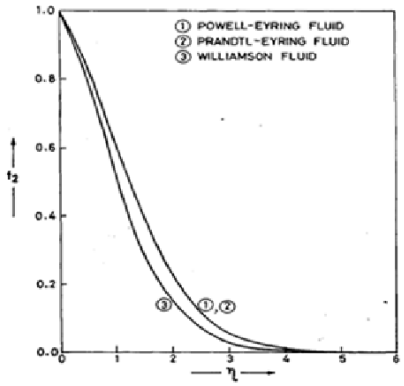
$$\tau_{yx}=\frac{1}{\rho U^2}\left(\frac{\bar{A}}{B+\frac{U}{L}\left(\frac{Gr\,\mathrm{Re}}{3}\right)^{1/2}f''}+\mu_\infty\right)\frac{U}{L}\left(\frac{Gr\,\mathrm{Re}}{3}\right)^{1/2}f''\left(\frac{\mathrm{Re}/3}{Gr}\right)^{1/2}$$

$$\frac{d(\tau_{yx})}{d\eta}=\frac{1}{3}f'''\left[\frac{\alpha'}{(1+\beta^{1/2}f'')^2}+1\right]$$

Substituting for $\frac{d(\tau_{yx})}{d\eta}$ in the equation (24) the flow equations are given by,

$$f'''=\frac{(f'^2-2ff''-3h)(1+\beta^{1/2}f'')^2}{(1+\beta^{1/2}f'')^2\alpha'}$$

$$2fh'+f'h+\frac{1}{\mathrm{Pr}}h''=0$$



With the boundary condition (20), (21).

In all the above cases, when the Prandtl number is small velocity is given by f' and temperature by h; when the Prandtl number is large, velocity is given by F' and the temperature by H. The set of equations in each of above three cases are coupled non-linear ordinary differential equations. These set of equations are solved numerically by application of Nachtsheim and Swigert technique of solution by the satisfaction of asymptotic condition extended to the said system of equations. Following the numerical technique discussed by Sirohi et al. (1984), Patel et al. and Surati et al. (2010s), the numerical solution of the present problem obtained. The graphical results are shown in figures[1]

Figure 1: Velocity Variation for Low
Figure 2: Temperature Variation for
Prandtl number for $(1/\alpha')$=100.0
low prandtl number for $(1/\alpha')$ = 100

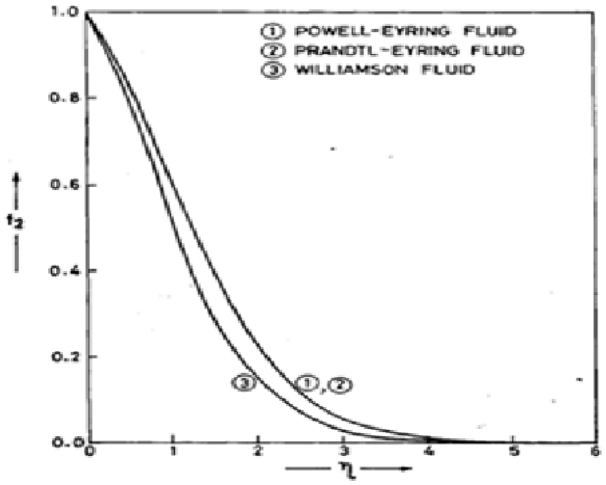
And β'=5x10^5 and Pr=0.71
and β'=5x10^5 and Pr=0.71

(41)

Temperature Variation for Large
Velocity distribution against ξ

Prandtl Number for $(1/\alpha')$ = 0.1 for Large
Prandtl Number for

$(1/\alpha')$ = 0.1 (42a)



4. CONCLUSION

For the comparative study of the above three models, velocity and temperature obtained for each model for (1/ α') = 100.0, β'=5x10^5 and Pr=0.71 for the case of small Prandtl number and for the case of large Prandtl number, (1/α') = 0.1 are plotted against η and ξ respectively. The results obtained are shown in Figure 1, Figure 2, Figure 3 and Figure 4. Variation of velocity is found to be same in the case of Powell – Eyring and Prandtl – Eyring fluids. For low Prandtl numbers, the convergence is found to be faster in Williamson fluids compared to other two fluids. The convergence in the case of Prandtl-Eyring fluid becomes faster as n increases. Similar behaviour is observed in the case of temperature profiles also. Temperature variation is found to be identical in the case of Powell-Eyring and Prandtl – Eyring fluids. For large Prandtl numbers, convergence of both velocity and temperature becomes faster compared to the other two models.[1].

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WAVELET TRANSFORMATION BASED FRACTAL COMPRESSION FOR IMAGE ENHANCEMENT

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Abstract- **Compression is a fundamental processing step in computer vision applications that efficiently stores and transmits the images while preserving the better possible quality. Images transmit from one device to another and the receiver gets the image with poor quality due to inefficient compression rates. In order to enhance the quality of the image, a novel image compression technique called Wavelet transformation based Fractal compression (WTFC) technique is introduced. The main aim of the WTFC technique is to perform efficient image quality enhancement with a higher compression ratio. In WTFC, numbers of images are collected from the input database. After that, image compression is performed to minimize the storage complexity by minimizing the unrelated and unnecessary parts of the image. After the compression, the Fractal decompression algorithm converts the encoded image into readable form. In this way, an efficient image quality enhancement is carried out with a higher compression ratio. Experimental evaluation is carried out using images with different factors such as compression ratio and compression time with respect to a number of images. The observed qualitative and quantitatively analyzed result confirms that the proposed WTFC technique achieves higher compression ratio with a minimum time than the state-of-the-art methods.**

Keywords: Image, Image compression, Fractile contraction mapping, iterated function system, Fractal decompression algorithm

I. INTRODUCTION

With the expensive growth of information technology, more multimedia information such as text, images, video, and audio creates great challenges to storage and communication. Therefore, the data compression method is extensively applied in the process of data transmission, storage, and communication. Among this generated information, the number of images is much bigger attention than other types of data. But the image includes a lot of redundant information such as some noise redundancy and visual redundancy, etc. Therefore, Image compression is the process of eliminating or removing the redundancy in image representation. Image compression is the process to reduce the size of digital image files while maintaining quality.Image compression is partitioned into two types such as lossy and lossless. In lossy compression, some parts of the original image will be lost after compression. The lossless compression remains similar to the original image after decompression. Lossless image compression is mainly used in some real-time applications such as medical imaging, military communication, remote sensing applications, etc. The Lossy compression discards some non-redundant information in the input image to provide a better compression ratio. Conventionally, large numbers of lossy and lossless image compression methods have been developed for the assessment of reconstructed image quality. An improved lossless image compression algorithm was introduced in [1] by using integer wavelet transform (IWT) and Huffman coding.

The designed algorithm minimizes the compressible space by reducing the redundancy of the original image. However, the complexity of the algorithm was not reduced to optimize the compression speed. A novel lossless compression encoding framework was developed in [2] for remote sensing images. The dinged framework increases the compression ratio but the time consumption for image compression was not minimized. An entropy minimization histogram mergence (EMHM) method was introduced in [3] to considerably minimize the number of grayscales and visible loss to image quality. But the higher compression ratio was not achieved. A novel lossy image compression method called singular vector sparse reconstruction (SVSR) was introduced in [4] for image compression and reconstruction quality. But it failed to improve the reconstruction of the image.Complex and novel Generative Adversarial BTC (GA-BTC) compression methods were developed in [5] to enhance the quality of block constructions and reconstructions significantly. However, it failed to implement more images by using multimedia resource compression strategies.

A. Paper outline

The paper is organized into different sections. Section 2 discusses the related works. Section 3 briefly describes the proposed WTFC technique for image compression with a neat diagram. In section 4, quantitative analyses are presented with different performance metrics. Finally, section 5 concludes the paper.

II. RELATED WORKS

An enhanced multivariance products representation (EMPR) was introduced in [6] for lossy hyperspectral image compression. However, the designed method failed to effectively minimize the performance of space complexity after the image compression. An extended hybrid image compression method was developed in [7] based on soft-to-hard quantification. But it failed to improve the performance of the hybrid image compression to process the compact images. A new variable-rate image compression framework was developed in [8]. But the designed framework was not efficient to improve the performance in terms of peak signal-to-noise ratio.

A context-based convolutional network (CCN) was developed in [9] for well-organized entropy modeling to improve image compression. But, it failed to solve various vision tasks such as image restoration and image quality assessment. A deep multi-stage representation-based image compression (MSRIC) technique was introduced in [10]. The designed MSRIC technique failed to investigate more images with lesser complexity.

III. METHODOLOGY

The image compression technique plays a vital role in both storage management systems and transmission. Image compression technique comprises two important processes namely compression and decompression. The compression process performs the operation of discarding information, whereas the decompression process is to recover lost information. In order to construct the decompressed image more similar to the original image, the classic image-processing techniques using two strategies such as lossy and lossless compression. However, its lack providesa higher accuracy rate in image recovering tasks. In order to improve the quality of image reconstruction, a novel technique called WTFC is introduced for concentrating on improving image qualitywith higher compression ratio as well as decompression strategies'.

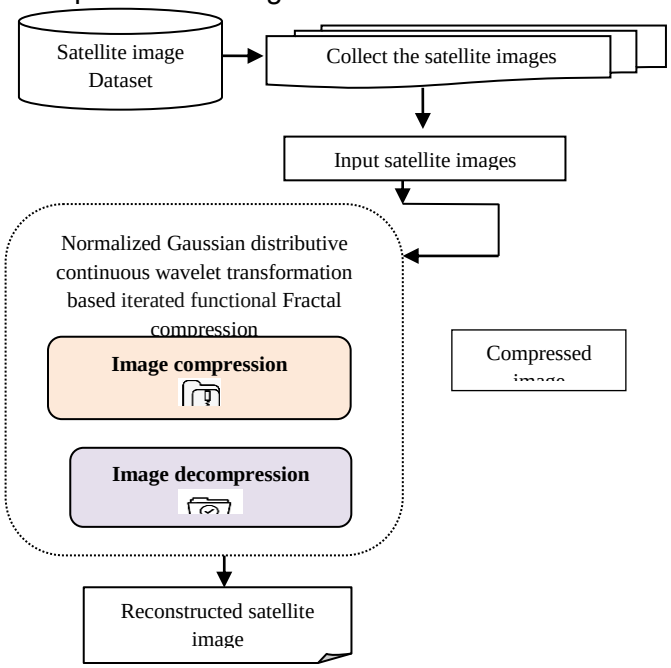

Figure 1 Architecture of the proposed WTFC technique

Figure 1 demonstrates an architecture diagram of the proposed WTFC technique to obtain the quality-improved reconstructed image. First, the number of images $Si_1, Si_2, Si_3, \ldots Si_n$ are collected from the input database 'DB'. After that, image compression is performed to minimize the storage complexity. First, the Normalized Gaussian distributive Ricker wavelet transform is applied for decomposing the input image into two parts such as domain block and range blocks. The entire size of the input image is said to be a domain block. The size of images gets reduced through the down sampling is called range blocks. The decomposition is the process of separating a given input image through down sampling and obtaining the different sub-blocks that are used for various applications in the fields of computer graphics and image processing. The main advantage of Ricker wavelet transform is that provides simultaneous localization in both times as well as frequency domains. The second main advantage of wavelets is that computationally very fast and also separates the fine details in an image. After the image decomposition, the Fractile contraction mapping between the domain block and range blocks is carried out using iterated function system (IFS).Iterated function system is a method of creating the fractals using self-similarity using the Hutchinson Operator by continuously mapping the pixels from the range block to the domain block. A fractal is a geometric shape including a detailed structure and each part of the shape has a similar geometric characters. The advantage of fractal image compression is to store the mathematical formulas in terms of fractal rather than as bit maps. In addition, the proposed compression technique has the ability to scale images without distortion. Then the encoding process is performed to find the best domain block for each current range block through the transformation. By applying an affine transformation of domain block, the linear combination of different operations is performed such as translation, rotation, and scaling. Finally, the best domain blocks along with its mathematical data such as scaling and offset coefficient are saved into the fractal codes. In this way, a compressed image is obtained.

After that, the Fractal decompression process is performed as a reverse process of compression that converts the compressed image into the reconstructed image. Based on image compression, an efficient image quality enhancement is obtained.

IV. **Evaluation Parameters**

There are different performances metrics are used to analyze the performance of the WTFC technique over the existing methods. The definition of the matricesare given below,

Compression ratio: It is defined as the ratio of the original image size to the compressed image size. The compression ratio is mathematically formulated as follows,

$$Ratio_{comp} = \left[\frac{original\ image\ (KB)}{compressed\ image\ (KB)}\right] (1)$$

Where, $Ratio_{comp}$ denotes a compression ratio. Higher the compression ratio, the technique is more efficient.

Compression time: It is defined as the amount of time taken by the algorithm to compress the given input images. The formula for calculating the compression time is expressed as follows,

$$CT = n * T\ \langle cp\ (Si)\rangle (2)$$

From (2),CT indicates a Compression time, 'n' indicates a number of images, T denotes the time taken by the algorithm to compress the image $i.e\ T\ \langle cp\ (Si)\rangle$. The Compression time is measured in milliseconds (ms).

Quantitative Performance analysis

In this section, performance discussion of the various metrics with three different techniques namely WTFC technique and the two state-of-the-art methods namely Lossless compression encoding framework [1] and Improved lossless image compression algorithm [2] are discussed. Initially, the peak signal-to-noise ratio is evaluated with various sizes of the input images illustrated in table I.

Figure 9 given above illustrates the graphical outcomes of peak signal-to-noise ratio versus various numbers of images. The number of images taken on the horizontal axis and the performance outcomes of the peak signal-to-noise ratio are obtained on the vertical axis.

The graphical representation noticed that the proposed WTFC technique achieves improved results of peak signal-to-noise ratio than the other two existing compression methods. This is because of applying the iterated functional Fractal image compression in which the original image is correctly reconstructed from the compressed image. These are also called noiseless since they did not add noise to the reconstructed image. Therefore, the output of reconstructed image quality level gets improved.

Images	Image Sizes (KB)	Compression ratio		
		WTFC	LCEF	ILICA
Image 1	179	1.154	1.052	1.022
Image 2	185	1.233	1.063	1.033
Image 3	186	1.248	1.075	1.050
Image 4	187	1.263	1.087	1.062
Image 5	188	1.278	1.105	1.074

Table 1 Comparison of Compression Ratio

Table 1 provides the performance results of compression ratio with respect to the number of images collected from the database. In order to conduct the experiment, the sizes of different images are taken from the database. Among three different compression methods, WTFC achieved a higher compression ratio than the conventional methods. Let us consider, that the input image size is$179KB$. Therefore, the performance of compression ratio using three methods namely WTFC, lossless compression encoding framework [1], and improved lossless image compression algorithm [2] are 1.154, 1.052, and 1.022 respectively. Similarly, different outcomes are observed for each method with respect to different sizes of the input images.

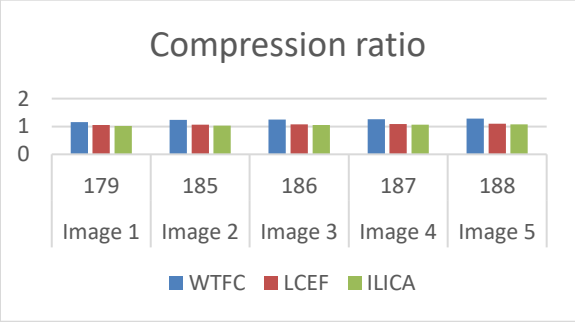

Figure 2 Graphical Representation of Compression Ratio

Figure 2 shows the compression ratio during image compression based on the size of the image in the database. Compared to the existing compression techniques, the proposed WTFC technique improves the compression ratio even with the increase in the size of images in the dataset. In the proposed WTFC technique, Wavelet transformation is performed where the mapping between domain block and range blocks in the fractal compression. After that, the best matching transformed domain block is identified for each range block and hence the improved compression ratio is obtained with different image sizes.

Table 2 comparison of compression time

Images (numbers)	Compression Time (ms)		
	WTFC	LCEF	ILICA
1000	125	134	145
2000	220	256	284
3000	270	330	390
4000	320	360	440
5000	350	400	475

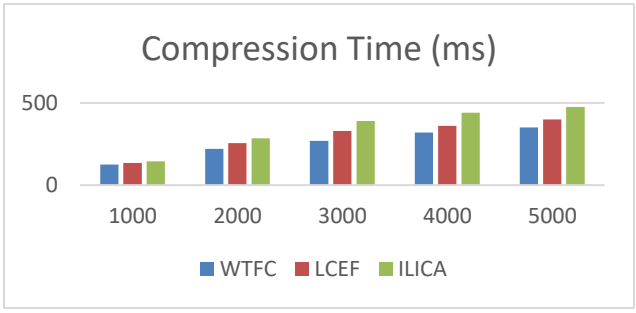

Figure 3 Graphical representation of Compression Time

Table 2 and figure 3 present the overall performance analysis of compression time with respect to a number of images taken from the database. As shown in graph 3, the compression time of three different methods namely WTFC, lossless compression encoding framework [1], and improved lossless image compression algorithm [2] is improved. But, the performance of compression time using WTFC is relatively lesser than the other two existing compression methods. As an experiment is conducted with '1000' input images, the compression time was found to be '$125ms$' using WTFC,'$134ms$' using [1], and $145ms$' using [2]. However, the overall performance analysis proposed technique is compared to existing methods.

V. CONCLUSION

In this paper, a novel compression technique called WTFC is introduced for compressing the images. In the proposed WTFC technique, the compression operation consists of image decomposition, mapping, and encoding operations. During decomposition, the WTFC images are decomposed to obtain a range and domain blocks. This smoothed image is then down-sampled to remove redundancy. After the image decomposition, the Fractile contraction mapping between domain and range blocks is carried out using iterated function system (IFS). Finally, the encoding process is executed to convert the image into mathematical data termed fractal codes. In this way, a compressed image is obtained. After the compression, image decompression is performed to convert the encoded image into readable form with higher quality.The comprehensive experimental evaluation is carried out with an images dataset. The quantitatively analyzed results indicate that theWTFC has received improved performance in terms of achieving higher compression ratio and lesser time consumption when compared to existing compression techniques.

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SPATIAL CONVOLUTED EDGE SMOOTHING FOR IMAGE ENHANCEMENT

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Abstract - **Image quality enhancement aims to improve the rich details from degraded images, which is applied in many fields, such as medical imaging, video surveillance, criminal investigations, remote sensing, etc. Natural images captured under varying light conditions have poor contrast, low brightness, hidden colors, and high noise. Numerous techniques have been developed for image enhancement. However, these techniques are only suitable for enhancing the images but it fails to remove the artifact-free quality improved results for various other types of images. Therefore, to meet this aim, in this paper, an automatic image enhancement technique called Spatial Convoluted Edge Smoothing (SCES) is introduced for image preprocessing to enhance the image quality with minimum error. The proposed SCES technique performs image preprocessing that includes two processes namely filtering and edge smoothing. Experimental evaluation is carried out using natural images with different factors such as mean square error and memory consumption with respect to a number of natural images and sizes.**

Keywords: Image quality enhancement, Filter., spatial convolutive edge smoothing

I. INTRODUCTION

Image enhancement and restoration are the fundamental processing steps of real vision systems. Therefore, the main purpose is to enhance the visual quality of images and offers reliable information for subsequent visual decision-making. Images collected in low-brightness environments often direct to poor visibility and reveal artifacts. These artifacts affect the visual observation of the human eye. The existing method-based image enhancements technique is faced many problems for accurate preprocessing.

A new adaptive weighted guided image filtering (AWGIF) technique was proposed in [1] to decompose an initial depth and to preserve the edges accurately. However, the performance of time consumption on image enhancement was not minimized. A Low Light Enhancement and Denoising (LLEAD) method was introduced in [2] for better-enhanced image contrast and minimizing the mean squared error. But it failed to develop a statistical model for the distortion of colors. An ensemble spatial method was developed in [3] for image enhancement. But, the designed method failed to improve the model with lesser mean squared error.

An adaptive guided image filtering using a modified cuckoo search algorithm was designed in [4] for removing the noisy image. However, the performance of the peak signal-to-noise ratio was improved but it failed to minimize the time complexity. A global-local image enhancement, (GLIE) was developed in [5] for contrast enhancement and structural preservation. But, the performance of the peak signal-to-noise ratio was not improved.

A color correction and adaptive contrast enhancement method were designed in [6] for underwater image quality improvement. But, the designed approach enhances the complexity of the algorithm. A simple and effective image contrast enhancement technique was introduced in [7] to achieve high dynamic range imaging. But, the performance of mean square error was not minimized.

A. Paper outline

The remaining sub-sections of this paper are as follows. Section 2 presents the related work of conventional image quality enhancement models. The proposed SCES technique is described in section 3. Section 4 provides the results and discussion of different performance metrics. Finally, the conclusion is presented in section 5.

II. RELATED WORKS

A fast and lightweight deep learning-based algorithm was introduced in [8] for low-light image enhancement. However, the designed algorithm was not efficient in further improving the information in the enhanced image. The morphological operator-based image fusion algorithm was designed in [9] for improving the efficiency of enhancement using spatial filtering. But, the computational complexity was not minimized at optimum levels.

A regularized illumination optimization approach was developed in [10] to improve the quality of low-light images by eliminating the negative effect of unwanted noise. However, the performance of processing time and space consumption was not minimized. A new Retinex-based lowlight image enhancement approach was introduced in [11] using Retinex image decomposition. But, the efficient filtering technique was not applied to achieve better image enhancement.

An automatic image enhancement approach was introduced in [12] to provide better quality results for all types of images. But it failed to properly handle the image enhancement approach for particularly dark regions. A novel traffic image enhancement algorithm was designed in [13] based on illumination adjustment and depth difference. But the algorithm failed to effectively handle the uneven illumination and haze images for improving the image enhancement.

III. PROPOSAL METHODOLOGY

Image quality enhancement aims to increase the quality of images in terms of colors, brightness, and contrasts. Since the images captured in low-brightness situations often direct to poor visibility and illustrate the artifacts such as distortion. These artifacts not only change the visual observation of the human eye but also reduce the performance of computer vision. Various denoising methods have been proposed to enhance image contrast and noise also removed. Conversely, the conventional denoising methods did not provide satisfactory performance in the image quality enhancement.

Therefore, a novel fast technique called SCES is introduced for enhancing the image enhancement and consequently, it is highly desired to improve the contrast enhancement by noise suppression as well as edge smoothing. Figure 1 given above illustrates the architecture diagram of the proposed SCES technique to perform the image quality enhancement with poor quality images. The input natural images are collected from the dataset. Let us consider the natural image dataset as input for quality enhancement. The 'n' number of low-quality natural images $I_1, I_2, I_3 \ldots I_n$ are collected from the dataset.

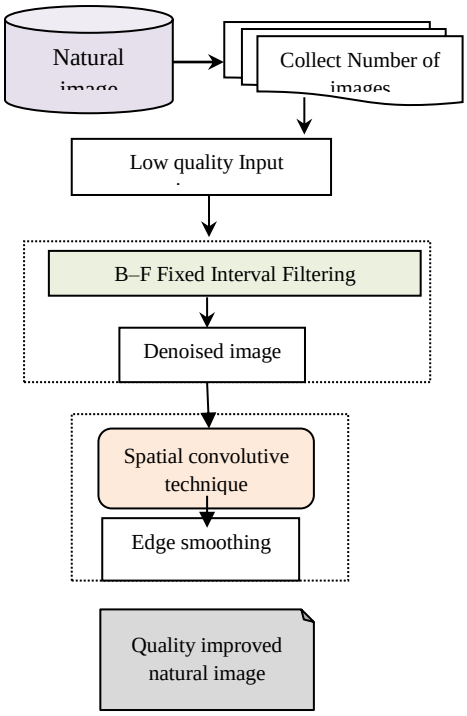

Figure 1 Architecture of proposed SCES Technique

The collected images are first given to the Piecewise regressive damped Bryson–Frazier Fixed Interval Filtering technique for noise removal. The Modified Bryson–Frazier Fixed Interval Filtering technique analyzes the image pixels by using piecewise regression and identifies the normal and noisy pixels. The Piecewise regression is a machine learning technique for analyzing the pixels of input images and partitioning them into two segments (i.e. normal or noisy pixels). Then the Piecewise regression analyzes the relationship between the center pixels and other neighboring pixels. Then the regression function uses the Damped least-squares method to find the pixels with minimum deviation from the center pixels value.

A damped least-square method is a mathematical model used to find the local minimum by reducing the non-linear least squares problems. As a result, the pixels with minimum deviation are called as normal. Otherwise, the pixels are said to be noisy. These noise pixels are removed from the image. Finally, the denoised image is obtained. After the image noise removal, the edge smoothing process is performed for improving the image quality. The proposed SCES uses the spatial convolutive Marr–Hildreth technique for smoothing the edges of the image in the two-dimensional space through the convolution of Laplace and Gaussian function. Finally, the quality-enhanced image is obtained with minimum time as well as error. The preprocessing step also minimizes memory consumption.

IV. RESULTS AND DISCUSSION

The experimental result of the proposed SCES technique and existing methods namely AWGIF [1] and LLEAD [2] are discussed in this section with the various performance metrics such as mean square error, and peak signal-to-noise ratio, preprocessing time, and memory consumption. Performance analyses are explained with the help of tables and graphical representation.

IMPACT OF MEAN SQUARE ERROR

Mean square error is measured based on the squared difference between the number of images and the number of natural images that are accurately preprocessed. The formula for calculating the Mean square error is given below,

$$MSE = \frac{1}{n} \sum \left(n_I - n_{Icp}\right)^2 \quad (1)$$

Where MSE' denotes a mean square error which is defined as the squared error between the number of images n_{Icp} and accurately preprocessed images.

Table 1 Mean Square Error

Number of natural images	Mean square error		
	SCES	AWGIF	LLEAD
600	0.166	0.24	0.326
3000	0.243	0.3	0.385
4900	0.316	0.35	0.421
5600	0.326	0.375	0.444
6000	0.368	0.4	0.486

Table 1 reports the performance results of the mean square error against the number of natural images for different enhancement methods namely SCES technique and existing methods namely AWGIF [1] and LLEAD [2]. The number of natural images collected from the dataset is taken in ranges from 600 to 6000. The observed results validate that the mean square error of the image preprocessing of the SCES technique is found to be minimized than the other existing image enhancement methods [1], [2]. This is proved through statistical estimation. Let us consider 600 natural images in the first iteration and the performance result of the mean square error is 0.166 using the SCES technique. By applying, AWGIF [1] and LLEAD [2] to calculate the mean square error with 600 natural images, the observed means the square error is 0.24, and 0.326. Similarly, remaining iterations are performed for each method with respect to a different number of images. After that, the observed error values of the SCES technique are compared to the existing methods.

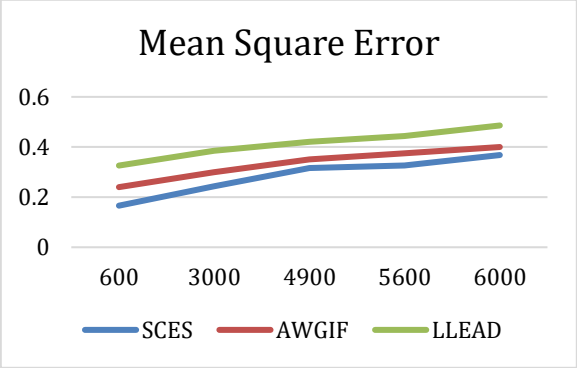

Figure 2 Performance Results of Mean Square Error

Figure 2 illustrates the performance results of the mean square error against a different number of natural images. The input natural images are taken as input on the horizontal axis whereas the performance results of the mean square error are obtained at the vertical axis. The graphical illustration indicates that the performance of the mean square error of the SCES technique is found to be minimized when compared to the other two existing methods. The reason behind this improvement is to apply the damped least-squares Modified Bryson–Frazier Fixed Interval Filtering technique and spatial convolutive Marr–Hildreth edge smoothing. First, the noisy pixels in the input images are removed, and then edge smoothing is performed. The proposed technique accurately performs the preprocessing for all the images hence it minimizes the error rate.

Impact of Memory consumption

Memory consumption is defined as the amount of memory space consumed by the algorithm to perform image denoising as well as edge smoothing. The memory consumption is calculated as follows,

$$Com_{Mem} = n * Mem\,[DN + ES] \quad (14)$$

Where 'Com_{Mem}' denotes memory consumption, n denotes the number of images, Mem denotes memory,DN indicates denoising and ES denotes edge smoothing. The memory consumption is measured in terms of Megabytes (MB).

Table 2 Memory Consumption

Number of natural images	Memory consumption (MB)		
	SCES	AWGIF	LLEAD
600	18	21.6	25.8
3000	31.5	34.5	38.4
4900	36.75	40.67	44.1
5600	38.08	41.44	45.92
6000	39	44.4	48

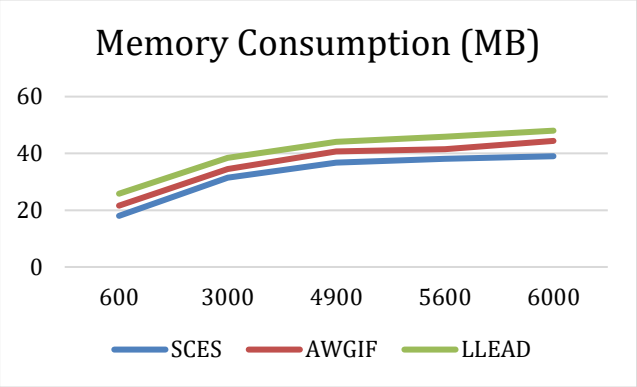

Figure 3 Performance results of Memory Consumption

Table 2 and Figure 3 illustrate the performance result of memory consumption with respect to a number of natural images taken in the ranges from 600 to 6000. By increasing the number of natural images, the memory consumption of image preprocessing also increased due to the increasing the count of input. The output result indicates that the SCES technique reduces the performance of memory consumption than the existing preprocessing techniques. The reason behind the improvement of the SCES technique is to reduce the size of the noisy pixels. The preprocessing helps to enhance the quality of images by removing the noisy pixels.

While considering 600 images collected from the dataset to conduct experimental work, the memory consumption was found to be $18MB$ using the proposed SCES technique. Then the memory consumption of existing AWGIF [1] and LLEAD [2] are $21.6MB$ and $25.8\,MB$ respectively. Likewise, various runs are carried out with respect to a number of input images. The observed performance of the proposed technique is compared to the existing methods.

V. CONCLUSION

With the rapid development of image processing technology, image quality enhancement is the fundamental processing step of many real vision systems. In order to improve the quality of a given image, the SCES technique is introduced in this paper for enhancing the image contrast by removing the noise as well as preserving the depth edges. First, Piecewise regressive damped Bryson–Frazier Fixed Interval Filtering is applied to a SCES technique to denoise the input natural image by identifying the noisy pixels. Then, the edge smoothing is carried out for improving the image quality. Based on the denoising and edge smoothing, accurate image preprocessing is obtained with minimum time. The comprehensive experimental assessment is carried out with the natural image dataset. The obtained quantitative result indicates that the proposed SCES technique offers improved performance in terms of achieving lesser mean square error and memory consumption when compared to existing methods.

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