SOCIAL NETWORKING-A DOUBLE-EDGED SWORD

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ABSTRACT

Social Networking is the buzzword of recent times. It is a double edged sword, since the benefits get people hooked on to it and then too much dependence might lead to psychological problems. The opinion is divided- since the supporters of bright side of social networking believe that if any psychic manifestations take place, the reason might be an already existing mental problem whereas those against it, believe that the excessive use of the Social networking leads to mental ailments. The paper tries to present a balanced view of the same, discussing the opinions of experts in the field, analysing the data and deriving conclusion.

Keywords -Social Networking, Social Media, Facebook, Selfies, Whatsapp

I. INTRODUCTION

The essence of social interactions has changed over the last few years. It simply meant meeting friends and families over lunch, dinner, tea or just spending sometime with them. Over the years, it has become synonymous with interacting online with all, with the aid of social media. Sharing life with each other through facebook, twitter, whatsapp etc is being preferred now. “Geography is history” now,the friends and family , living at distant places are able to constantly stay in touch easily, being aware of all that is happening in each others life.

Social networking implies sharing of information for social interaction with family and friends. It is used extensively by businesses to inform, educate and engage customers or its users. The sharing of information is the basic human need and to do that with the ease of online mediums has made it very popular. The reason for its rise are aplenty. The need to stay connected and informed about each other’s life and whats going on in the world around them. Paucity of time, to go and meet-up with friends has been sorted out through the Social Networking medium. Nuclear families, with both parents working also creates the problem of “loneliness” amongst kids, which they try and take care of by connecting to a lot of friends through the SN websites.

II. OBJECTIVES AND METHODOLOGY

The article is aimed to analyze Social Networking from various perspectives, this qualitative research aims to find out

1. The relevance of Social Networking in marketing the products/people/causes

2. To analyze theoretically the various evils associated with Social Networking with special reference to Facebook and whatsapp

To understand the essence of Social Networking, a lot of literature has been studied and prevailing trends analyzed, to critically evaluate the positive and negative role of Social Networking. Informal conversations with students and other affected people were also initiated to analyze the same.

III. REVIEW OF LITERATURE

The study of the literature related to the Social Networking showed that though the research in this area is in its infancy but many researchers are studying the various aspects of it. The negative aspects have been studied in detail by psychologists and reported.

Samrita Ghosh in her article , “Beware! Social media addiction can cause FOMO”, shares that FOMO i.e. ‘Fear of Missing out’ keeps people hooked on to the Social Media. A clinical psychologist shares that absence of social media can lead to FOMO. One tends to develop uneasiness if staying away from social media is for too long.

Idris Mootee in his article, How to avoid the Facebook /Twitter Addiction Disorder(FTAD) Pandemic?” says that Social Media Addiction Disorder is becoming a real problem, it is a psychophysiological disorder involving tolerance; withdrawal symptoms; affective disturbances; and interruption of social relationships. The most common one is Facebook /Twitter Addiction Disorder (FTAD).

Emma Stein in her article , “Is Social Media Dependence A Mental Health Issue?” discussed the finding of the leaders opinion on “Status updates” pattern, trends and what do they signify? It concludes thatin moderation, its great but when used excessively it has negative impact on the quality of life being led.

Casey , Ferrand in her article “Signs of suffering from 'selfie' addiction”, shares that selfies have become a cultural phenomena and most of the celebrities are promoting its use. Though some are caught up in the addiction of it, being obsessed with it. She also shares a set of statements that may help in figuring out whether someone is suffering from selfie addiction or is borderline case of the same. The article shares the opinion of various doctors. One of them said that the patients want surgery done to improve their chances of looking better in the selfies. He also opines that,"Too many selfies indicate a self obsession and a certain level of insecurity that most teenagers have. It just makes it worse. Now they can see themselves in 100 images a day on Facebook and Instagram." In the article titled , 'Selfie Addiction' Is No Laughing Matter” from The Huffington Post , the psychiatrists say selfies may become an addiction for people with some form of psychological ailment like Body Dismorphic Disorder, Obsessive Compulsive Disorder, etc.. As opposed to the belief that selfies cause psychological problems, it said that addiction happens in those who are already suffering from it.

Sverre Ole Dronen in the paper titled, “New Research about Facebook Addiction” the study has clear views as to why some people develop Facebook dependency. It occurs more regularly among younger than older users.

It also found that people who are anxious and socially insecure use Facebook more than those with lower scores on those traits, probably because those who are anxious find it easier to communicate via social media than face-to-face.People who are organised and more ambitious tend to be less at risk from Facebook addiction. They will often use social media as an integral part of work and networking.

– the research also indicates that women are more at risk of developing Facebook addiction, probably due to the social nature of Facebook

IV. FINDINGS AND CONCLUSION

The detailed study of the literature available on area has resulted in dividing the findings and conclusions which revolves around the use of Social Media as a constructive tool and also sometimes causing addiction resulting in an unhealthy way of life.

4.1. Social Media as a Tool of Marketing

4.2 Social Media-The evil side

4.2.1 Whatsapp

4.2.2 Facebook

4.1 Social Media as a Marketing tool

Social Media channels have added new dimensions to the field of business and marketing. There are certain aspects of the customers or users that have to be considered whenever a decision regarding setting aside resources of time and money have to be taken..

Social Media as a tool for marketing would serve well for the organisation whose customers or end users are comfortable online and spend substantial time on the internet based activities. Marketing through the channel of Social Media is considered a cost-effective way of reaching the customers.

Though cost-effective as compared to the other mediums, it still requires a detailed planning to frame the strategy to cater to different social medias, viz. facebook, twitter, instagram, linkedin and so on. No single strategy would work for all the users and for all the platforms. The platforms and the users are ever-changing and also there are no blue-prints to follow , since the medium and its discovery as a marketing channel is comparatively new.

The strategy should be to assign an expert in the particular Social Media to use only that media for a particular period of time or for a particular event. The objective is not only to generate interest (“likes” on Facebook) but also to keep the interest alive, so that it manifests into profits for the organisation.

The strategy to address users/ customers through social media should not be a “on-and-off” one, but a constant one, which needs to be adaptive of new changes in technology , medium or propagation of a new medium. A strategy should be finalised which should be economical and is able to yield desired result.

The most economical and at times the most dangerous is the “Word-of-mouth” (WOM). The speed with which the word spreads is confusing at times. “WOM” can work for and against the company, so due care needs to be exercised. The online travel industry has been thriving well, even during the rock bottom years of e-commerce. The online travel customers rely heavily on the recommendations of the other customers. One good or bad experience with one customer of the hotel/resort can have a ripple effect and hence the result. According to Nielsen report, 92% of consumers believe recommendations from friends and family over all forms of advertising. The good experiences can result in multiplication of customers and a bad one can deplete the existing base of customers also.

In addition to the "word of mouth" , the capability of precise targeting of the customers is driving people to invest in marketing through Social Media. The successful ventures of Gillette India, Vaseline, Philips India, on Facebook are a few of the success stories. The highlights of all, being the one-to-one marketing or advertising.

Twitter is also being used as an extensive tool of marketing for marketing of people, events and causes. Since Lok sabha Polls 2014, Narendra Modi has been using twitter to convey what he would do and also what he has been doing since he came to power. The Indian citizens wanted communication and this is what they have been provided with, through social media interactions.

Movies and Events are being rooted heavily through twitter. PK for the first time used audio as a part of twitter promotions. When Bang-Bang was to be released Hrithik Roshan, the star of the film, created and invited his friends from Bollywood for the Bang-Bang challenge, hence promoting and marketing their film.

Important events like Delhi Elections, are being promoted through Social Media. People taking to Facebook to upload their dotted index finger , encouraging people to go out and vote. Chief Ministerial candidates promoting the importance of voting by taking to twitter and requesting all to go out and vote.

Recently the cause of Raif Badawi is a Saudi Arabian writer and activist is being manifested online for gathering online support worldwide. Aseem Trivedi has started a series of cartoons dedicated to the activist, requesting people to support and stop his lashing.

The positives of using Social Media are aplenty and are being used by businesses and people to their advantage.

4.2 Social Media-The flip side

The connectivity provided by Social Media provides so many benefits and that are being reaped by Social Media giants and by the users. But there's something gloomy about it, beyond the glitters. The charm of connecting to the family, friends (real or only online friends), celebrities is far beyond the human mind can fathom and handle. Even the excessive use is seem as normal by the users, but is it?

There are reasons specified by various experts have been numerous, some of them are enlisted and discussed below.

a. Self distraction
b. Boredom relief
c. Re-enforcements in the form of supportive comments and 'Likes' make them come back repeatedly
d. (Dr.Shannon M Raunch, University of Mesa.)
e. Self-demonstration "ME"
f. Fear of Missing Out (FOMO)

Social networking provides people with a platform for self demonstration and human psyche gives extreme importance to "Me"i.e. themselves. A medium where everyone is flaunting their possessions, relations and themselves. It also provides a distraction from the work or task at hand and we all can avail it sometime or the other. Another important reason has been relief from boredom. The feature of "Likes" on Facebook and retweets on twitter, gives users a high and make them come back again and again. Lately, the term "FOMO" has been given an important status , where users live in constant fear that they will be missing out on something if they are not logged on or using the Social Networking platform. As a result, they keep logged on and hooked on.

It stirs a variety of emotions including elation on receiving positive comments ; feeling rejected with negative comments; unrest and inadequacy when we are comparing ourselves with friends and family and so on. Anxiety UK, conducted a survey on Social Media use and shared their findings -53% of the participants said SM sites changed their behavior and 51% of those said there was a negative impact , they claimed their lives have been *worsened. They now feel less confident and more disturbed when they see the happening lives of their friends.*

Also, Dr. Bernard studied and found out that The drug and alcohol use has shown an increasing trend of use by excessive users of SM. They confess that when they see the "happening lives" of their friends and family, through the exposure of pictures of drug and alcohol use, they are more inclined to use it themselves. Since everything online being shared is glamorised.

Each platform has its own charm and whims, which need to be analyzed, separately. For the purview of this article, we will study the platform of whatsapp and Facebook, also touching upon the new obsession with Selfies.

4.2.1 Whatsapp

Whatsapp has become an obsession with the people with smartphones. A simple application developedmakes it possible to have a conversation with anyone, anytime and least cost. It aids in sharing pictures, videos, jokes, etc. The phenomena is relatively new but has taken over the life of all with an internet connection and smart phone.

There are innumerable instances where excessive use of whatsapp has been creating problems.

In Indore, India a software engineer filed a case of divorce against his wife, accusing her of not giving their life anytime, since her world is limited to WhatsApp messaging service. A similar case in Yemen where a wife filed a case against her husband over spending most of time using Whatsapp. Another unique one, A Zimbabwe Prisons and Correctional Services officer is facing disciplinary action after two inmates escaped from Chikurubi Maximum Security Prison while he was glued to social networking platform WhatsApp.

There are a few signs that can be helpful in figuring out whether someone is addicted to Whatsapp use or not.

a. Urge to check is too much.
b. Thinking about whats on whatsapp before going to sleep and early morning
c. Checking 'last online' of friends
d. Changing your status and display picture very often
e. If you continuously check your phone
f. If you keep forwarding the jokes, msgs, without verification and without getting response from people
g. If you pick up fights with people who don't respond immediately to your conversations

De-addiction

If some or all of these feature in anybody's daily life, the problem of addiction exists and needs to be taken care of. There are certain suggestions that aid in de-addiction from whatsapp.

The basic and first step to be taken is to remove the whatsapp icon from the home screen, fight the urge to open whatsapp the moment there's a new message; instant reply to new chats is uncalled for; do not forward anything and everything; frequent updating profile photos should be avoided; change of status should be restricted to once a week and the time frame to check whatsapp (whether it be one hour or two hours), etc.

Protocol

There is an upsurge of groups on whatsapp- name it and we have it. Work group, friends group, parents group, etc. Since the concept is new, so in this article we create an discuss a protocol to be followed in different groups.

– Professional Group

- DOs Only Information (only useful)
- DONTS
  - No Good Morning messages
  - No jokes
  - Do not use your discretion on whats important and whats not
  - Very imp: when Information shared-should it be followed by "Thank you" NO

There are various things that need to be followed stringently, especially in the Professional groups formed on whatsapp. The basic reason is that it is a forum formed by professional colleagues , so problems cant be pin-pointed openly. The Dos section is simple one liner, only useful information pertaining to the work needs to be shared on the platform.Whats not to be shared requires a lot of thought i.e. Donts. Good Morning messages are a strict "No". Jokes, spiritual, motivational messages are also not meant for the professional group. It is important not to use your discretion in judging what is important and what isn't. Another very important dilemma is that if some information is shared and you are thankful for that information. Do we all say "Thank you"? the answer is definitely "No". It is assumed that you are Thankful.Also, if some information about someone's achievement is shared, Do we all start congratulating the person in the group? The answer is again "No". But in this case, the protocol is to congratulate the person on his personal whatsapp account and not on the group.

- Protocol for Group-Dos and Donts

- Friends Group
  - DOS
    - Share whatever you want to
  - The DONTS
    - Do not contribute to rumour
    - Check with news websites
      - ≫Bomb hoax
      - ≫Fire

≫death

The Protocol for Group of friends is simple. Anything can be shared since as opposed to professional group, friends would tell you upfront what they wanter dont want you to share.The Donts list is small as well, Do not become a means of spreading rumours, check with a news website or channel before you forward a message about a fire anywhere, death of a celebrity, bomb hoax, etc.

The excessive use can also cause injury to the wrist, refered to as whatsappititis. The technology is supposed to be helpful and it is but it is addictive and the addiction tp anything isn't good.

4.2.2 FAD-Facebook Addiction Disorder

Facebook is only 11 years old and has taken over the world by storm, by becoming an integral part of staying connected with friends and family. Each event of personal life is shared with hundreds of online friends within an instant and the need to stay connected is satisfied. The positives are a plenty but Facebook Addiction Disorder (FAD) has surfaced and is hitting the generation hard, so there's a need to know that

a. it exists
b. there are traceable symptoms
c. There is a possibility of de-addiction there is a pattern of excessive use being observed by psychologists, parents and friends.

The research by Boston University's Ashwini Nadkarni and Stefan G. Hofmann propose that the social network meets two primary human needs-the need to belong and the need for self-presentation. The instant connection with people, at any hour of the day provides a false sense of security to people, the messages that the get is exciting since it feels like someone is interested in "me"."Me" being the crux of whole social networking-myself, my family, my house, my car , my holiday, etc. The urge of appreciation and belongingness is fulfilled by Facebook. at the same time, when the comments get negative, theres a problem of feeling rejected and bullied at the same time.

As per Joanna Lipari, a clinical psychologist at University of California, LA, Eleanor Shaw (2013) in the article "Status update : Facebook Addiction Disorder", the following symptoms explain if the problem is serious.

1. Losing sleep over FB. Staying logged in throughout the night and eventually getting too tired for the next day;
2. As a bench mark, spending one hour or more on FB is too much;
3. Being obsessed with exes who reconnect on FB;
4. Ignoring work for FB;
5. The thought of getting off FB leaving the user in cold sweat;

Also if the user has more online friends than real life friendships,checks facebook more than 5 times a day ,updates status too frequently ,spends hours updating the status , checks facebook account the first thing in the morning and clicks pictures not for a memory but to post on Facebook

All these are detrimental to the health-both physical and mental. Clicking of pictures, especially selfies have known to be a symptom of narcism or body dimorphic disorder. Pictures are clicked mostly with the intention of posting online rather than to create and cherish those as memories. Hours are spent on updating the status, with the sole interest of getting comments and "likes" from online friends. Online friends almost always out-number

the real-life friends and in some cases many online friends are not even known to the person. To overcome boredom or to distract themselves they log on to the Facebook but end up ignoring their work.

the addiction interrupts their day-to-day activities; many teenagers are using FB to express themselves and some getting depressed since their real life didn't match their "FB persona" leading to depression and even suicidal tendencies. The couples cited it as one of the major cause of their break-up.

The University of Michigan addressed this issue in a study published in August of 2013 that observed the relationship between FB use and Well-being. By studying the participants five times a day over two weeks about how they felt after using Facebook and how satisfied they were with their lives after the two-week period. Their study found that Facebook negatively impacted them with each variable. The more people used Facebook "the worse they felt" and "the more their life satisfaction levels declined over time. the question again arises that If Facebook makes us feel worse, why can't we stop ourselves from going back for more?

The answer to this is provided by another research conducted by Harvard University's Psychology Department The reason we can't keep our thumbs away from updating, liking, and hashtagging was explored in this study that found that there is a biological reward that happens when people disclose information about themselves.

- "Self-disclosure was strongly associated with increased activation in brain regions that form the mesolimbic dopamine system," the study reported.
- Rewards were magnified when participants knew that their thoughts would be communicated to another person.

De-addiction

- Know that you are addicted
- Start questioning why you are on FB?
- "Likes" on FB, do they mean something?
- Keep track of time spent on FB
- Ask family and real life friends how they feel about the amount of time you spend on FB
- Be careful of race to have as many friends as possible
- Stop updating the status frequently
- Keep "FB Free day" once a week
- Try giving up FB for a particular event
- Turn off email notification
- Remove FB application from your mobile phone

It starts with honest confessions to self, about why we are using Facebook excessively and what do "likes" imply for me. Removing the facebook app from the smart phone and having a FB free day and event can go a long way in determining the addiction level and also help in de-addiction.

To conclude, Social Networking is an intriguing field of operation and research. Researcher are divided on whether its positives outweigh the negatives or vice-versa. The medium cannot be blamed for all the evils.

Sometimes it may be a pre-existing problems like Body Dismorphic Disorder, Obsessive Compulsive Disorder, which is blown out-of-proportion when SN is used excessively. The article concludes that though there's no denying the fact that if used judiciously, SN can help achieve a lot but if it takes over our life and the dependence is too much, its time to back off. If the addiction is allowed to propagate, the consequences are grave and hence it should only be used as a way and not the way of life.

"The path treaded on Social Networking
looks greener and younger;
But the terrain will get tougher
if not reined in sooner"

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ROBUST HASHING FOR IMAGE AUTHENTICATION USING ZERNIKE MOMENTS, GABOR WAVELETS AND HISTOGRAM FEATURES

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ABSTRACT

For detecting image forgery including removal, insertion, and replacement of objects, and abnormal colour modification and for locating the forged area a robust hashing method is developed. Global, local and histogram features are used in forming the hash sequence. The global features are based on Zernike moments representing luminance and chrominance characteristics of the image. The local features are extracted using Gabor wavelets which includes position and texture information of salient regions in the image. The histogram features includes the number of pixels in the same intensity. Secret keys are introduced in feature extraction and hash construction. Being robust against content-preserving image processing, the hash is sensitive to malicious tampering and applicable for image authentication. The hash of a test image is compared with that of a reference image. When the hash distance is greater than a threshold and less than, the received image is judged as a fake. By decomposing the hashes, the type of image forgery and location of forged areas can be determined.

Keywords **:** ***Gabor Wavelets, Histogram Features, Salient Region, Thresholding, Zernike Moments***

I INTRODUCTION

More and more digital images are being created and used every day due to the popularity of digital technology. However, they are susceptible to modification and forgery. When the digital image contains important information's, their credibility must be ensured. So it is necessary to have reliable image authentication systems. Robustness and securities are two important design criteria for image hash functions. By robustness, we mean that when the same key is used, perceptually similar images should produce similar hashes. Here, the similarity of hashes is measured in terms of some distance metric.

With the widespread use of image editing software, more and more digital media products are easily to distribute illegal copy. Image hashing is a technique that extracts a short sequence from the image to represent its contents, and therefore can be used for image authentication. If the image is maliciously modified, the hash must be changed significantly. The hash functions in cryptography such as MD5 and SHA-1 that are extremely sensitive to every single bit of input. The image hash should be robust against normal image processing. In general, a good image hash should be reasonably short, robust to ordinary image manipulations, and sensitive to tampering. Different images have significantly different hash values, and secure so that any unauthorized party

cannot break the key and coin the hash. To meet all the requirements simultaneously, especially robustness and sensitivity to tampering, is a challenging task.

In general an ideal image hash should have the following desirable properties:

- Perceptual robustness: The image hash function should be insensitive to those common geometric deformations, image compression and filtering operations, which do alter the image but protect its visual quality.
- Uniqueness: Probability of two different images having the same hash value should tend to zero.
- Sensitivity: Perceptually significant changes to an image should lead to a totally different hash.
- Secret Key: Secret keys are used for hash construction.

Until now, various image hashing methods have been proposed. V. Monga [1] developed a two-step framework that includes feature extraction (intermediate hash) and coding of the intermediate result to form the final hash. This has become a routine practice in many image hashing methods. Many previous schemes are either based on global or local features. Global features are generally short but insensitive to changes of small areas in the image, while local features can reflect regional modifications but usually produce longer hashes.

S. Xiang [2] developed a histogram based image hashing scheme which is robust against geometric deformations. Histogram represents the number of pixels with a particular pixel value. Histograms are not sensitive to single bit changes. Thus the same images with different pixel values will have same histograms. This method will affect the hash generated from the digital image. The histogram shape as the exploited robust feature is not only mathematically invariant to scaling, rotation and translation, but also insensitive to those challenging geometric attacks. The main disadvantage is that images with similar histogram cannot be distinguished.

A. Swaminathan [3] proposed an image hash method based on rotation invariance of Fourier-Mellon transform features. This method is good to filtering operations, geometric distortions, and various content-preserving manipulations. Using image hashing for multimedia searching operations is computationally highly efficient where the hash has much smaller size with respect to original data [4]. The method proposed in [4] is robust against geometric transformation and normal image processing operations, and can detect content changes in relatively large areas.

In another work, Monga [5] apply NMF to pseudo-randomly selected subimages. The NMF construct a secondary image, and obtain low-rank matrix approximation of the secondary image with NMF again. The matrix entries are concatenated to form an NMF- NMF vector. The inner products of the NMF-NMF vector and a set of weight vectors are calculated. Because the final hash comes from the secondary image with NMF, their method cannot locate forged regions. In analyzing the NMF-NMF method, Fouad [6] point out that, among the three keys it uses, the first one for pseudo-randomly selecting several subimages is crucial. However, it can be accurately estimated based on the observation of image hash pairs when reused several times on different images.

Khelifi [7] propose a robust and secure hashing scheme based on virtual watermark detection. The method is robust against normal image processing operations and geometric transformation, and can detect content changes in relatively large areas. In [8], a wavelet-based image hashing method is developed. The input image is partitioned into non-overlapping blocks, and the pixels of each block are modulated using a permutation sequence. The image undergoes pixel shuffling and then wavelet transform. The sub-band wavelet coefficients

are used to form an intermediate hash, which is permuted again to generate the hash sequence. This method is robust to most content-preserving operations and can detect tampered areas. Lv [9] proposes a SIFT-Harris detector to identify the most stable SIFT key points under various content-preserving operations. The extracted local features are embedded into shape-context-based descriptors to generate an image hash. The method is robust against geometric attacks and can be used to detect image tampering. The performance is degraded when the detected key points from the test image do not coincide with that of the original.

A new framework FASHION [10], standing for Forensic Hash for Information assurance. The FASHION framework is designed to answer a much broader range of questions regarding the processing of multimedia data than simple binary decision from robust image hashing. In another work of forensic hashing [11], SIFT features are encoded into compact visual words to estimate geometric transformations, and block-based features are used to detect and localize image tampering.

The objective of this method is to provide a reasonably short image hash with good performance, being perceptually robust while capable of detecting and locating content forgery. Zernike moments of the luminance/chrominance components is used to reflect the image's global characteristics, and extract local texture features from salient regions in the image to represent contents in the corresponding areas. Histogram of each salient region is calculated to represents the number of pixels with a particular pixel value. Histograms are not sensitive to single bit changes Distance metrics indicating the degree of similarity between two hashes are defined to measure the hash performance. Two thresholds are used to decide whether a given image is an original/normally-processed or maliciously doctored version of a reference image, or is simply a different image. The method can be used to locate tampered areas and tell the nature of tampering, e.g., replacement of objects or abnormal modification of colours. Compared with some other methods using global features or local features alone, the proposed method has better overall performance in major specifications, especially the ability of distinguishing regional tampering from content-preserving processing.

II BRIEF DESCRIPTION OF USEFUL TOOLS AND CONCEPTS

2.1 Zernike Moments

Zernike moments are the mappings of an image onto a set of complex Zernike polynomials. Since Zernike polynomials are orthogonal to each other, Zernike moments can represent the properties of an image with no redundancy or overlap of information between the moments. Zernike moments (ZM) of order n and repetition m of a digital image I(ñ,è) are defined as:

$$Z\,n,m = \frac{n+1}{\pi}\sum_{(\rho,\theta)\varepsilon\, unitdisk}\sum I(\rho,\theta)V\,n,m(\rho,\theta)$$

where $V\,n,m(\rho,\theta)$ is a Zernike polynomial of order n and repetition m

$$Vn,m(\rho,\theta) = Rn,m(\rho)e^{jm\theta}$$

in which n = 0,1,……..,0 <= |m| <= is even, and $R_{n,m}(\rho)$ are real-valued radial polynomials.

Zernike moments Fig 1, are selected as feature extractor due to its robustness to image noise, geometrical invariants and orthogonal property. Zernike moments are used efficiently as shape descriptors of image objects that cannot be defined by a single outline. Zernike moments are dependent on the translation and scaling

moments of the object. Zernike moments are used for extracting global features of image such as chrominance and luminance characteristics.

2.2 Gabor Wavelet Transform

Gabor wavelet transform is one of the most effective feature extraction techniques for textures. Feature extraction is a special form of reduction. Transforming the input data into the set of features is called feature extraction. Feature extraction involves simplifying the amount of resources required to describe a large set of data accurately. The multi-resolution and multi-orientation properties of the Gabor wavelet transform makes it a popular method for feature extraction.

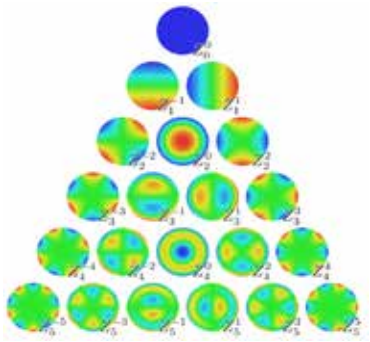

Fig 1 Moments describes numeric quantities at some distance from a reference point or axis.

2.3 Salient Region Detection

The region that visually attracts the eye can be called as salient region. Visually salient image regions are useful for many applications. It includes object segmentation, adaptive compression, and object recognition. In this method, we introduce a method for salient region detection that outputs full resolution saliency maps with well salient objects. More frequency information is retained in the salient region and thus salient region detection is more accurate than the other techniques. Visual attention results both from fast, pre-attentive, bottom retinal input, as well as from slower, top volition based processing that is task-dependent.

According to [11], information in an image can be viewed as a sum of two parts: that of innovation and that of prior knowledge. The former is new and the latter redundant. The information of saliency is obtained when the redundant part is removed. Log spectrum of an image, L(f), is used to represent general information of the image. Because log spectra of different images are similar, there exists redundant information in L(f). Let A(f) denote the redundant information defined as convolution between L(f)and an l * l low-pass kernel h_1:

$$A(f) = h_1 * L(f)$$

Spectral residual representing novelty of the image, B(f), can be obtained by subtracting A(f) from L(f), which is then inversely Fourier transformed to give a saliency map :

$$S_M(x) = F^{-1}[B(f)] = F^{-1}[L(f) - A(f)]$$

A threshold equal to three times of the mean of SM(x) is chosen to determine the salient regions. For example, Fig 2 (a) is an original image, (b) its saliency map, (c) the salient regions after thresholding, and (d) the image marked with four circumscribed rectangles of the largest connected salient regions. We will extract the image's local and histogram features from these rectangles.

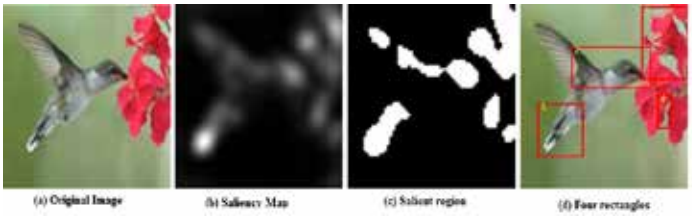

Fig 2 Salient Region Detection

2.4 Texture Features

Texture is an important feature to human visual perception. In this method, coarseness C1 and contrast C2 plus skewness and kurtosis are used to describe texture features. To evaluate coarseness around a pixel at (x, y) the pixels in its neighbourhood sized $2^k * 2^k$ are averaged:

$$A_k\ (x,y) = \frac{1}{2^{2k}} \sum_{i=x-2^k}^{x+2^k-1} \sum_{j=y-2^k}^{y+2^k-1} g(i,j)$$

k = 0,1,……5 where $g(x, y)$ is the gray-level of pixel(i, j).

III PROPOSED HASHING SCHEME USING GLOBAL AND LOCAL FEATURES

The great advancement in image processing demands a guarantee for assuring integrity of images. For detecting image forgery which includes removal, insertion, and replacement of objects, abnormal color modification and for locating the forged area, a robust hashing method is developed. The global, local and histogram features are used in forming the hash sequence. The global features are found out using Zernike moments. The local features include position and texture information of salient regions in the image. The histogram features includes the number of pixels with the same intensity. Gabor wavelet transform is an efficient method for local feature extraction especially texture features. In medical applications efficient texture extraction can easily distinguish normal tissue from abnormal tissue and is possible only through Gabor wavelet transform approach. Global feature extraction means extracting global features from global perspective. Global features are based on Zernike moments represents luminance and chrominance characteristics of image. Local features are extracted from local regions but contain much more information. To extract certain features from the image data to generate image hash a secret key is used. The type of image forgery and location of forged areas can be determined by decomposing the hashes. Implementation results confirm that our proposed system has higher hashing efficiency when compared with the previous methods.

In this section, the proposed image hashing scheme and the procedure of image authentication using the hash is described. The hash is formed from Zernike moments to represent global properties of the image, and the GWT to represent local properties of image especially texture features and histogram features.

The image hash construction includes the steps:

3.1 Preprocessing

The aim of pre-processing is an improvement of the image data that suppresses undesired distortions or enhances some image features relevant for further processing and analysis task. The image is first rescaled to a

fixed size F x F with bilinear interpolation. In texture mapping, it is also known as bilinear filtering or bilinear texture mapping, and it can be used to produce a reasonably realistic image.

An algorithm is used to map a screen pixel location to a corresponding point on the texture map. A weighted average of the attributes (color, alpha, etc.) of the four surrounding pixels is computed and applied to the screen pixel. This process is repeated for each pixel forming the object being textured. When an image needs to be scaled up, each pixel of the original image needs to be moved in a certain direction based on the scale constant.

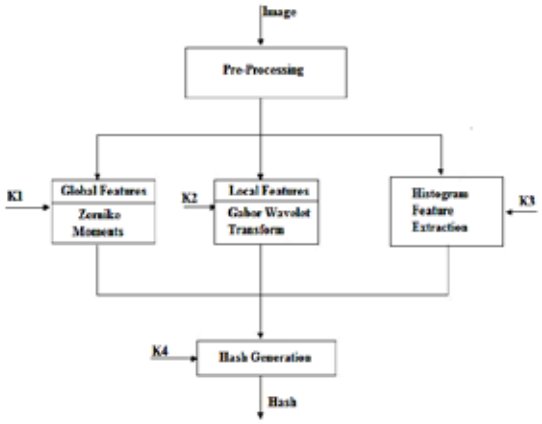

Fig 3 Block diagram of the proposed image hashing method.

Bilinear interpolation can be used where perfect image transformation with pixel matching is impossible, so that one can calculate and assign appropriate intensity values to pixels. Bilinear interpolation uses only the 4 nearest pixel values which are located in diagonal directions from a given pixel in order to find the appropriate colour intensity values of that pixel. It then takes a weighted average of these 4 pixels to arrive at its final, interpolated value. After bilinear interpolation the image is converted from RGB to the YCbCr representation. Y and CbCr are used as luminance and chrominance components of the image to generate the hash. The aim of rescaling is to ensure that the generated image hash has a fixed length and the same computation complexity

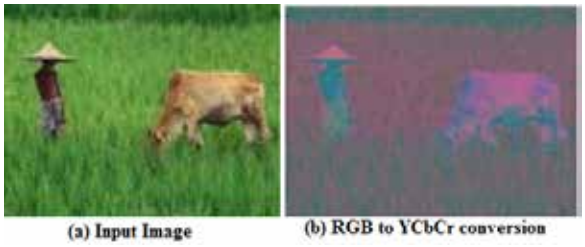

Fig 4 A color image and its Y, Cb and Cr components.

3.2 Global Feature Extraction

The Global features are extracted from global perspective. These content are usually on macro level. Consider image as whole and then extract features such as luminance and chrominance. Luminance is a photometric measure of the luminous intensity per unit area of light travelling in a given direction. Chrominance is the signal used in video systems to convey the color information of the picture. Zernike moments are used for generating global features which is then scrambled with key. Zernike moments are the mappings of an image onto a set of complex Zernike polynomials. Fig. 3 shows proposed image hashing method. Zernike moments are selected as feature extractor due to its robustness to image noise, geometrical invariants and orthogonal property. Zernike

moments are often used efficiently as shape descriptors of image objects. Magnitudes of the Zernike moments are rounded and used to form a global vector, $\mathbf{Z' = [Z_Y Z_C]}$. Magnitude represents size of objects especially mathematical object, a property by which the object can be compared as larger as or smaller than other objects of the same kind of object. A secret key K1 is generated from pseudo-random generator .The encrypted global vector Z is obtained by scrambling with key K1.

3.3 Local Feature Extraction

Feature represents piece of information which is most important for solving the computational task related to a certain kind of applications. Features can refer to the result of a general neighbourhood operation (feature extractor or feature detector) applied to the image. Position and texture features are mainly considered as local features. Saliency map and saliency region are shown in Fig 5. For local feature extraction salient regions of images are first considered and then apply Gabor Wavelet Transform method for feature extraction especially texture feature extraction. Texture means the regular repetition of an element or pattern on a surface. Texture analysis plays an increasingly important role in computer vision.

The Gabor wavelets are usually called Gabor filters in the scope of applications. The Gabor wavelets could not only be used for feature extraction for face images, but also for other images such as landscape images, textures etc. The position/size and texture of all salient regions together form a local feature vector S'= [P T]. A secret key K2 is used to generate encrypted local vector S.

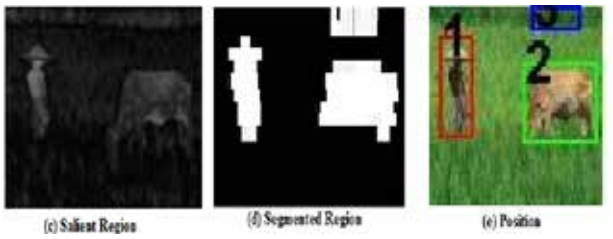

Fig. 5 Salient Region detection of an input Image

Histogram Features

The insensitivity of the audio histogram shape to time scale modification has been exploited. In this paper, the image histogram shape invariance to geometric distortions is exploited for image hashing. The histogram shape is represented as the relative relations of groups of two different bins. The hash function consists of three broad steps. The input images are filtered with a low-pass Gaussian The histogram is extracted from the pre-processed image by referring to the mean value of the image. Hash Generation: A binary sequence is afterwards computed according to the relative relations in the number of pixels among groups of two different bins. Finally, the key-dependent hash is obtained by randomly permuting the resultant binary sequence. All the three features are combined together to form the final hash.

The histogram (H_m) is extracted from the preprocessed image by referring to the mean value of the image. A rotationally invariant Gaussian filtering is designed to improve the hash robustness. A secret key K3 is used to randomly generate a row vector X3 containing 48 random integers in [0, 255]. Fig 6 shows the histogram value for the given image. The horizontal axis of the graph represents the tonal variations, while the vertical axis represents the number of pixels in that particular tone.

3.4 Hash Construction

The Zernike features (Z) represent the global vectors, salient local vectors (S) and histogram vectors (H_m) are concatenated and produce an intermediate hash, namely H'. Secret key K4 used to generate the final hash sequence H.

$$H' = [\, Z \; S \; H_m]$$

$$H' = H$$

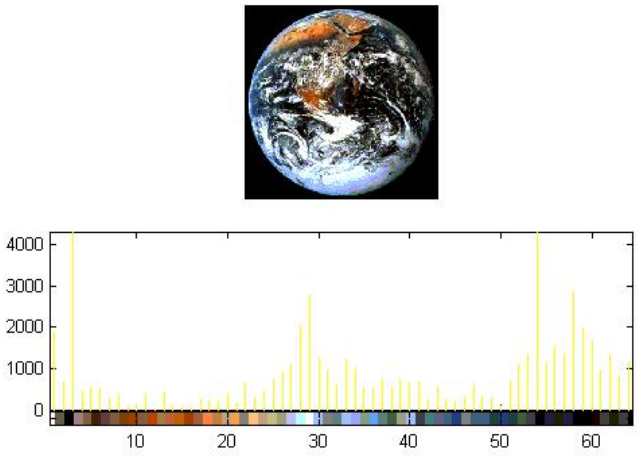

Fig. 6 Example of Histogram color image

IV IMAGE AUTHENTICATION

There are two types of hashes. One is the reference hash of the trusted image and the other is the hash of a received image. These two hashes are compared to determine whether the test image has the same contents as the trusted one or has been maliciously tampered, or is simply a different image. Here, two images having the same contents (visual appearance) do not need to have identical pixel values. One of them, or both, may have been modified in normal image processing such as contrast enhancement and loss compression. In this case, we say the two images are perceptually the same, or similar.

The images authentication is used to product the images from the forgery attacks. The image authentication process is performed in the following way.

a) Image extraction.

The test image is transfer to global, local, and histogram vectors and the test image is extracted to obtain the intermediate hash without encryption,

H1'= [Global vector (Z) * Salient vector(S)]

b) Decomposition of global, local and histogram features.

The intermediate hash with secret keys K1, K2, and K3 are concatenated to obtain the sequence of the trusted image. It decomposes the images into global, local and histogram features.

c) Salient region comparison

Check if the salient region in the test image is matching those in the trusted image.

d) Hash distance computation

Find the distance between hashes of an image pair and check whether the images are similar, dissimilar and forged images.

e) Locating the forgery areas

If the test image is a fake image, then locate the forged region and find the nature of the forgery. Four types of image forgery can be identified: removal, insertion, replacement of objects and unusual color changes.

The hash value H0, H1 and H2 representing global , local and histogram features and R denote the number of matched salient regions in the trusted image (N0) and test image (N1).

- If N0 > N1 = R, Object removal
- If N1 > N0 = R, Object insertion
- If N1 = N0 = R and Calculation of hash distance $\delta Z_C - \delta Z_Y \delta > \lambda_C$, Unusual color changes.
- If N1 = N0 = R and Calculation of hash distance $\delta Z_C - \delta Z_Y \delta < \lambda_C$, Replaced objects.
- If N0 > R and N1 > R, Tampered salient region.

V PERFORMANCE EVALUATION

The success rate of forgery localization is 96%. When the hash distance is greater than the threshold λ_1 but less than λ_2, the received image is judged as a fake. Consider the threshold λ_1 =7and λ_2 =50 used for finding the original and fake images. If the two different images have the similar hash distance, collision occurs. Fig.7 shows curves of Receiver Operating Characteristics (ROC).The ROC represent six types of content preserving processing: gamma correction, JPEG coding, Gaussian noise addition, rotation, scaling, and slight cropping. The method ROC differentiates the original and forged image.

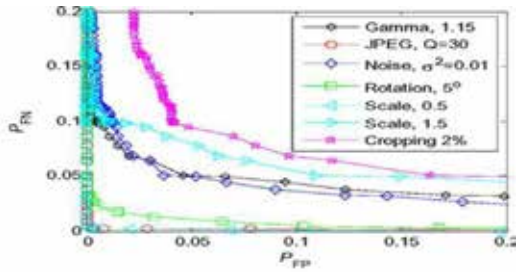

Fig 7 ROC Performance

VI CONCLUSION

An image hashing method is developed for image authentication and finding the forged regions. The global features are based on Zernike moments representing the luminance and chrominance characteristics of the image as a whole. The local features are extracted using Gabor wavelet transform representing position and texture information of in the image. Salient local features and histogram features include Gaussian filter are used to find the forgery region effectively. Also the histogram features helps to get accurate information about the forgery. Hashes produced with the proposed method are robust against common image processing operations including brightness adjustment, scaling, small angle rotation, and JPEG coding and noise contamination. It reduces the collision between hashes of different images. The hash can be used to find similar, forged and other images. At the same time, it can also identify the type of forgery and locate fake regions containing salient contents. In the image authentication, a hash of a test image is generated and compared with a reference hash. When the hash

distance is greater than the threshold but less than the received image is judged as a fake. The method proposed is used due to its acceptable accuracy and computation complexity.

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EMERGING OPPORTUNITIES & CHALLENGES OF TQM IN E-BANKING SYSTEM OF INDIA

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ABSTRACT

E Banking in India is still in progress of growth and development. Competition and changes in technology has changed the face of Banking. The changes that have taken place to impose on banks tough standards of competition and compliance. Electronic banking is the use of computer & computer networking to retrieve and process banking data and to initiate transactions directly with a bank via a Internet system. In other words-banking system is the wave of future. E Banking is likely to bring host opportunities as well as poses new challenges for authorities in regulating and supervising the financial system and in designing and implementing the macroeconomic policy. This paper aims to focus on Total Quality Management system on Emerging E-Banking opportunities & challenges in India.

Keywords: E-Banking, Retrieve & Process Data, Internet System, Total Quality Management System.

I. INTRODUCTION

The Banking sector in India has experienced a rapid transformation. Internet banking (or E-banking) means any user with a personal computer and a browser can get connected to his bank -s website to perform any of the virtual banking functions. In internet banking system the bank has a centralized database that is web-enabled. All the services that the bank has permitted on the internet are displayed in menu. Any service can be selected and further interaction is dictated by the nature of service. Once the branch offices of bank are interconnected through terrestrial or satellite links, there would be no physical identity for any branch. It would a borderless entity permitting anytime, anywhere and anyhow banking. The network which connects the various locations and gives connectivity to the central office within the organization is called intranet. These networks are limited to organizations for which they are set up. SWIFT is a live example of intranet application.[1]

The Reserve Bank of India constituted a working group on Internet Banking. The group divided the internet banking products in India into 3 types based on the levels of access granted. They are:

i) Information Only System: General purpose information like interest rates, branch location, bank products and their features, loan and deposit calculations are provided in the banks website. There exist facilities for downloading various types of application forms. The communication is normally done through e-mail. There is no interaction between the customer and bank's application system.

ii) Electronic Information Transfer System: The system provides customer- specific information in the form of account balances, transaction details, and statement of accounts. The information is still largely of the 'read only' format. Identification and authentication of the customer is through password. The information is fetched from the bank's application system either in batch mode or off-line.

iii) Fully Electronic Transactional System: This system allows bi-directional capabilities. Transactions can be submitted by the customer for online update. This system requires high degree of security and control. In this environment, web server and application systems are linked over secure infrastructure.[2]

The private and foreign banks brought new technologies and rendered technology based world class quality services to customers through ATMs, credit cards and internet banking, which Public sector banks, were not even dreamed about. By offering world class quality services, these banks started snatching customers from Public Sector banks and they felt the heat and realized that if they do not follow the path of these banks, they would be thrown out from the banking scene within no time.

II. OBJECTIVES OF THE STUDY

· The primary objective of the research paper is to get the full acquaintance of the various internet banking services provided by banks

· To discuss the Opportunities and challenges for E-banking in India.

· To focus on Total quality management System of the various internet banking services provided by banks.

III. THEORETICAL BACKGROUND

The Banks are the most significant players in the Indian financial market because they are the biggest purveyors of credit and attract most of the savings from the population. Banking plays very important role in the economic development of all the nations of the world because a developed banking system holds the key as well as serves as a barometer of economic health of a country.[3]

Online banking services provided by banks are as follows –

a) Core Banking Solution (CBS)

b) Automated Teller Machine (ATM)

c) Electronic Fund Transfer (EFT)

d) Real Time Gross Settlement System (RTGS)

e) National Electronic Fund Transfer (NEFT)

f) Mobile Banking (M-Banking)

g) Magnetic Ink Character Recognition (MICR)

h) Electronic Clearing Services (ECS)

i) Plastic Cards (Credit Card, Debit Card & Smart Cards)

j) Cheques Truncation Payment System

• E-Banking: E-banking allows customers of a financial institution to conduct financial transactions on a secure web website operated by the institution, which can be a retail or virtual bank, credit union or building society. Electronic or online banking is the latest delivery channel to be presented by the retail banks and there is large customer acceptance rate which means delivery of banking services to customers using electronic technology either at their office or home.

• Core Banking – Core Banking is a general term used to describe services provided by a group of networked bank branches.

• ATM (Automated Teller Machine) – ATM is a Computerized machine that permits bank customers to gain access to their Accounts with Magnetically encoded plastic card & a Code number. It enables the customer to perform several

banking operations without the help of Teller such as to Withdraw Cash, Make Deposits, Pay Bills, Obtain Bank Statements & Effective Cash Transfer.

• Plastic Cards (Debit, Credit & Smart Cards) – Plastic Cards have gained greater acceptance & Momentum as a Medium Financial Transaction. Credit Card provides Cash Free & anywhere and anytime shopping to the Customers but with fixed limit prescribed by Banks. Debit Card, unlike Post-paid Credit Card, is a Pre-paid Card with some Stored value.

• Electronic Fund Transfer (EFT) – EFT is another E-Banking Product facilitating Transfer of Funds from any Branch of a Bank to any other Branch of any Bank in Shorter Time. Before EFT's, intercity transfer of Money for the Customer was made through Demand Drafts, Mail Transfers & Telegraphic Transfers.

• Mobile Banking – Mobile Banking is an extension of application such as Phone Banking & Online Banking. It can be defined as a channel where by Customers interacts with a Bank through a Mobile Device, e.g. Cell Phone.

• Real Time Gross Settlement System (RTGS) – It provides for an electronic based Settlement of inter Bank & Customer based transactions, with Intraday Collateralized liquidity support from RBI to the participants of the system.

IV. OPPORTUNITIES FOR E-BANKING SYSTEM IN INDIA

Information technology revolution has converted the world into a global village. The thinking, structure, work-culture and functioning styles are changing on hour basis. IT has created tremendous job opportunities for the people around the globe as well made the organizations efficient and productive. There has been an IT revolution in the world in the last 40 years. This revolution has altered the way we work and think. It has touched every enterprise, sector, society and government where banking is the most triggered area. IT has created tremendous job opportunities for the people around the globe, and has made the organizations efficient and productive. In most of the developed countries like USA, it has contributed to half of the productive growth and a third of the economic growth over the last five years. In India most of the organizations have already deployed IT to transform their processes.[4]

The opportunities of e banking can be analyzed from the viewpoint of customers, banking organizations and economy in general. Recent developments have introduced a plethora of opportunities for development in banking industry. IT as an enabler has broken all bounds of cost, distance and time.

4.1 Opportunities for Customers

General banking customers have been significantly affected by the advent of e-banking revolution.

a) A banking customer's account is extremely accessible with an online account.

b) Through internet banking customer can operate his account remotely from his office or home. The need for going to bank in person for every single banking activity is dispensed with.

c) Internet banking lends an added advantage towards payment of utility bills. It eliminates the need to stand in long queues for the purpose of bill payment.

d) All services that are usually available from the local bank can be found on a single website.

e) Sharp growth in credit card/debit card usage can be majorly attributed to e-banking. A customer can shop globally without any need for carrying paper currency with him.

f) By the medium of e-banking (including internet banking), banks are available 24x7 and are just a mouse click away.

4.2 Opportunities for Banking Sector

In addition to banking customers, growth of e-banking infrastructure in general and online banking in particular has proved to be extremely beneficial to banks and overall bank organizations on account of following:

a) The concept of online banking has immensely helped the banks in putting a tab over their specific overheads and operating cost.

b) The rise of internet banking has made the banks more competitive. It resulted in opening of better prospects and avenues for banking operations.

c) The online banking has ensured transparency of transactions and facilitated towards removing the documentation requirements to a major extent, since majority of records under an e-banking set up are maintained electronically.

d) The reach and delivery capabilities of internet-enabled banks, proves to be significantly better than the network of physical bank branches.

V. MAJOR CHALLENGES TOWARDS E-BANKING SYSTEM IN INDIA

E-banking in India is in its earliest stage of development. Most of them are basic services only the deregulation of e-banking industry coupled with the emergence of new banking technology is enabling new competitors to enter the financial services markets quickly and efficiently. However it needs to be recognized that perception norms and an improvement in functioning of e-bank.

In today's cyber world where when people do not have much time even for their personal work, E-Banking appears as a boon. Internet banking has become very popular in the recent years, as it is quick and easy. Though E-Banking provides more advantages than traditional banking however, it has some disadvantages too which are as listed:

- Setting up an account in the bank may take time though the E-Banking facility is provided by the banks.
- Internet account of customer with an Internet Service Provider (ISP) which may be another hectic experience.[5]
- Banking sites can be difficult to navigate at first by the customers who do not have knowledge of computer and internet so getting acquitted with the banking sites software may require some time to read the tutorials in order to become comfortable in persons virtual lobby. There may be some difficulties to the customer for learning these activities of E-Banking.
- Some alterations or changes made in the banks sites due to technological advancement may lead to a problem to customers who have to provide all the personal information once again through online transaction.
- E-Banking is time consuming for the customers, though there is option of online transactions, in the end customers have to run to the ATM for withdrawing the cash.[6]
- No personal contact with any of the bank staff, and if talk to any bank staff through the telephone, there is no guarantee to the customers that they had talked with a right person or not.
- "Hackers" who may access customer's bank account is the main disadvantage to the customers who takes E-Banking facility very casually.
- Security concern is the important issue as cybercrimes activities are clutching up which decreases the number of customers to avail the benefit of E-Banking.
- Technical breakdowns where online banking websites sometimes go down. If this happens then, if customer wishes to close his bank account then he will definitely go penniless.

- Switching banks due to technical faults can be a major disadvantage of using E-Banking system to the customer.
- Increasing online frauds and attacks i.e. Trojan horse (Remote Attacker) are a major disadvantage of using E-Banking.
- However, in the case of Internet banking, one will find oneself making endless calls to the customer service department. There have been cases, where the person is put on hold or has been passed around from one person to another.
- Hackers and crackers attack on the bank account of customer by stealing passwords or using fake credit cards to cheat a person which will cause loss to the customer's wealth.
- Risk Involved In Using E-Banking: E-Banking poses some different risks as compared to the traditional banking. These risks are more pronounced in the case of Internet banking. Firstly, the risk of technological changes has to be carefully watched. This is essential to update technologies and remain cost effective and customer friendly. The banks have to be careful about risks involved in agreements with third parties. The security is an important area of risk. In fact it will be very crucial for the expansion of Net Banking. Another important area will emerge out of cross-border implications as 'E- Banking' breaks the geographical boundaries. Imposing regularity conditions on such transactions will be a difficult task.

5.1 E-Banking Frauds

Fraudsters are continuing their switch from traditional card fraud to raiding online bank accounts. According to the new research Fraud losses on UK credit and debit cards totalled £440m in 2009 – a drop of 28% compared with the previous year – the UK Cards Association said. But the number of "phishing" attacks rose by 16% in the same period. This is when fraudsters trick people into entering their personal details on a website or in e-mails. As there is expansion in the illegal activities of the hackers, crackers and Trojan horse there must be a strict law to punish such criminals. Online frauds are very common nowadays because it is easy to access or to obtain password, pin code and account number of customers by hackers. Recently there is a case which is known as 'ICICI Bank Fraud Case' where Rs/- 150000 was stolen by the person's bank account and it was a heavy loss of money to the account holder though the complaint was filed by the account holder but banks are still silent on that issue as banks too have no idea how these activities are taking place.[7]

5.2 Preventive Measures

As E-Banking is an important aspect for the bankers and customers as well, there must be some measures and policies which should be adopted by the banks before providing E-Banking facilities to the customers which can be taken as precautionary measure. A best preventive measure is that the account holder of the bank must be aware of increasing bank frauds and cybercrimes, and he should not give his password, pin number and credit cards number to anyone by using E-Banking facility. "As it is recognise that cards will always be targeted by criminals, so we are determined not only to continue to prevent, detect and deter those who are behind this type of crime, but also to make sure that innocent victims do not lose out,". There is always necessity that "Customers need to protect themselves on their computer, remaining vigilant and using go.

"A better-educated consumer is less likely to fall foul of phishing attacks" this saying has its own importance because consumer is the king with respect to the Indian trade and market but here while using E-Banking facilities a consumer

need to be more careful of online frauds, so a consumer must take some necessary precautions while opting out for E-Banking facilities.[8]

Major Focus point in this paper "How we implement the Total Quality Management in Banking system". TQM use to improve the service facilities which are provided by banks.

VI. TQM ROLE TO IMPROVE OF E-BANKING SYSTEM IN INDIA

TQM is a general term to improve the efficiency of any system. We know that our banking system is going to progress online banking or online business system. This system is very interesting, qualitative and fast processing. This system has a big change in our society. But we should not forget the basic conditions of India. Each of state have the different challenges of system. That may be the technical, social, literacy, infrastructure and political. On behalf of lot of challenges we focused on provided the facility to customer. If we go outside of the metro cities in India a lot of challenges to fulfilment of banking services. Our focus should be on the out of metro cities citizens, where are lake of resources. We can see long lines of customer on the counter of banks. Sometime long days banks are not working lake of network. No doubt, Internet system has facilitated us, but dependency is also more increase on Network and Communication System.[9] That's way a lot we are focusing in Total management System in banking sectors. This is must for transparency of task, alternate options when network is failed, network is not connected, server is down etc. we will be observe of TQM in Banking system.

6.1 Customer Acceptance

Proper understanding of the customer is the primary aspect of the E-banking. It is known that computer literacy in India is still very low and is barrier in fast acceptance of internet. Mindset of the Indian customer needs to be changed by giving awareness about technical terms in e-banking. Even though it adopts in the fast changing technical scenario, the obsolesce of technology fast. Hence there is always shortage of skilled personal and fear of technology puts the customer away from electric delivery channels.[10]

6.2 Cost of Technology

In connection with Start-up cost e-banking is huge at initial level for acquiring personal computer and other equipments; oneself to do online banking is still not with reach of the middle class & upper middle class customers. The cost of maintenance of all equipments like, modem, routers, bridges and network management systems. The cost of sophisticated hardware and software and skill level of employees needed.

In e-banking there is need of skilled employees or knowledgeable professionals to route the banking transactions through the internet. Banks can employ software application developers, database administrators and training to existing bank staff on the changing systems and procedures who can handle e-banking applications under proper supervision.

6.3 Security

A secrecy threat as circumtensive decision to cause the economic hardship to data, destruction of network resources disclosure, modification of data or fraud, denial in services and distortion of information. Providing appropriate security of using encryption techniques, implementation of firewalls and virus protection software etc.[11]

6.4 Legal Issues

In today's bank world, legal frame work for recognizing the validity of banking transactions. Conducted through the NET is still being put in place? Information technology act provides security & legal frame work for e-commerce transactions. Information technology act or RBI suggested that criterion of Digital Signature Certification Board for authentication of electric records and communication with digital signatures.

6.5 Restricted Business

Not all transactions can be carried electronically; many deposits and some withdrawals require the use of physical services. Some banks have automated to their customers (front end) but still largely depend upon manual process (back end).It result, most of clientele or customers were restricted by lack and awareness and due to technical problems.

6.6 Transparency In Offering Services

Banks will strive to adopt best practices in corporate governance and Corporate Social Responsibility (CSR) this will enhance image and can help them to enhance their confidence of international investors. Banks much towards better corporate governance standards and adoption of uniform accounting standards and disclosure requirements

6.7 Adopt Proper Organization Structure

Banks may required to adopt flatter organization structure for judicious blending of needs foe greater delegation of power, decentralization, customer centric business models, quickly reaction of customer needs, learn continuously from customers, provide customer access, whatever and however they want to transact and interact especially for catering younger IT survey population.

VII. CONCLUSION

The growth of information technologies in the world has been phenomenal. Thanks to these technologies, banks are being able to reach their customers anywhere at any time. Compared to banks abroad, Indian banks offering online services still have a long way to go. For online banking to reach a critical mass, there has to be sufficient number of users and the sufficient infrastructure in place. E-banking offers a higher level of convenience for managing one's finances even from one's bedroom. However, it continues to present challenges to the financial security and personal privacy. Many people have had their account details compromised, as a result of online banking. Thus, if one is going to use it for financial transactions, he should be aware of the risks involved. Awareness of the risks and problems enables him to take precautions for a more secured online banking experience. E-Banking system is not only popular nationally but also internationally where a person can transfer money through any part of the world. E-banking system is useful for the bankers as well as customers of banks.

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OPERATIONS ON INTERVAL-VALUED FUZZY GRAPHS

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ABSTRACT

To discuss the Cartesian Product Composition, union and join on Interval-valued fuzzy graphs. We also introduce the notion of Interval-valued fuzzy complete graphs. Some properties of self complementary graph.

Keywords: Complement Of A Fuzzy Graph, Interval-Valued Fuzzy Graph, Self Complementary Interval Valued Fuzzy Complete Graphs, Strong Interval Valued Fuzzy Graphs

I INTRODUCTION

In 1975, Zadeh [27] introduced the notion of interval-valued fuzzy sets as an extension of fuzzy sets [26] in which the values of the membership degrees are intervals of numbers instead of the numbers. Interval-valued fuzzy sets provide a more adequate description of uncertainty than traditional fuzzy sets. It is therefore important to use interval-valued fuzzy sets in applications, such as fuzzy control. One of the computationally most intensive part of fuzzy control is defuzzification [15]. Since interval-valued fuzzy sets are widely studied and used, we describe briefly the work of Gorzalczany on approximate reasoning [10, 11], Roy and Biswas on medical diagnosis [22], Turksen on multivalued logic [25] and Mendel on intelligent control [15].

The fuzzy graph theory as a generalization of Euler's graph theory was first introduced by Rosenfeld [23] in 1975. The fuzzy relations between fuzzy sets were first considered by Rosenfeld and he developed the structure of fuzzy graphs obtaining analogs of several graph theoretical concepts. Later, Bhattacharya [5] gave some remarks on fuzzy graphs, and some operations on fuzzy graphs were introduced by Mordeson and Peng [19]. The complement of a fuzzy graph was defined by Mordeson [18] and further studied by Sunitha and Vijayakumar [24]. Bhutani and Rosenfeld introduced the concept of M-strong fuzzy graphs in [7] and studied some properties. The concept of strong arcs in fuzzy graphs was discussed in [8]. Hongmei and Lianhua gave the definition of interval-valued graph in [12].

In this paper, we define the operations of Cartesian product, composition, union and join on interval-valued fuzzy graphs and investigate some properties. We study isomorphism (resp. weak isomorphism) between interval-valued fuzzy graphs is an equivalence relation (resp. partial order). We introduce the notion of interval-valued fuzzy complete graphs and present some properties of self complementary and self weak complementary interval-valued fuzzy complete graphs.

The definitions and terminologies that we used in this paper are standard. For other notations, terminologies and applications, the readers are referred to [1, 2, 3, 4, 9, 13, 14, 17, 20, 21, 28].

II PRELIMINARIES

A graph is an ordered pair G* = (V, E), where V is the set of vertices of G* and E is the set of edges of G*. Two vertices x and y in a graph G* are said to be adjacent in G* if {x,y} is in an edge of G*. (For simplicity an edge {x,y} will be denoted by xy. A **simple graph** is a graph without loops and multiple edges. A **complete graph** is a simple graph in which every pair of distinct vertices is connected by an edge. The complete graph on n vertices has n vertices and n(n – 1)/2 edges. We will consider only graphs with the finite number of vertices and edges.

By a **complementary graph** $\overline{G^*}$ of a simple graph G* we mean a graph having the same vertices as G* and such that two vertices are adjacent in $\overline{G^*}$ if and only if they are not adjacent in G*.

An **isomorphism** of graphs G_1^* and G_2^* is a bijection between the vertex sets of G_1^* and G_2^* such that any two vertices v_1 and v_2 of G_1 are adjacent in G_1 if and only if f(v_1) and f (v_2) are adjacent in G_2. Isomorphic graphs are denoted by $G_1^* \cong G_2^*$.

Let $G_1^* = (V_1, E_1)$ and $G_2^* = (V_2, E_2)$ be two simple graphs, we can construct several new graphs. The first construction called the **Cartesian product** of G_1^* and G_2^* gives a graph $G_1^* \times G_2^* = (V, E)$ with V = V_1 x V_2 and

$$E = \{(x, x_2)(x, y_2) \mid x \in V_1, x_2 y_2 \in E_2\} \cup \{(x_1, z)(y_1, z) \mid x_1 y_1 \in E_1, z \in V_2\}$$

The **composition of graphs** G_1^* and G_2^* is the graph $G_1^*[G_2^*] = (V_1 \times V_2, E^0)$, where

$$E^0 = E \cup \{(x_1, x_2)(y_1, y_2) \mid x_1 y_1 \in E_1, x_2 \neq y_2\}$$

and E is defined as in $G_1^* \times G_2^*$. Note that $G_1^*[G_2^*] \neq G_2^*[G_1^*]$.

The union of graphs G_1^* and G_2^* is defined as $G_1^* + G_2^* = (V_1 \cup V_2, E_1 \cup E_2)$.

The join of G_1^* and G_2^* is the simple graph $G_1^* + G_2^* = (V_1 \cup V_2, E_1 \cup E_2 \cup E')$, where E' is the set of all edges joining the nodes of V_1 and V_2. In this construction it is assumed that $V_1 \cap V_2 \neq \emptyset$.

By a fuzzy subset μ on a set X is mean a map μ : X → [0, 1]. A map v : X x X → [0,1] is called a fuzzy relation on X if v(x, y) ≤ min(μ(x), μ(y)) for all x,y∈ X. A fuzzy relation v is symmetric if v(x, y) = v(y, x) for all x, y∈ X.

An **interval number D** is an interval $[a^-, a^+]$ with $0 \le a^- \le a^+ \le 1$. The interval [a, a] is identified with the number a∈ [0,1]. D[0, 1] denotes the set of all interval numbers.

For interval numbers $D_1 = [a_1^-, b_1^+]$ and $D_2 = [a_2^-, b_2^+]$, we define

- $r\min(D_1, D_2) = r\min([a_1^-, b_1^+], [a_2^-, b_2^+]) = [\min\{a_1^-, a_2^-\}, \min\{b_1^+, b_2^+\}]$,
- $r\max(D_1, D_2) = r\max([a_1^-, b_1^+], [a_2^-, b_2^+]) = [\max\{a_1^-, a_2^-\}, \max\{b_1^+, b_2^+\}]$,
- $D_1 + D_2 = [a_1^- + a_2^- - a_1^- . a_2^-, b_1^+ + b_2^+ - b_1^+ . b_2^+]$,
- $D_1 \le D_2 \Leftrightarrow a_1^- \le a_2^- \text{ and } b_1^+ \le b_2^+$,
- $D_1 = D_2 \Leftrightarrow a_1^- = a_2^- \text{ and } b_1^+ = b_2^+$,
- $D_1 < D_2 \Leftrightarrow D_1 \le D_2 \text{ and } D_1 \neq D_2 \Rightarrow a_1^- < a_2^-, b_1^+ < b_2^+$

· $kD_1 = k[a_1^-, b_1^+] = [ka_1^-, b_1^+]$, *where* $0 \le k \le 1$.

Then, (D[0,1], ≤, V, Λ) is a complete lattice with [0, 0] as the least element and [1,1] as the greatest.

The interval-valued fuzzy set A in V is defined by

$$A = \{(x, [\mu_A^-(x), \mu_A^+(x)]) : x \in V\},$$

where $\mu_A^-(x)$ and $\mu_A^+(x)$ are fuzzy subsets of V such that $\mu_A^-(x) \le \mu_A^+(x)$ for all $x \in V$. For any two interval-valued sets $A = [\mu_A^-(x), \mu_A^+(x)]$ and $B = [\mu_B^-(x), \mu_B^+(x)]$ in V we define:

· $A \cup B = \{(x, \max(\mu_A^-(x), \mu_B^-(x)), \max(\mu_A^+(x)\mu_B^+(x))) : x \in V\}$,

· $A \cap B = \{(x, \min(\mu_A^-(x), \mu_B^-(x)), \min(\mu_A^+(x)\mu_B^+(x))) : x \in V\}$.

If G* = (V, E) is a graph, then by an **interval-valued fuzzy relation** B on a set E we mean an interval-valued fuzzy set such that

$$\mu_B^-(xy) \le \min(\mu_A^-(x), \mu_A^-(y))$$

$$\mu_B^+(xy) \le \min(\mu_A^+(x), \mu_A^+(y))$$

for all $xy \in E$.

If G* =(V,E) is a graph, then by **A strong interval valued fuzzy graph,** we mean

$$\mu_B^-(xy) = \min(\mu_A^-(x), \mu_A^-(y)), \ \mu_B^+(xy) = \min(\mu_A^+(x), \mu_A^+(y))$$

III OPERATIONS ON INTERVAL-VALUED FUZZY GRAPHS

Throughout in this paper, G* is a crisp graph, and G is an interval-valued fuzzy graph.

Definition 3.1. By an interval-valued fuzzy graph of a graph G* = (V, E) we mean a pair G = (A, B), where $A = [\mu_A^-, \mu_A^+]$ is an interval-valued fuzzy set on V and $B = [\mu_B^-, \mu_B^+]$ is an interval-valued fuzzy relation on E.

Definition 3.2. The Cartesian product $G_1 \times G_2$ of two lattice graphs $G_1 = (A_1,B_1)$ and $G_2 = (A_2,B_2)$ of the graphs G_1^* = (V_1, E_1) and G_2^* = (V_2, E_2) is defined as a pair ($A_1 \times A_2$, $B_1 \times B_2$) such that

i) $$\begin{cases} (\mu_{A_1}^- \circ \mu_{A_2}^-)(x_1, x_2) = \min(\mu_{A_1}^-(x_1), \mu_{A_2}^-(x_2)) \\ (\mu_{A_1}^+ \circ \mu_{A_2}^+)(x_1, x_2) = \min(\mu_{A_1}^+(x_1), \mu_{A_2}^+(x_2)) \end{cases}$$

for all $(x_1, x_2) \in V$,

ii) $$\begin{cases} (\mu_{B_1}^- \circ \mu_{B_2}^-)(x, x_2)(x, y_2)) = \min(\mu_{A_1}^-(x), \mu_{B_2}^-(x_2y_2)) \\ (\mu_{B_1}^+ \circ \mu_{B_2}^+)(x, x_2), (x, y_2) = \min(\mu_{A_1}^+(x), \mu_{B_2}^+(x_2y_2)) \end{cases}$$

for all $x \in V_1$, and $x_2y_2 \in E_2$,

iii) $\begin{cases} (\mu_{B_1} \circ \mu_{B_2})(x_1,z)(y_1,z)) = \min(\mu_{B_1}(x_1y_1), \mu_{A_2}(z)) \\ (\mu^+_{B_1} \circ \mu^+_{B_2})(x_1,z),(y_1,z) = \min(\mu^+_{B_1}(x_1y_1), \mu^+_{A_2}(z)) \end{cases}$

for all $z \in V_2$, and $x_1y_1 \in E_1$.

Definition 3.3 The complement of an interval-valued fuzzy graph G=(A,B) of G^*=(V,E) is an interval-valued fuzzy graph

$\overline{G} = (\overline{A},\overline{B})$ on G^*, where $\overline{A} = A = [\mu^-_A, \mu^+_A]$ and $\overline{B} = [\overline{\mu^-_B}, \overline{\mu^+_B}]$ is defined by

$$\overline{\mu^-_B}(xy) = \begin{cases} 0, if \mu^-_B(xy) > 0. \\ \min(\mu^-_A(x), \mu^-_A(y), if \mu^-_B(xy) = 0 \end{cases}$$

$$\mu^+_B(xy) = \begin{cases} 0, if \mu^+_B(xy) > 0 \\ \min(\mu^+_A(x), \mu^+_A(y), if \mu^+_B(xy) = 0 \end{cases}$$

Definition 3.4 An interval valued fuzzy graph is self complementary,

if $\overline{\overline{G}} = G$

Example 3.5: Consider a graph G^*=(V,E) such that V=$\{a,b,c\}$,

E=$\{ab,bc\}$, then an interval valued fuzzy graph G=(A,B), where

A = $\left\langle \left(\frac{a}{0.1}, \frac{b}{0.2}, \frac{c}{0.3} \right), \left(\frac{a}{0.3}, \frac{b}{0.4}, \frac{c}{0.5} \right) \right\rangle$, B=$\left\langle \left(\frac{ab}{0.1}, \frac{bc}{0.2} \right), \left(\frac{ab}{0.3}, \frac{bc}{0.4} \right) \right\rangle$

is self complementary.

Solution: $\overline{\mu^-_B}(ab) = 0, \overline{\mu^+_B}(ab) = 0, \overline{\mu^-_B}(bc) = 0, \overline{\mu^+_B}(bc) = 0$ (by definition)

$\overline{\overline{\mu^-_B}}(ab) = 0.1 = \mu^-_B(ab), \overline{\overline{\mu^+_B}}(ab) = 0.3 = \mu^+_B(ab),$

$\overline{\overline{\mu^-_B}}(bc) = 0.2 = \mu^-_B(bc), \overline{\overline{\mu^+_B}}(bc) = 0.4 = \mu^+_B(bc)$

Definition 3.6

Let G_1 and G_2 are Interval Valued Fuzzy Graphs

$G = G_1 + G_2 = \langle V_1 \cup V_2, E_1 \cup E_2 \cup E' \rangle$ defined by

$(\mu_1 + \mu'_1)(v) = (\mu_1 \cup \mu'_1)(v)$ if $v \in V_1 \cup V_2$

$(g_1 + g'_1)(v) = (g_1 \cup g'_1)(v)$ if $v \in V_1 \cup V_2$

$(\mu_2 + \mu'_2)(v_iv_j) = (\mu_2 \cup \mu'_2)(v_iv_j)$ if $v_iv_j \in E_1 \cup E_2$

$= (\mu_1(v_i).\mu'_1(v_j))$ if $v_iv_j \in E'$

Theorem 3.7

Let $G_1 = \langle V_1, E_1 \rangle$ and $G_2 = \langle V_2, E_2 \rangle$ be two Interval Valued Fuzzy Graphs. Then

(i) $\overline{G_1 + G_2} \supseteq \overline{G_1} \cup \overline{G_2}$

(ii) $\overline{G_1 \cup G_2} \supseteq \overline{G_1} + \overline{G_2}$

Proof

Consider the identity map I : $V_1 \cup V_2 \to V_1 \cup V_2$,

To prove (i) it is enough to prove

(a) (i) $\overline{m_1 \cup m_1'}(v_i) = \overline{m_1} \cup \overline{m_1'}(v_i)$

(ii) $\overline{g_1 + g_1'}(v_i) = \overline{g_1} \cup \overline{g_1'}(v_i)$

(b) (i) $\overline{m_2 \cup m_2'}(v_i, v_j) = \overline{m_2} \cup \overline{m_2'}(v_i, v_j)$

(ii) $\overline{g_2 + g_2'}(v_i, v_j) = \overline{g_2} \cup \overline{g_2'}(v_i, v_j)$

(a) (i) $\overline{(m_1 \dot{\cup} m_1')}(v_i) = (m_1 + m_1')(v_i)$, by Definition 4.1

$$= \begin{cases} m_1(v_i) & \text{if } v_i \in V_1 \\ m_1'(v_i) & \text{if } v_i \in V_2 \end{cases}$$

$$= \begin{cases} \overline{m_1}(v_i) & \text{if } v_i \in V_1 \\ \overline{m_1'}(v_i) & \text{if } v_i \in V_2 \end{cases}$$

$$= (\overline{m_1} \cup \overline{m_1'})(v_i)$$

(ii) $\overline{(g_1 + g_1')}(v_i) = (g_1 + g_1')(v_i)$, by Definition 4.1

$$= \begin{cases} g_1(v_i) & \text{if } v_i \in V_1 \\ g_1'(v_i) & \text{if } v_i \in V_2 \end{cases}$$

$$= \begin{cases} \overline{g_1}(v_i) & \text{if } v_i \in V_1 \\ \overline{g_1'}(v_i) & \text{if } v_i \in V_2 \end{cases}$$

$$= (\overline{g_1} \cup \overline{g_1'})(v_i)$$

(b) (i) $\overline{(m_2 + m_2')}(v_i, v_j) = (m_1 + m_1')(v_i).(m_1 + m_1')(v_j) - (m_2 + m_2')(v_i, v_j)$

$$= \begin{cases} (m_1 \cup m_1')(v_i).(m_1 \cup m_1')(v_j) - (m_2 \cup m_2')(v_i, v_j) & \text{if } (v_i, v_j) \in E_1 \cup E_2 \\ (m_1 \cup m_1')(v_i).(m_1 \cup m_1')(v_j) - m_1(v_i).m_1'(v_j) & \text{if } (v_i, v_j) \in E' \end{cases}$$

$$= \begin{cases} (m_1)(v_i).m_1(v_j) - m_2(v_i, v_j) & \text{if } (v_i, v_j) \in E_1 \\ m_1'(v_i).m_1'(v_j) - m_2'(v_i, v_j) & \text{if } (v_i, v_j) \in E_2 \\ (m_1)(v_i).m_1'(v_j) - m_1(v_i).m_1'(v_j) & \text{if } (v_i, v_j) \in E' \end{cases}$$

$$= \begin{cases} \overline{m_2}(v_i, v_j) & if\ (v_i, v_j) \in E_1 \\ \overline{m_2'}(v_i, v_j) & if\ (v_i, v_j) \in E_2 \\ 0 & if\ (v_i, v_j) \in E' \end{cases}$$

$$= \left(\overline{m_2} \cup \overline{m_2'}\right)(v_i, v_j)$$

(b) (ii) $\left(\overline{g_2 + g_2'}\right)(v_i, v_j) = (g_1 + g_1')(v_i).(g_1 + g_1')(v_j) - (g_2 + g_2')(v_i, v_j)$

$$= \begin{cases} (g_1 \cup g_1')(v_i).(g_1 \cup g_1')(v_j) - (g_2 \cup g_2')(v_i, v_j) & if\ (v_i, v_j) \in E_1 \cup E_2 \\ (g_1 \cup g_1')(v_i).(g_1 \cup g_1')(v_j) - g_1(v_i).g_1'(v_j) & if\ (v_i, v_j) \in E' \end{cases}$$

$$= \begin{cases} (g_1)(v_i).g_1(v_j) - g_2(v_i, v_j) & if\ (v_i, v_j) \in E_1 \\ g_1'(v_i).g_1'(v_j) - g_2'(v_i, v_j) & if\ (v_i, v_j) \in E_2 \\ (g_1)(v_i).g_1'(v_j) - g_1(v_i).g_1'(v_j) & if\ (v_i, v_j) \in E' \end{cases}$$

$$= \begin{cases} \overline{g_2}(v_i, v_j) & if\ (v_i, v_j) \in E_1 \\ \overline{g_2'}(v_i, v_j) & if\ (v_i, v_j) \in E_2 \\ 0 & if\ (v_i, v_j) \in E' \end{cases}$$

$$= \left(\overline{g_2} \cup \overline{g_2'}\right)(v_i, v_j)$$

To prove (ii) it is enough to prove

(a) (i) $\left(\overline{m_1 \cup m_1'}\right)(v_i) = \left(\overline{m_1} \cup \overline{m_1'}\right)(v_i)$

(ii) $\left(\overline{g_1 \cup g_1'}\right)(v_i) = \left(\overline{g_1} + \overline{g_1'}\right)(v_i)$

(b) (i) $\left(\overline{m_2 \cup m_2'}\right)(v_i, v_j) = \left(\overline{m_2} + \overline{m_2'}\right)(v_i, v_j)$

(ii) $\left(\overline{g_2 \cup g_2'}\right)(v_i, v_j) = \left(\overline{g_2} \cup \overline{g_2'}\right)(v_i, v_j)$

Consider the identity map $I : V_1 \cup V_2 \to V_1 \cup V_2$

(a) (i) $\left(\overline{m_1 \cup m_1'}\right)(v_i) = (m_1 \cup m_1')(v_i)$

$$= \begin{cases} m_1(v_i) & if\ v_i \in V_1 \\ m_1'(v_i) & if\ v_i \in V_2 \end{cases} = \begin{cases} \overline{m_1}(v_i) & if\ v_i \in V_1 \\ \overline{m_1'}(v_i) & if\ v_i \in V_2 \end{cases}$$

$$= \left(\overline{m_1} \cup \overline{m_1'}\right)(v_i)$$

(ii) $\left(\overline{g_1 \cup g_1'}\right)(v_i) = (g_1 \cup g_1')(v_i)$

$$= \begin{cases} g_1(v_i) & if\ v_i \in V_1 \\ g_1'(v_i) & if\ v_i \in V_2 \end{cases}$$

$$= \begin{cases} \overline{g_1}(v_i) & if\ v_i \in V_1 \\ \overline{g_1'}(v_i) & if\ v_i \in V_2 \end{cases}$$

$$= (\overline{g_1} \cup \overline{g_1'})(v_i)$$

(b) (i) $(\overline{m_2 \cup m_2'})(v_i, v_j) = (m_1 \cup m_1')(v_i).(m_1 \cup m_1')(v_j) - (m_2 \cup m_2')(v_i, v_j)$

$$= \begin{cases} (m_1)(v_i).m_1(v_j) - m_2(v_i, v_j) & if\ (v_i, v_j) \in E_1 \\ m_1'(v_i).m_1'(v_j) - m_2'(v_i, v_j) & if\ (v_i, v_j) \in E_2 \\ m_1(v_i).m_1'(v_j) - 0 & if v_i \in v_1, v_j \in V_2 \end{cases}$$

$$= \begin{cases} \overline{m_2}(v_i, v_j) & if\ (v_i, v_j) \in E_1 \\ \overline{m_2'}(v_i, v_j) & if\ (v_i, v_j) \in E_2 \\ m_1(v_i).m_1'(v_j) & if\ v_i \in V_1, v_j \in V_2 \end{cases}$$

$$= \begin{cases} \overline{m_2} \cup \overline{m_2'}(v_i, v_j) & if\ (v_i, v_j) \in E_1\ or\ E_2 \\ m_1(v_1).m_1'(v_1) & if\ (v_i, v_j) \in E' \end{cases}$$

$$= (\overline{m_2} + \overline{m_2'})(v_i, v_j)$$

(b) (ii) $(\overline{g_2 \cup g_2'})(v_i, v_j) = (g_1 \cup g_1')(v_i).(g_1 \cup g_1')(v_j) - (g_2 \cup g_2')(v_i, v_j)$

$$= \begin{cases} (g_1)(v_i).g_1(v_j) - g_2(v_i, v_j) & if\ (v_i, v_j) \in E_1 \\ g_1'(v_i).g_1'(v_j) - g_2'(v_i, v_j) & if\ (v_i, v_j) \in E_2 \\ g_1(v_i).g_1'(v_j) - 0 & if v_i \in v_1, v_j \in V_2 \end{cases}$$

$$= \begin{cases} \overline{g_2}(v_i, v_j) & if\ (v_i, v_j) \in E_1 \\ \overline{g_2'}(v_i, v_j) & if\ (v_i, v_j) \in E_2 \\ g_1(v_i).g_1'(v_j) & if\ v_i \in V_1, v_j \in V_2 \end{cases}$$

$$= \begin{cases} \overline{g_2} \cup \overline{g_2'}(v_i, v_j) & if\ (v_i, v_j) \in E_1\ or\ E_2 \\ g_1(v_1).g_1'(v_1) & if\ (v_i, v_j) \in E' \end{cases}$$

$$= (\overline{g_2} + \overline{g_2'})(v_i, v_j)$$

Theorem 3.8

Let $G_1 = \langle V_1, E_1 \rangle$ and $G_2 = \langle V_2, E_2 \rangle$ be two Strong Interval Valued Fuzzy Graphs. Then $G_1 \circ G_2$ is a strong Interval Valued Fuzzy Graph.

Proof

Let $G_1 \circ G_2 = G = \langle V, E \rangle$ where V= V_1 x V_2 and

$$E = \{(u,u_2)(u,v_2) : u \in V_1, u_2v_2 \in E_2\} \cup \{(u_1,w)(v_1,w) : w \in V_2, u_1v_1 \in E_1\}$$

$$\cup \{(u_1,u_2)(v_1,v_2) : u_1v_1 \in E_1, u_2 \neq v_2\}.$$

(i) $\mu_2\{(u,u_2)(u,v_2)\} = \mu_1(u).\mu_2(u_2v_2)$

$= \mu_1(u).\mu_1'(u_2).\mu_1'(v_2)$, since G_2 is strong

$= \mu_1(u).\mu_1'(u_2).\mu_1(u).\mu_1'(v_2)$

$= (\mu_1 \circ \mu_1')(u,u_2).(\mu_1 \circ \mu_1')(u,v_2)$

$\sigma_2\{(u,u_2)(u,v_2)\} = \sigma_1(u).\sigma_2(u_2v_2)$

$= \sigma_1(u).\sigma_1'(u_2).\sigma_1'(v_2)$, since G_2 is strong

$= \sigma_1(u).\sigma_1'(u_2).\sigma_1(u).\sigma_1'(v_2)$

$= (\sigma_1 \circ \sigma_1')(u,u_2).(\sigma_1 \circ \sigma_1')(u,v_2)$

(ii) $\mu_2((u_1,w)(v_1,w)) = \mu_1'(w).\mu_2(u_1,v_1)$

$= \mu_1'(w).\mu_1(u_1).\mu_1(v_1)$, since G_1 is strong

$= \mu_1'(w).\mu_1(u_1).\mu_1'(w).\mu_1(v_1)$

$= (\mu_1 \circ \mu_1')(u_1,w).(\mu_1 \circ \mu_1')(v_1,w)$

$\sigma_2((u_1,w)(v_1,w)) = \sigma_1'(w).\sigma_2(u_1,v_1)$

$= \sigma_1'(w).\sigma_1(u_1).\sigma_1(v_1)$, since G_1 is strong

$= \sigma_1'(w).\sigma_1(v_1).\sigma_1'(w).\sigma_1(v_1)$

$= (\sigma_1 \circ \sigma_1')(u_1,w).(\sigma_1 \circ \sigma_1')(v_1,w)$

(iii) $\mu_2(u_1,u_2)(v_1,v_2) = \mu_2(u_1,v_1).\mu_1'(u_2).\mu_1'(v_2)$

$= \mu_1(u_1).\mu_1(v_1).\mu_1'(u_2).\mu_1'(v_2)$, since G_1 is strong

$= \mu_1(u_1)|.\mu_1'(u_2).\mu_1(v_1).\mu_1'(v_2)$

$= (\mu_1 \circ \mu_1')(u_1,u_2).(\mu_1 \circ \mu_1')(v_1,v_2)$

$\sigma_2(u_1,u_2)(v_1,v_2) = \sigma_2(u_1,v_1).\sigma_2(u_1,v_1).\sigma_1'(v_2)$

$= \sigma_1(u_1).\sigma_1(v_1).\sigma_1'(u_2).\sigma_1'(v_2)$, since G_1 is strong

$= \sigma_1(u_1).\sigma_1'(u_2).\sigma_1(v_1).\sigma_1'(v_2)$

$= (g_1 \circ g_1')(u_1, u_2).(g_1 \circ g_1')(v_1, v_2)$

From (i), (ii), (iii), $G_1 \circ G_2$ is a strong Interval valued Fuzzy Graph.

IV CONCLUSION

It is well known that interval-valued fuzzy sets constitute a generalization of the notion of fuzzy sets. The interval-valued fuzzy models give more flexibility and compatibility to the system as compared to the classical and fuzzy models. So, we have introduced interval-valued fuzzy graphs and have presented several properties in this paper. The further study of interval-valued fuzzy graphs may also be extended with the following projects.

- Data base theory
- Expert systems
- Neural Networks
- Shortest paths in networks

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MAXIMUM AREA COVERING ALGORITHM – A NEW APPROACH OF VERTEX COVER

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ABSTRACT

One of most frequent operation to be performed to avoid traffic in smart cities is to place a security cameras on the road in less amount i.e. wherever required so that less cameras can covers maximum number of roads to save country money and that saved money can be used in other development of country. An efficient algorithm is required to perform a following task . This paper present a new algorithm named Maximum Area Covering Algorithm(MACA).

Keywords: ***Computer Algorithm, security, smart city, Maximum Area Covering Algorithm, Vertex Cover, Complexity.***

I INTRODUCTION

The process of using a computer to solve a given problem by performing several steps . The set of rules for carrying out calculation or sequence of computational steps used to transform input into output is called computer algorithm[1].

The complexity of algorithm is founded by the analysis of algorithm in the form of Big O(n) notation, where O represent complexity of algorithm and n represent size of the list.

II BACKGROUND AND PREVIOUS WORK

The vertex cover (VC) problem belongs to the class of NPcomplete graph theoretical problems, which plays a central role in theoretical computer science and it has a numerous real life applications [2].

In computer science, the Vertex Cover Problem or Node Cover Problem is one of Karp's 21 NP-complete problems. It is often used in complexity theory to prove NP-hardness of more complicated problems. The classical minimum vertex-cover problem involves graph theory and finite combinatory and is categorized under the class of NP-complete problems in terms of its computational complexity [3].

At present, all known algorithms for NP-complete problems require time that is super polynomial in the input size, and it is unknown whether there are any faster algorithms. [4],[5]. The following techniques can be applied to solve computational problems in general, and they often give rise to substantially faster algorithms: [6].

The vertex cover of an undirected graph G(V,E) is a subset V' is subset of V such that if (u,v)belongs to E then u belong to V' or v belongs to V'(or both). In vertex cover problem we wish to determine whether a graph have vertex cover of given size k.

VERTEX COVER={(G,k): graph G has vertex cover of size k }

III FLOW OF PROPOSED ALGORITHM

- Initialize n,J(n),J'(n)=@,J''(n)=@ // n represent number of node or junction in the list, @ represent empty list.
- Find degree of each nodes and insert in J(n).
- Now rearrange the degree of nodes i.e. in J(n) in non-increasing order.
- Mark the junctions having maximum connectivity and add to list J'(n) and add the connecting node to J''(n).
- Now check the nodes not traversed in J'(n) list

```
If(J'(n) U J"(n)== J(n))
  {
     Print(J'(n))
  }
 Else
{
J'(n)=J'(n) U untraversed element   of J(n)
J"(n)=J"(n)U {connectivity of new node}
}
Move to if statement
end
```

IV EXPERIMENTAL RESULTS

Consider a city having six nodes or junctions such that they connected to each other in a given way

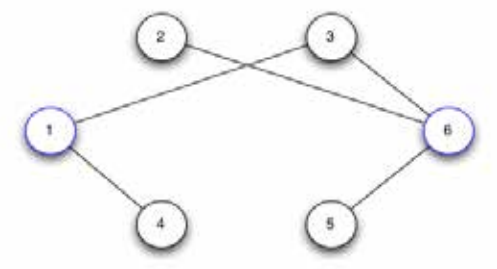

Figure 1: Shows the Six Nodes or Junctions in City

Now according to our proposed algorithm:

- n= 6, J(n),J'(n)=@,J"(n)=@ is initialized .
- Degree of each node is to be calculated:

  J(n)={ node 1= 2, node 2= 1, node 3=2, node 4= 1, node 5=1,node6= 3}
- Now rearranging in non-increasing order.

  J(n)={ node6= 3,node 1= 2, ,node 3=2, node 2= 1,node 4= 1, node 5=1, }
- Since maximum connectivity is with node 6 so place security camera at node 6 due to this node 3 , node 2, node 5 is traversed.

  So, J'(n)={node 6} and,

  J''(n)={node 2, node 3, node 5}
- Now check whether J'(n) U J"(n)== J(n))

  Here not equal so move to else part.

  So, J'(n)=J'(n)U {node 4}

  Now, new J''(n)= { node 2, node 3, node5,node1}

  Now new J'(n)={node 6, node 4}

Now move to **if statement** and now,

J'(n) U J"(n)== J(n)

And J'(n)={node 6, node 4}

So, now we need only 2 security cameras to cover 6 nodes or junctions of a city i.e. at node 6 and node 4 . So, this algorithm act as money saver and full secured system is developed by this algorithm.

V COMPLEXITY COMPARISON OF A MACA ALGORITHM WITH PREVIOUS ALGORITHM

In the previous algorithm or previous technique government use to fix security camera at each and every node i.e. complexity of previous algorithm was **O(n)** but by this algorithm only 2 security cameras covers all the six nodes . So, in this algorithm the complexity is decreased and becomes **< O(n).** So, new Complexity<O(n).

VI CONCLUSION

An efficient algorithm is developed to avoid traffic in smart cities and we placed a security cameras on the road in less amount i.e. wherever required so that less cameras can covers maximum number of roads to save country

money and that saved money can be used in other development of country . In this paper we presented a new algorithm named Maximum Area Covering Algorithm(MACA) so that maximum area is covered and less resources are utilized.

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DATA HIDING IN ENCRYPTED H.264/AVC VIDEO STREAMS BY CODEWORD SUBSTITUTION

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ABSTRACT

Digital video sometimes needs to be stored and processed in an encrypted format to maintain security and privacy. For the purpose of content notation and/or tampering detection, it is necessary to perform data hiding in these encrypted videos. In this way, data hiding in encrypted domain without decryption preserves the confidentiality of the content. In addition, it is more efficient without decryption followed by data hiding and re-encryption. A novel scheme of data hiding directly in the encrypted version of H.264/AVC video stream is proposed, which includes the following three parts, i.e., H.264/AVC video encryption, data embedding, and data extraction. By analyzing the property of H.264/AVC codec, the codewords of intraprediction modes, the codewords of motion vector differences, and the codewords of residual coefficients are encrypted with stream ciphers. Then, a data hider may embed additional data in the encrypted domain by using codeword substitution technique, without knowing the original video content. In order to adapt to different application scenarios, data extraction can be done either in the encrypted domain or in the decrypted domain. Furthermore, video file size is strictly preserved even after encryption and data embedding.

Keywords : Data Hiding, Encrypted Domain, H.264/AVC, Codeword Substituting.

I INTRODUCTION

CLOUD computing has become an important technology trend, which can provide highly efficient computation and large-scale storage solution for video data. Given that cloud services may attract more attacks and are vulnerable to untrustworthy system administrators, it is desired that the video content is accessible in encrypted form. The capability of performing data hiding directly in encrypted H.264/AVC video streams would avoid the leakage of video content, which can help address the security and privacy concerns with cloud computing [1]. For example, a cloud server can embed the additional information (e.g., video notation, or authentication data) into an encrypted version of an H.264/AVC video by using data hiding technique. With the hidden information, the server can manage the video or verify its integrity without knowing the original content, and thus the security and privacy can be protected. In addition to cloud computing, this technology can also be applied to other prominent application scenarios. For example, when medical videos or surveillance videos have been encrypted for protecting the privacy of the people, a database manager may embed the personal information into the corresponding encrypted videos to provide the data management capabilities in the encrypted domain. Till now, few successful data hiding schemes in the encrypted domain have been reported in the open literature. With the increasing demands of providing video data security and privacy protection, data hiding in encrypted H.264/AVC videos will undoubtedly become popular in the near future. Obviously, due to the constraint of the underlying encryption, it is very difficult and sometimes impossible to transplant the existing data hiding algorithms to the encrypted domain. To the best of our knowledge, there has been no report on the

implementation of data hiding in encrypted H.264/AVC video streams. The proposed scheme can achieve excellent performance in the following three different prospects.

- The data hiding is performed directly in encrypted H.264/AVC video bitstream.
- This scheme can ensure both the format compliance and the strict file size preservation.
- This scheme can be applied to two different application scenarios by extracting the hidden data either from the encrypted video stream or from the decrypted video stream.

II. RELATED WORK

W. Hong, T. S. Chen, and H. Y. Wu have proposed that most of the work on reversible data hiding focuses on the data embedding/extracting on the plain spatial domain[6]. The five MSBs of each pixel of the decrypted image will be identical to those of the cover image. According to the data-hiding key, it is easy for the data hider to reversibly embed data in the encrypted image. Thus the data hider can benefit from the extra space Emptied out in previous stage to make data hiding process effortless.

In the field of video, W. Puech , Z. Erkin, M. Barni, S. Rane proposed SE of H.264 video is proposed by doing frequency domain selective scrambling, DCT block shuffling and rotation. It performs SE by pseudo-randomly inverting sign of DCT coefficients in Region of intrest. A scheme for commutative encryption and watermarking of H.264/AVC. Here SE(selective encryption) of some MB header fields is combined with watermarking of magnitude of DCT coefficients but they are not format compliant. SE scheme based on H.264/AVC has been presented on CAVLC and CABAC for I and P frames .This method fulfills real-time constraints by keeping the same bitrate and by generating a completely compliant bit stream[1].

III. SYSTEM ARCHITECTURE

A novel scheme of data hiding in the encrypted version of H.264/AVC videos is presented, which is made up of three subsequent parts, i.e., H.264/AVC video encryption, data embedding and data extraction.It is necessary to perform data hiding in the encrypted videos for the purpose of the content notation and/or tampering detection. Data hiding in encrypted Domain without decryption preserves the confidentiality of the content. Furthermore, it is more efficient without decryption followed by data hiding and re-encryption. A novel scheme of data hiding directly in the encrypted version of H.264/AVC video stream is proposed. By analyzing the property of H.264/AVC codec, the codewords of intra-prediction modes, the codewords of motion vector differences, and the code words of residual coefficient are encrypted with stream ciphers. Then, a data hider may embed additional data in the encrypted domain by using codeword substitution technique, without the knowledge of original video content.

3.1 Encryption of H.264/AVC Video Stream

An H.264/AVC video encryption scheme with good performance including security, efficiency, and format compliance is been proposed. By analyzing the property of H.264/AVC codec, three sensitive parts (i.e., IPMs, MVDs, and residual coefficients) are encrypted with stream ciphers. Selective encryption in the H.264/AVC compressed domain has been already put forth on context-adaptive variable length coding (CAVLC) and even on context-adaptive binary arithmetic coding (CABAC). Further improved and enhanced the previous proposed approach by encrypting more syntax elements.

***1) Intra-Prediction Mode (IPM) Encryption*:** According to H.264/AVC standard, there are four different types of intra coding are supported, which are denoted as Intra_4×4, Intra_16×16, Intra_chroma, and I_PCM. Four intra prediction modes (IPMs) are available in the Intra_16 ×16.

2) Motion Vector Difference (MVD) Encryption: Further to protect both texture information and motion information, not only the IPMs but also the motion vectors should be encrypted. In H.264/AVC, motion vector prediction is further carried out on the motion vectors, which yields MVD. In H.264/AVC baseline profile, Exp-Golomb entropy coding is used to encode MVD encryption may change the sign of MVD, but does not affect the length of the codeword and satisfies the format compliance.

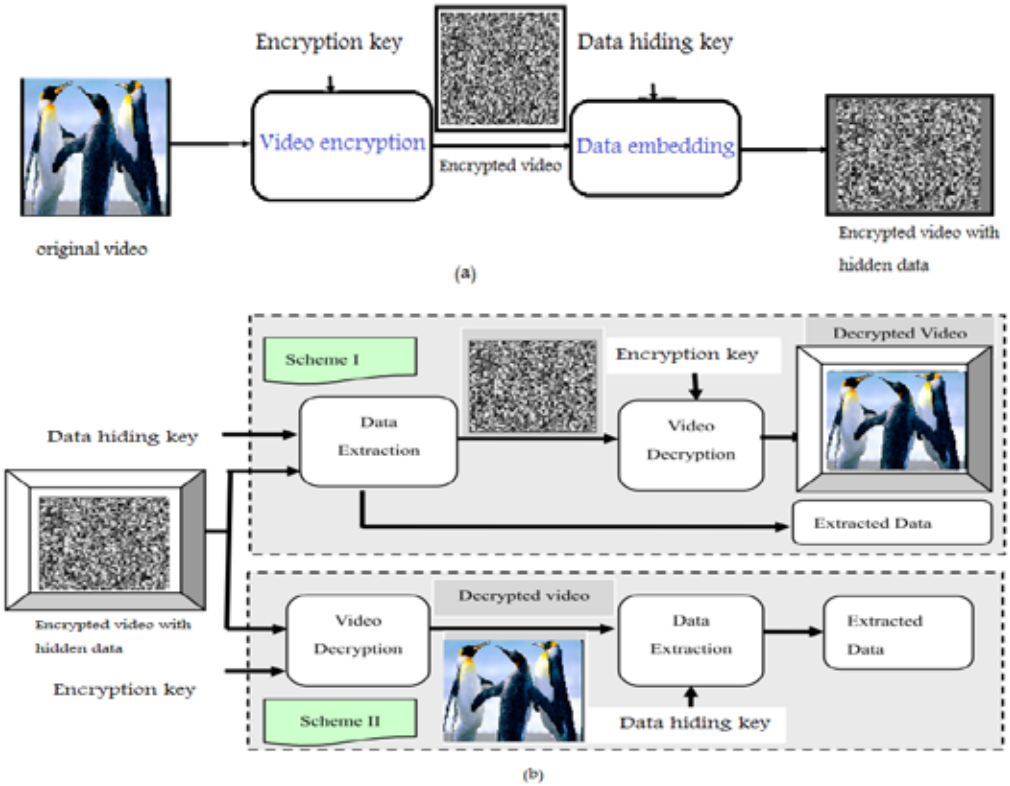

Figure 3.1 Diagram of proposed scheme. (a) Video encryption and data embedding at the sender end. (b) Data extraction and video display at the receiver end in two scenarios

***3) Residual Data Encryption*:** In order to keep high security, another type of sensitive data, i.e., the residual data in both I-frames and P-frames should be encrypted. In this region, a novel method for encrypting the residual data based on the characteristics of codeword.In H.264/AVC baseline profile, CAVLC entropy coding is used to encode the quantized coefficients of a residual block. Each CAVLC codeword can be expressed as the following format:

{Coeff_token,Sign_of_Trailing Ones, Level, Total_zeros, Run_before}

3.2 Data Embedding

In the encrypted bitstream of H.264/AVC, the proposed data embedding is accomplished by substituting eligible codewords. On the other hand, the codewords substitution should fulfill the following three limitations. First, the

bitstream after codeword substituting must remain syntax compliance so that it can be decoded by standard decoder. Second, to keep the bit-rate unchanged, the substituted codeword should have the same size as the original codeword. The codewords of Levels which suffix Length is 2 or 3 would be divided into two opposite codespaces denoted as C0 and C1 as shown in Figure. 3.2. The codewords assigned in C0 and C1are associated with binary hidden information "0" and "1". Suppose the additional data that we want to embed is a binary

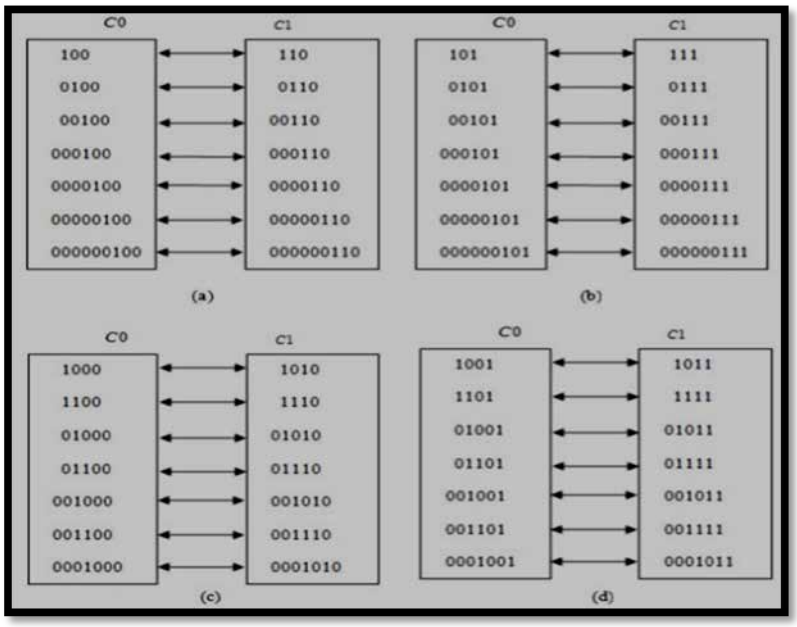

Figure 3.2 CAVLC codeword mapping.

sequence denoted sB={b(i)|i =1,2,⋯,L,b(i)∈ {0,1}}. Data hiding is performed directly in encrypted bit-stream through the following steps.

Step:. In order to enhance the security, the additional data is encrypted with the chaotic pseudo-random sequence P={p(i)|i =1,2,⋯,L,p(i)∈{0,1}}[22] to generate the to-be-embedded sequence W={w(i)|i =1,2,⋯,L,w(i)∈{0,1}}. The sequence Pis generated by using logistic map with an initial value, i.e., the data hiding key. It is very difficult for anyone who does not retain the data hiding key to recover the additional data.

```
Procedure
If(databit==0){
        if(the codword belongs to C0)
         The codeword is unmodified;
         Else if (the codeword belongs to C1)
         The codeword is replaced with the corresponding codeword in C0
            }
If(data  bit==1){
        if(the codword belongs to C1)
         The codeword is unmodified;
         Else if (the codeword belongs to C0)
         The codeword is replaced with the corresponding codeword in C1
           }
```

Figure 3.3. The procedure of codeword mapping

Step2: The codewords of Levels are obtained by parsing the encrypted H.264/AVC bitstream.

Step3: If current codeword belongs to codespaces C0 or C1, the to-be-embedded data bit can be embedded by codeword substituting. Otherwise, the codeword is left unchanged.

The detailed procedure of codeword substituting for data hiding is shown in Figure. 3.3. For example, when Level is positive 1 and its suffix Length is 3, then its corresponding codeword is "1000" which belongs to C0 as

shown in Figure.3.2. If the data bit "1" needs to be embedded, the codeword "1000" should be replaced with "1010". Otherwise, if the data bit "0" needs to embedded, the codeword "1000" will keep unchanged.

Step4: Choose the next codeword and then go to Step3 for data hiding. If there are no more data bits to be embedded, the embedding process is stopped. Suppose the to-be-embedded data is "1001", the CAVLC codeword of Level parsing from H.264/AVC bitstream is Figure. 3.3. The procedure of codeword mapping

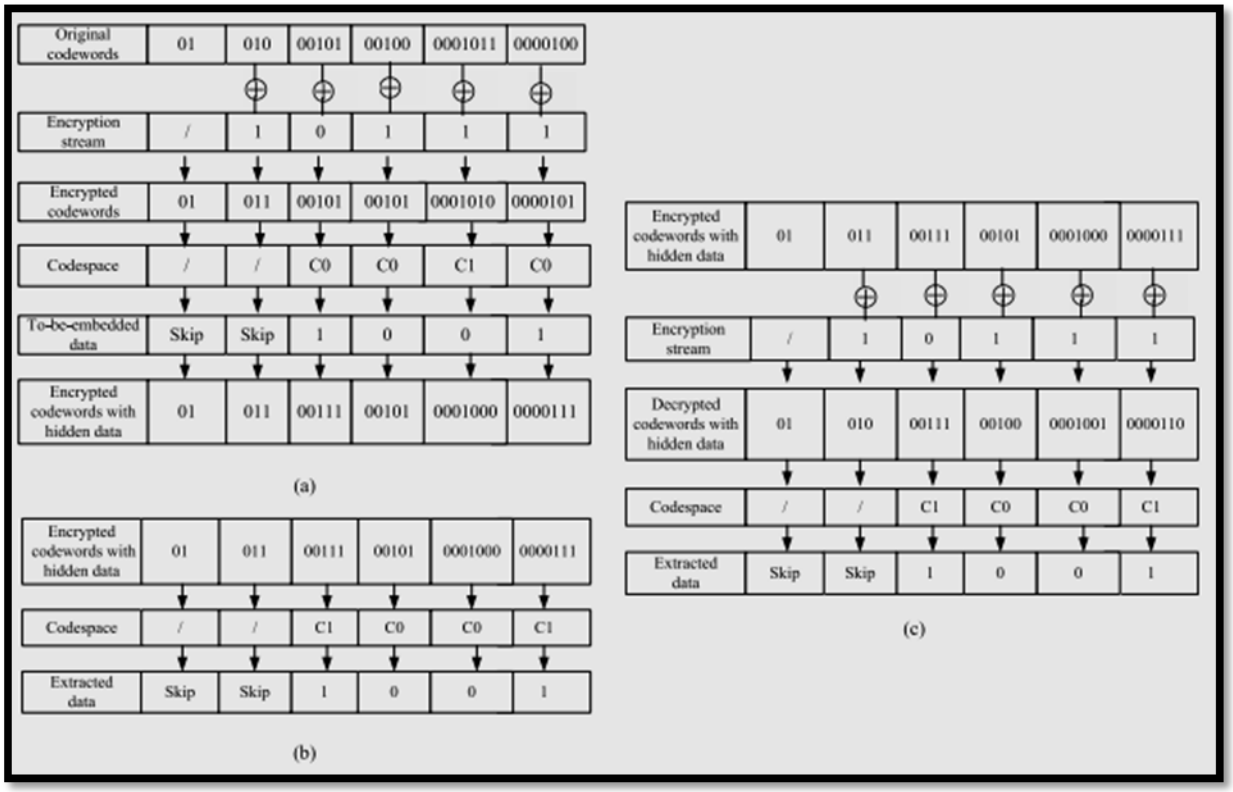

Figure 3.4: An example of data embedding and extraction. (a) Data embedding.(b) Data extraction in encrypted domain. (c) Data extraction in decrypted domain

3.3 Data Extraction

In this scheme, the hidden data can be extracted either in encrypted or decrypted domain. Data extraction process is fast and simple.

***Scheme I*:** Encrypted Domain Extraction.

***Scheme II*:** Decrypted Domain Extraction.

Scheme I: Encrypted Domain Extraction.

To protect privacy, a database manager (e.g., cloud server) may only get access to the data hiding key and have to manipulate data in encrypted domain. Data extraction in encrypted domain guarantees the feasibility in this case. In encrypted domain, as shown in Figure. 3.1(b), encrypted video with hidden data is directly sent to the data extraction module. An example of data extraction in encrypted domain is shown in Figure. 3.4(b).

Scheme II: Decrypted Domain Extraction.

In scheme I, both embedding and extraction of the data are performed in encrypted domain. However, in some cases, users want to decrypt the video first and extract the hidden data from the decrypted video. For example, an authorized user, which owned the encryption key, received the encrypted video with hidden data. The

received video can be decrypted using the encryption key. That is, the decrypted video still includes the hidden data, which can be used to trace the source of the data. In Figure 3.1(b), the received encrypted video with hidden data is first pass through the decryption module.

The whole process of decryption and data extraction is given as follows.

Step1: Generate encryption streams with the encryption keys as given in encryption process.

Step2: The codewords of IPMs, MVDs, Sign_of_TrailingOnes and Levels are identified by parsing the encrypted bit stream.

Step3: The decryption process is identical to the encryption process, since XOR operation is symmetric. The encrypted codewords can be decrypted by performing XOR operation with generated encryption streams, and then two XOR operations cancel each other out, which renders the original plain-text. Since the encryption streams depend on the encryption keys, the decryption is possible only for the authorized users. After generating the decrypted codewords with hidden data, the content owner can further extract the hidden information.

Step4: the last bit encryption may change the sign of Level. The encrypted codeword and the original codeword are still in the same code spaces.

Step5: Generate the same pseudo-random sequence that was used in embedding process according to the data hiding key. The extracted bit sequence should be decrypted to get the original additional information. An example of data extraction in decrypted domain is shown in Figure. 3.4(c).

IV. CONCLUSION

The existing system just addresses the calculation of smoothness and the process of image recovery and lacks in addressing the data encryption & data embedding process. Time consumption rate is also high when compared to the recent methods developed. The block encryption methods are not robust to noise.Data hiding in encrypted media is a new topic that has started to draw attention because of the privacy-preserving requirements from cloud data management. An algorithm is used to embed additional data in encrypted H.264/AVC bit stream, which consists of video encryption, data embedding and data extraction phases.The data-hider can embed additional data into the encrypted bit stream using codeword substituting, even though he does not know the original video content. Since data hiding is completed entirely in the encrypted domain, here we can preserve the confidentiality of the content completely.

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AN ENERGY EFFICIENT AND RELIABLE TWO TIER ROUTING PROTOCOL FOR TOPOLOGY CONTROL IN WIRELESS SENSOR NETWORKS

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ABSTRACT

Wireless Sensor Networks (WSNs) is used in many applications for precise monitoring. The key issue in WSNs is energy conservation is the most important strategies to save energy and to prolong the lifetime of the WSNs are topology control. A reliable energy-efficient topology control protocol in wireless sensor networks is proposed, it is one of the most important techniques utilized to reduce energy consumption in wireless sensor networks, considers the residual energy and number of neighbors of each node for cluster formation, and well-balanced a loss of energy of the network. Topology control is an efficiency method that can extend the network lifetime in a wireless sensor network. Cluster heads selection and selected cluster head maintains connectivity and network coverage with respect to time in this approach. Balancing energy consumption and prolonging network lifetime are open challenges in Wireless Sensor Networks. This not only balances the energy consumption of each node and provides prolonged the network life time but also provides global reliability for the whole network.

Keywords: Clustering, Topology Control, Wireless Sensor Network.

I. INTRODUCTION

A WSN consists of spatially distributed autonomous sensor nodes to cooperatively monitor physical or environmental conditions such as temperature, sound, vibration, motion, pressure, or pollutants at different locations. A WSN may consist of hundreds or even thousands of nodes. Source node transmits their data to destination nodes through intermediate nodes. This destination node is connected to a central gateway, also known as a base station. Central gateway provides a connection to the wired world where the data can be collected, processed, and analyzed.

Achieving maximum lifetime in WSNs by optimally using the energy within sensor nodes has been the subject of significant researches in the last recent years. A wireless sensor network (WSN) mainly considered as a number of tiny, low-powered, energy-constrained sensor nodes with sensing, data processing and wireless communication components. Sensor nodes in WSNs are small battery powered devices with limited energy resources, and their batteries cannot be recharged once the sensor nodes are deployed. Therefore, minimizing energy consumption is an important issue in the design of WSNs protocol. Clustering is a most effective solution in reducing energy consumption, prolonging the lifetime of the networks and network scalability [1].
Transmit power adjustment of node in multihop and access control with cross layer optimization, this is a Power control technique [*2, 3*] that reduces interference and improve throughput. Topology control by tuning

transmission powers is discussed in [*4*, *5*, and 6]. Among several challenging issues, in most current designs, nodes are deployed using random and uniform distributions as they are the popular schemes because of simplicity. However, node deployment schemes have a good impact on system functionality as well as on lifetime.

Data funneling and aggregation [8] may address the problem to some extent, but cannot eliminate the problem either. The main objective of our work is to provide a long-term continuous connectivity. They attempt to address the problem by designing a power-aware topology management scheme. Major attention is given to the connectivity of the network as purposes of sensing coverage. Note that without a valid data path, an active node has the same role as a dead one. The sensing area covered by unconnected nodes is still inaccessible. Most of the application only one tiered or two tiered sensor network is used. Two tiered scenario different compared to muti-hop scenario, thus energy consumption also will be different. Two tiered architecture of sensor network itself is a solution to energy loss problem in wireless sensor network. A node is selected as cluster head again and again then it energy will reduce by destroying. Many of the researcher have tier two to balance energy consumption in two tier sensor network.

II. LITERATURE SURVEY

Heinzelman W.B, Chandrakasan, A.P Balakrishnan H, Proposed the application specific protocol architecture for wireless Microsensor networks, IEEE Transition on Wireless Communication 2002[1]. Robust wireless communication protocols that are energy efficient and provide low latency, develop and analyze low-energy adaptive clustering hierarchy (LEACH), it is a protocol architecture for Microsensor networks that combines the ideas of energy-efficient cluster-based routing and media access together with application-specific data aggregation to achieve good performance in terms of system lifetime, latency, and application-perceived quality. The LEACH includes a distributed cluster formation technique that enables self-organization of large numbers of nodes, algorithms for adapting clusters and rotating cluster head positions to evenly distribute the energy load among all the nodes, and techniques to enable distributed signal processing to save communication resources.

Zhi Chen, Shaoqian Li proposed the Energy-Efficient Access Control Algorithm with Cross-Layer Optimization in Wireless Sensor Networks(WSN)[3], Access control algorithm designed to minimize WSN node energy consumption. This algorithm incorporates the power control of physical layer, the transmitting probability of medium access control (MAC) layer, and the automatic repeat request (ARQ) of link layer, Based on slotted ALOHA protocol. Access control algorithm, a cross-layer optimization is preformed to minimizing the energy consuming per bit. The cross-layer algorithm results in a significant energy savings relative to layered design subject to the same throughput per node, and the energy saving is extraordinary in the low throughput. A new cross-layer access control (CLAC) algorithm that accounts for power control of physical layer, access control of MAC layer, and ARQ behavior of link layer

Ram Ramanathan, Regina Rosales-Hain proposed the topology control of multihop wireless networks using transmit power adjustment [5]. *Multihop wireless network* is a packet may have to traverse multiple consecutive

wireless links in order to reach its destination. The *topology* of a multihop wireless network is the set of communication links between node pairs used explicitly or implicitly by a routing mechanism. The topology depends on ‘uncontrollable” factors such as node mobility, weather, interference, noise, as well as on “controllable” parameters such as transmit power and antenna direction. Consider the problem of adjusting the

trans-mit powers of nodes in a multihop wireless network (also called an ad hoc network) to create a desired topology, formulate it as a constrained optimization problem with two constraints - connectivity and biconnectivity, and one op-timization objective - maximum power used. They present two centralized algorithms for use in static networks, and prove their optimality. For mobile networks, presents the two distributed heuristics that adaptively adjust node transmit powers in response to topological changes and attempt to maintain a connected topology using minimum power.

III. A TWO-TIERED WIRELESS SENSOR NETWORK.

A two-tiered Wireless Sensor Network (WSN) where nodes are divided into clusters and nodes forward data to base stations through cluster heads is considered. To maximize the network lifetime, two tier energy efficient approaches are investigated. Topology of two-tiered WSN as depicted in Figure 1. It consists of a number of clusters and multiple mobile base stations. Each cluster is composed of a set of Sensing Nodes and one Cluster Head. Sensing Nodes are small, low cost and densely deployed in each cluster. They are responsible of sensing raw data and then forwarding to the corresponding Cluster Head.

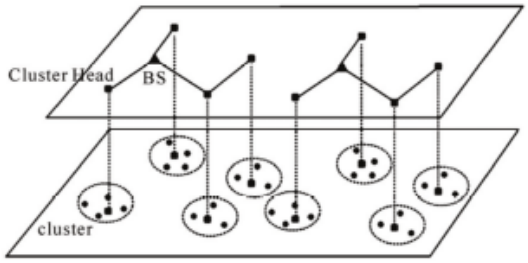

Fig1. Two - tiered wireless sensor network.

Consider the cluster formation is based on neighborhood. Hence, direct transmissions can be used inside each cluster. However, Sensing Nodes do not communicate with other Sensing Nodes in the same or other clusters. Cluster Heads, on the other hand, have much more responsibilities. First, they manage their clusters (send queries, instruct some nodes to be in idle or sleep status…) and gather data from their cluster members. Second, they perform aggregation of this data to eliminate redundancy and minimize the number of transmissions and thus save energy. The aggregated data at each Cluster Head represents a local view of its cluster. Third, they transmit the composite bit-stream towards the nearest base station. Each base station can then generate a comprehensive global view of the entire network coverage by combining the different local view data received from the different Cluster Heads.

Cluster heads from different regions send their collected data to the gateway. The cluster head of tier 2 can send the data to the cluster head of another network which can further send the data to the gateway. The biggest advantage e of this topology is that it divides the whole network into a number of small zones within which routing of signals can be done locally. The cluster heads can be designed to be more powerful in terms of computation/communication. In addition to it, the nodes can also be connected through a wire, which increases the transmission speed as well as reliability of network

Cluster-head selection mechanisms consider cluster heads cooperate with each other to forward their data to the base station, the cluster heads closer to the base station are burdened with heavy relay traffic and tend to die early leaving areas of the network uncovered and causing network Partitions, This mechanism developed that

considers residual energy, number of neighbors, and centrality of each node and uses production rules for cluster-head selection. Reasoning mechanism is used to develop reliable multi-hop routing algorithm among cluster heads, the pre-processed data is forwarded to the back-end via a gateway, optionally multi-hopping over routers. The sinks perform local, rule-based reasoning,

IV. EXISTING SYSTEM

A3 algorithm [7] assumes no prior knowledge about the position or orientation of the wireless sensor nodes. However, nodes can determine how distance of a node is from another node, based on signal strength when it is received. This information is enough to select a close-to-optimal Connected Dominating Set (CDS) tree, based more area of communication coverage. The A3 is executed in three phases: Neighborhood Discovery, Children Selection and Second Opportunity

A. Neighborhood Discovery

The CDS building process is started by a pre-defined node that might be the sink node just after the nodes are deployed. The sink node starts the protocol by sending an initial *Hello* Message. It allows the neighbors of the starting node to know its 'parent' node. If the node not have been covered by another node receives the *Hello* message, it sets state as covered, adopts the sender as its 'parent' node and replies with a *Parent Recognition* Message. This message also includes a selection metric that is based on the signal strength of the received *Hello* Message. If another node has already covered to the receiver, it ignores the *Hello* Message.

B. Children Selection

The parent node sets a timeout to receive answers from its neighbors. Each metric is stored in a list of candidates. Once this timeout expires, the parent node sorts the list in decreasing order according to the selection metric. The parent node then broadcasts a *Children Recognition* Message that includes the complete sorted list to all its candidates. During the timeout, nodes wait for *Sleeping* Messages from their brothers. If a node receives a *Sleeping* Message during the timeout period, it turns off. This is because the recipient of the *Sleeping* Message understands that one of its brothers is more appropriate to become a part of the CDS tree. Based on this scheme, the best node according to the chosen metric sends a *Sleeping* Message thereby blocking any other node in its range. Therefore, only other candidate nodes outside its area of coverage have the opportunity to start their own generation process.

C. Second Opportunity

Although this methodology works very well, there are some cases where a node is sent to sleep to avoid bottleneck. In order to avoid this situation, every node sets a timer once it receives the *Sleeping* Message to send a *Hello* Message and starts its own building process.

D. Advantages

- A3 is very scalable, as it only needs local information and operates in a completely distributed manner;
- A3 does not need location information; no GPS or any localization mechanism is necessary.
- A3 requires no synchronization scheme thanks to the ordered sequence of the tree creation.
- A3 is simple, and presents low computational complexity, and
- A3 is very Energy-efficient.

E. Disadvantages

- This algorithm in a complete topology control solution where the CDS tree will have to be changed many times
- Doesn't determine an approximation ratio to the optimal solution, as a performance metric of the algorithm.

V. PROPOSED SYSTEM

A reliable energy-efficient topology control protocol in wireless sensor networks is proposed. This approach considers the residual energy it means that remaining energy of each node and number of neighbors of each node for cluster formation in network, and well-balanced a loss of energy of the network. This proposed system not only balances the energy load of each node but also provides global reliability for the whole network. To maximize the network life time optimal cluster head selection is important. CHs require more energy than all other nodes because they perform processing, sensing, communication and aggregation. In case, the cluster head dies in earlier, then the entire network becomes useless; since the CH cannot communicate with Base Station. To obtain optimal cluster head, CH should be elected based on the residual energy of each and every node. Therefore energy efficiency is maximized & prolonged network lifetime.

A. Cluster head selection

CHs are selected from the deployed nodes based on the criteria such as residual energy, connectivity, communication cost and mobility. All nodes are located in a two tier dimension and it has to reach communication coverage. Each and every node starts in an unvisited state. The sink is main step of the process and it has a large amount of energy. As the cluster heads change after time t=$T+\beta$, to connect between the cluster heads use an approximation of (CDS)connected dominating set algorithm to form a reliable multihop connection and converge among the cluster heads.(β= the time interval between two CH selection run). So that then there is no packet loss at the Data Link Layer, It is main advantage of this approach.

As per the cluster head selection chance A_i, can get the time t_i of the m^{th} node broadcasting the cluster declaring message CH as $t_i = A_i \times T$, where T is predefined as the maximum time cluster head is competing. If a sensor node does not receive the message CH before time t expires, it will broadcast message CH to its neighbor nodes. If the n^{th} node receives some CH message before the time t_j expires, the n^{th} node will not compete for cluster head selection and will construct a cluster head candidate table containing the sender of the CH messages. Then, the n^{th} node selects the node with the maximum chance as its cluster head. If there are multiple nodes having the same maximum chance, the node having more energy is selected as the cluster head. Finally, the node transmits the JOIN message to the cluster head.

B. Cluster heads connection

Immediately when the clusters are formed further there is a need to connect the cluster heads to aggregate data and forward it to the base station through a multihop path. As the cluster heads change after time T, they use an approximate connected dominating set algorithm to form a reliable multi-hop connection among the cluster heads.

C. Advantages

- Really significant in terms of better coverage and efficiency in terms data handling.

- In the proposed scheme energy is spent insidiously to build topology compared to the A3 algorithm.
- Energy efficient, and has prolonged network life.
- No pocket loss at the data link layer.
- Nodes have a perfect communication coverage disk.

D. Disadvantages

- The sensing area coverage in the proposed system is initially less.
- The proposed system is not time efficient.

VI. CONCLUSION

Cluster-head selection mechanism is selects the cluster head of network this mechanism aggregates the date from each cluster node, considers the residual energy, number of neighbors, and cluster head connection mechanism is develop reliable multi-hop routing among cluster heads and network coverage. The reliable energy efficient two tiers routing protocol that provides to balances the energy load of each node and there is no pocket loss in network this provides global reliability for the whole network.

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ENERGY EFFICIENT AND REDUCTION OF POWER COST IN GEOGRAPHICALLY DISTRIBUTED DATA CARDS

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ABSTRACT

Data centers is the most discussed topic in current technical world which considered the brain of a company that holds the responsibilities of storage, management and dissemination of data etc. In other words global technology cannot be feasible without a proper functioning of those data centers. We consider a stochastic optimized method for the process of job scheduling and server management in distributed data centers. In this process jobs are allocated according to the server choices. In this section server activation decides the active servers which are at slow time scale in the other section service rates of the section are controlled by the power scaling decisions. To solve this problem, we propose a novel approach based on decreasing time algorithm based on the priority values.

Keywords: Data Center, Power Management, Stochastic Optimization, Performance Analysis

I. INTRODUCTION

Over a few decades technology that insist computing in various aspects and improvement of those data center still in requirement phase. This can be stabilized by enabling a huge scale geographically distributed data centers with large numbers of servers. Data centers are centralized servers which organize storage and management in an effective manner. In which data centers compose lot of power for two usages such as running the actual equipment and cooling power of this equipments. In the current technical world every organization is using the data center which can be considered as brain of an organization. The serious discussion should be taken for improving the performance in hardware design and engineering as well as adjusting the CPU speed in a single server.

The Fig.1 shows the design of a data center; the consumption cost can be optimized by dealing the workloads in an effective manner. There are various algorithm and techniques have been in process dealing in controlling the workloads in several aspects. In this manner the known public data center is The National Climatic Data Center (NCDC) that holds the huge archive of weather information's. But this section still in research with various issues as the computing demand has grown successfully. According to Carrie Higbie, of Global Network Applications data center in every organization is under restriction access and the networking systems were

controlled by automatic systems that monitors regularly overall server activity along with network performance and web traffic.

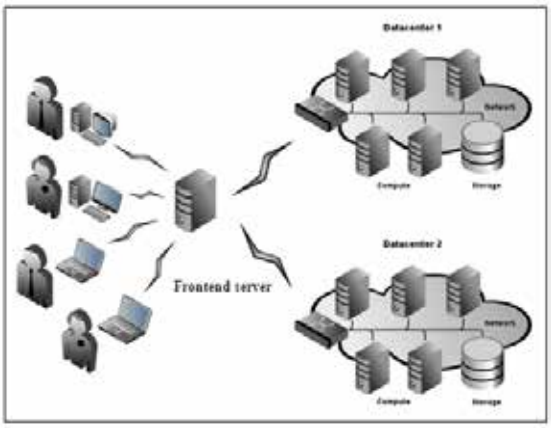

Fig.1 Data centers

While discussing this green computing was also popular among the organizations in this the computer user holds the overall responsibility. The aim of this approach is minimizing the energy and harmful materials. Cloud computing is a pattern that characterized the delivery and consumption of IT. Cloud computing consumes resource utilization which minimize the hardware equipments. It was a large set of server which is grouped with each other by means of internet. Here job scheduling plays vital role in arranging the job execution in an effective manner. The job allocation has to be faced various issues like which job is to be executed first, what resources to be allocated to do in a competent manner. The various servers may cause of network traffic which overall result on poor performances. A proper mechanism is to be prepared to over the issue that takes the performance of cloud computing into a new era.

II. RELATED WORKS

The importance of cloud centers and requirement of performance improvement grabs the attentions of various researchers in analyzing a prominent solution on these factors. From the beginning several peoples were developed some mechanism with the goal of improving performance, according to a report [1], Google (1 million), Microsoft (200K), Akamai (60-70K), INTEL100K), which has large number of various servers that are location in a various locations. In these the consuming cost are million dollars per year. With the goal of reduced power cost in data centers various works are carried out by [2][3][4][5][6][7] which can be discussed on two sections such as dealing with the saving power cost of DC power supplies, cooling systems and energy efficient chips. In the next section is sizing the data center as much as feasible.

The workload are major drawbacks to be controlled in data centers, to do this various algorithm are developed according to Lyapunov optimization concepts from [8] it designed with stochastic settings but this not suitable for real-time situations. Next on this way MapReduce-based application which makes use of web services that is indicated in [9]. By Gandhi et al. way developed certain management policies for minimizing the total power cap [11]. Some research on service providers like Google replicates data across were carried out on [12] for

providing better services on I/O intensive jobs. According to Urgaonkar et al. he has discussed about the network utility optimization problems for job admission control, routing, and resource allocation [13].

Some algorithm were developed which are designed to work on single server with minimum power consumption subject to job deadlines and response time [14][15]. This work is continued on [16] in reducing the single server power consumptions. By the recent researches some works are implemented in making a better usage of power on data centers. According to El-Sayed et al. [17] and Liu et al. [18] introduce various strategies on cooling systems and they process renewable energy by making the server management together with cooling systems. In [19][20] they discussed about the existing techniques about the for reducing durable availability of MapReduce jobs on both the prevalence and the magnitude of task

III. EXISTING SYSTEM

The power cost minimization is the growing problem which is solved by using the SAVE (StochAstic power redUction schEme).This algorithm is categorized of three factors such as front-end rounting, backend server management and Queue update. It minimize the power consumption of the server and supports grren computing platform. It works on the basis of two scale mechanism that reduce the power cost in geographically distributed data centers. It serves job according to a particular slot even in queue due to high price at data center.

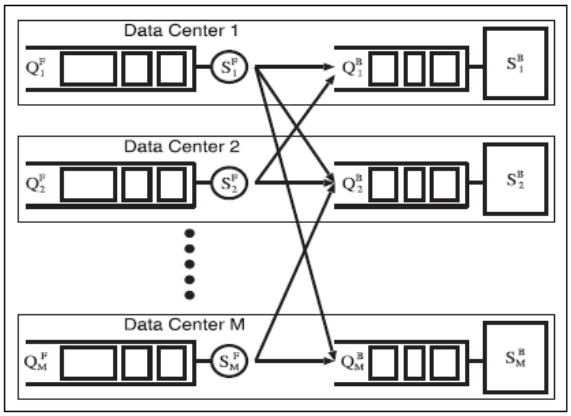

Fig.2 SAVE Mechanism

The mechanism sends the workload from front end to back end server this mechanism does not changed for that slot. For a larger time slot the algorithm optimized the time consumption in order to reduce the cost. This algorithm is based on Lyapunov optimization framework with queue stability. One of the best thing in this algorithm is inaccurate in queuing the backlog information which routes multiple jobs with lower power price. This mechanism is discreteness due to job sizes in which all tasks are assigned at back end cluster which is difficult to control the power consumption. The workload is cannot be solved by SAVE in an effective manner because some slots are failed to achive the power cost. Since in this approach the load balancing in all servers are not active because it assumes that servers can switch between active state and sleep state with same frequencies. The maximum workload is a greedy fashion that is not very effective in order to reducing power

cost. The major drawback of this method is it require simultaneously activation and deactivation on multiple servers but it results in unsteadiness in power grids.

IV. PROPOSED SYSTEM

To overcome the problem as discussed in the existing system we proposed a decreasing time algorithm, initially it creates the priority list by means of it. In which it set the maximum priority to the very long task in order which completes the task in a shortest time period.

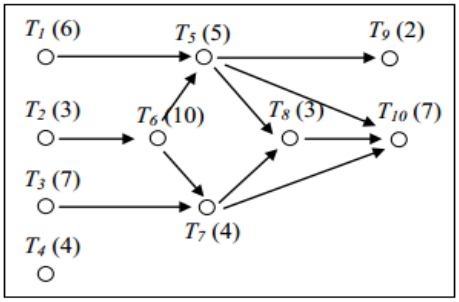

Fig.3 Proposed system

As shown in the Fig.3 the proposed system makes the priority list by arranging the tasks from longest time to shortest time in a prominent manner which will be more effective power consumption as better than SAVE method. With the Fig.3 the priority list is T6 (10), T3 (7), T10 (7), T1 (6), T5 (5), T4 (4), T7 (4), T2 (3), T8 (3), T9 (2). These compute a minimum time to complete the job along with highest total completion time. The difficulty is to identify which one is longest task that is high priority it could be practiced by preparing the list which is scheduled to process with the completion time of 32. Consider that this algorithm is processed with two processors finishes at time 32 with only 4 time units on the second processor. Such as from the list T3, T2, T4, T1, T6, T5

Machine 1: T3, T4, T5

Machine 2: T2, T1, T6

The remaining tasks are carried out in the same manner. Check that the sum of two sets at a value of 30. It can be mathematically explained by

$$((4/3)-1/(3m))T$$

In which T is the optimal time for schedule task and number of machine (two), is represented by m then the tasks are carried. The care should be taken in finding the critical path because it makes the process some time critical. The methodology behind this algorithm is the longer task sound good which complete the task quickly at the end the overall performance which results in reliable power consumption.

V. SYSTEM DESIGN

In this section the information are collected and servers are collected which are going to implement this process. A analysis should be taken what are the jobs and how it could be carried out. How the process is going too happened in geographically distributed datacenters.

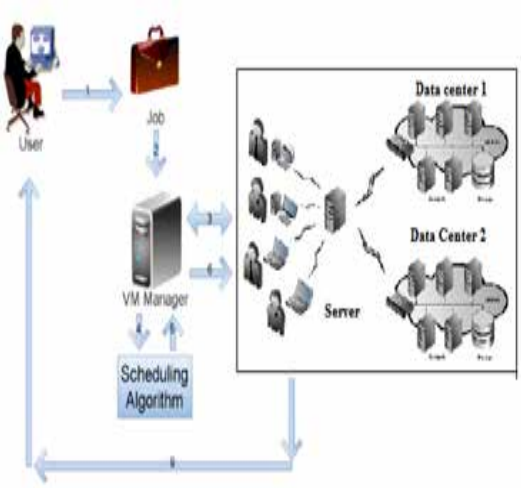

Fig.4 Proposed system architecture

Based on this system the jobs are carried, in which the VM collects the overall task for a job of single server. In this the slot is prepared by implementing the decreasing time algorithm. Based on this a priority list is prepared by means of longest task in forward which was listed in times by decreasing order. Here two data centers are shown each one has clusters of systems which are connected to a server such as front-end proxy server and a back-end server cluster respectively. The workload is allocated by the user, so the workload arrived time are calculated and size of the workload are also noticed based on this analysis the above mentioned priority list is prepared for a slot. This is denoted by denoted by D = {D1,…, DM}, where the system operates in slotted time, i.e., t = 0, 1, 2, . . . with workload arriving time at Di by A(t) = (A1(t),…,AM(t)) denotes the arrival vector.

Fig.5 Task allocation

The above figure shows the how the priority list was carried out by two machines which results in optimum solutions.

VI. ALGORITHM IMPLEMENTATION

Step 1: Jobs allocating

Step 2: First identify the execution time of jobs before scheduling

Step 3: Calculate the priority values

Step 4: Fix the priority values.

Step 5: Based on the priority, we schedule the jobs

Step 6: Arbitrary List: A (6), B (5), C (7), D (2), and E (5)

Decreasing Time List: C (7), A (6), B (5), E (5), D (2)

Step 7: Execution of jobs

Step 8: Output the execution time

VII. RESULT & DISCUSSION

The jobs are arrived at the datacenters in which it is identified and sends to the router. The router schedules the job in which the backend cluster manipulates arrived jobs. The result shows list of arrived jobs and tables are scheduled. In which the task are analyzed among that the longest one in the topmost priority which can be seen in the Fig.6.

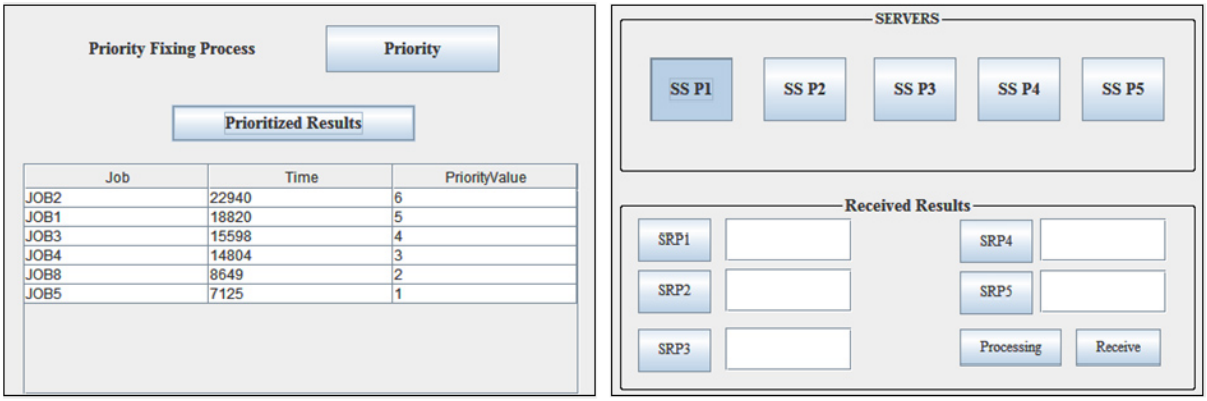

Fig.6 Server executes the jobs based on priority

After that the available server to which the execution jobs to be carried out. On that various job are allocated as per in the priority list with the help of host IP in each of the systems. Fig.7 shows some sample jobs such as converting image color and document in to PDF in a similar manner all these executions are traced and monitored prominently.

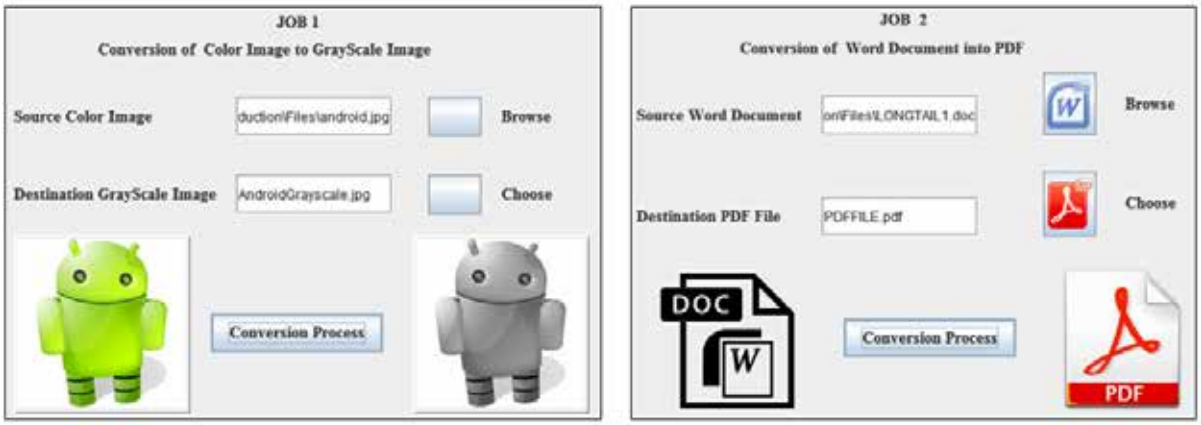

Fig.7 Conversion of color image to grayscale image and word document to pdf

By the Queue the jobs are executed and the results are tabulated as shown in the Fig.8 by the activation of server. This value is calculated in next stage to analyze the overall performance. In the same aspect the power consumption were also calculated which are also tabulated to analyze the final result.

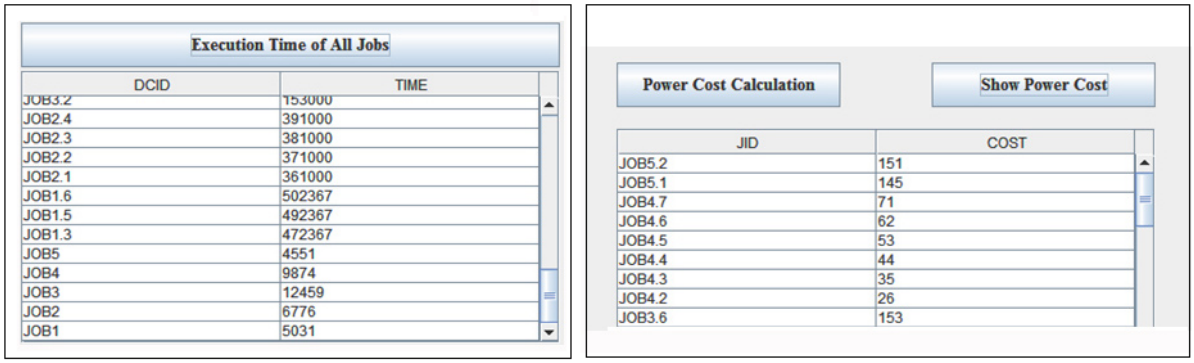

Fig.8 Execution time and power cost calculation

Based on these two reading a graphical representation is created. The Fig.9 justified the decrease the time algorithm is more feasible when compared to result attained by the SAVE algorithm. It is clear how the tasks of the jobs are carried out and power cost taken by each jobs are graphically shown, as prominent support for proving the efficiency of our proposed algorithm. Thus proves that minimum time consumption is result in minimum power cost consumption which was successfully achieved by our proposed algorithm.

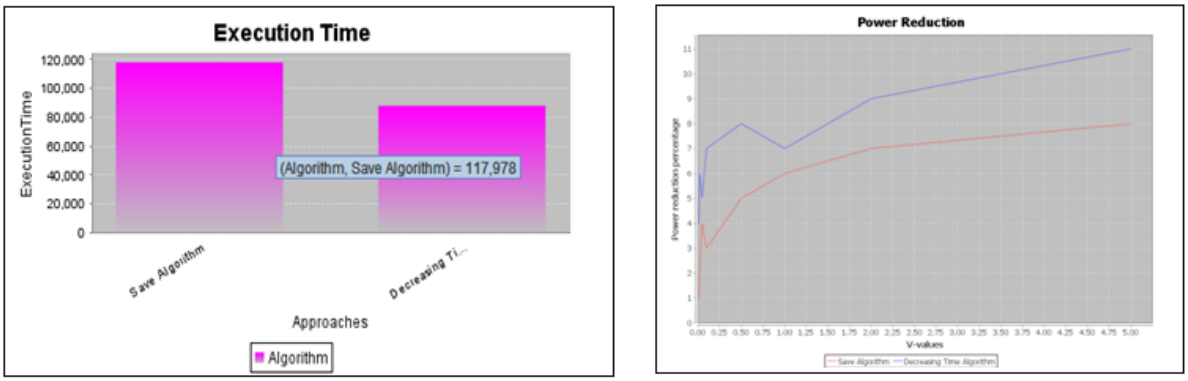

Fig.9 Graphical representation of execution time and power reduction between SAVE algorithm and decreasing time algorithm

VIII. CONCLUSION & FUTURE WORK

In this paper we shown how our proposed system is carried out the performance done is more efficient than earlier systems. Here it clearly explained that decreasing time algorithm based priority list is how effective than the SAVE system in achieving the minimum power cost consumptions. In addition to it we also show that how our approach is effectively handling the delay tolerant workloads as well as the network traffic in distributed data centers. Finally we provide a prominent solution for doing activation and deactivation of multiple servers to do process. The overall result based on real-time data in simplifying the problem by assuming the processing

time of each job is proportional to the amount of work. In future the work is carried out in improving the performance of datacenters by achieving more accuracy with the help of modern algorithm that satisfies the delay tolerance.

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THEORETICAL AND EXPERIMENTAL EVALUATION OF AUTOMOBILE AIR-CONDITIONING SYSTEM USING R134A

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ABSTRACT

This study involves the theoretical & experimental aspects of R134a Automobile Air Conditioning (AAC) system. The main aim of the study was to evaluate the performance of R134a AAC system theoretically and validate the results with experimental. For theoretical analysis purpose, a program was developed in EES software and thermodynamic evaluation of standard Rating cycle of VCR system was carried out. NIST CYCLE_D had been used for the thermodynamic analysis. Refrigerating effect, compressor work, Coefficient of Performance and Specific compressor displacement were evaluated. For experimental analysis purpose, an experimental set up made from original components of an R134a AAC system had been set up and instrumented. The same parameters were measured experimentally. Finally the comparison of theoretical & experimental performance of an R134a AAC System was plotted in graphs. The agreement between the theoretical results and experimental results of R134a AAC system was found almost nearer to each other.

Keywords: Theoretical evaluation, Experimental evaluation, Automobile air-conditioning system, R134a, Comparative evaluation

I. INTRODUCTION

According to the ASHRAE, air conditioning is the science of controlling the temperature, humidity, motion and cleanliness of the air within an enclosure. In a passenger/driver cabin of a vehicle, air conditioning means controlled and comfortable environment in the passenger cabin during summer and winter, i.e., control of temperature (for cooling or heating), control of humidity (decrease or increase), control of air circulation and ventilation (amount of air flow and fresh intake vs. partial or full recirculation), and cleaning of the air from odour, pollutants, dust, pollen, etc. before entering the cabin [1].

The open literature on the AAC systems is very limited. Few researchers had done research on Substitution of Different Alternative Refrigerants in place of R134a.

S. Devotta et. al [2] has searched Alternatives to HCFC-22 for Air Conditioners. Among the refrigerants studied (HFC-134a, HC- 290, R-407C, R-410A, and three blends of HFC-32, HFC-134a and HFC-125), HFC-134a offers the highest

COP, but its capacity is the lowest and requires much larger compressors. For retrofitting, R-407C is probably the best candidate but requires system modification.

In addition to the studies on the alternative refrigerants, some investigators simulated AAC systems and done energy-exergy analysis.

Dilek Ozlem ESEN, Murat HOSOZ [3] performed Energy and Exergy Analysis of an Automobile Air Conditioning System Using Refrigerant R134a. Exergy and energy analysis show that the performance of the system degrades with increasing compressor speed.

M. Preissner et al. [4] Work on Suction Line Heat Exchanger for R134A Automotive Air-Conditioning System. The COP and the capacity increased on the order of 5 to 10 % with a suction line heat exchanger with 60 % effectiveness.

G.H. Lee, J.Y. Yoo [5] carried out Performance analysis and simulation of automobile air conditioning system under various operating conditions. A computer program for performance analysis of the parallel flow type condenser, has been developed, which demonstrates that the predicted condensing capacity agrees very well with the experimental data. The agreement between the simulation results and experimental ones was within 7%.

1.1 Objectives

- To evaluate thermodynamic properties of R134a.
- To carry out thermodynamic evaluation of standard Rating cycle of VCR system.
- To build an experimental setup made from original components of an R134a Automobile Air Conditioning (AAC) system.
- To compare the theoretical & experimental performance of an R134a AAC System.

For fulfilment of above mentioned objectives, following softwares were used;

- Engineering Equation slower (EES) version 7.027
- Refprop version 9.0

II. THEORETICAL CYCLE ANALYSIS

2.1 Thermodynamic properties of R134a refrigerant

The thermodynamic properties of R134a refrigerant as well as safety & flammability data are described in Table 1.

Table.1: **Thermodynamic properties of R134a refrigerant [6]**

Refrigerants	R134a
Chemical composition	CH_2FCF_3
Molecular weight (kg/kmol)	102.03
Normal boiling Point(°C)	-26.06
Critical Temp(°C)	101.08
Critical Pressure(MPa)	4.06

Critical density(kg/m^3)	515.3
Critical volume (m^3/kg)	0.00194
Safety class	A1
ODP	0
GWP	1430

2.2 Theoretical cycle analysis procedure

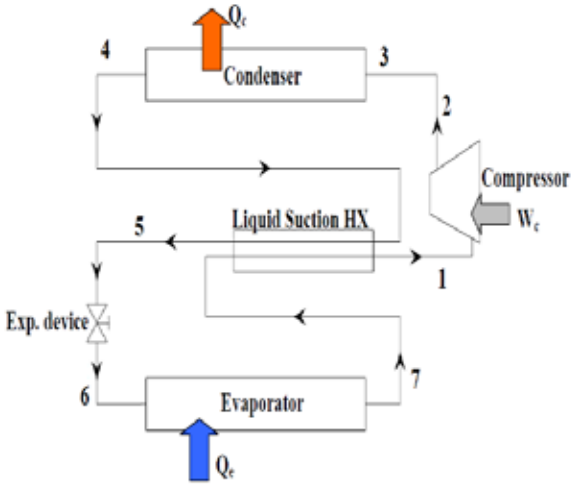

Fig. 1: Schematic Diagram of VCR [7]

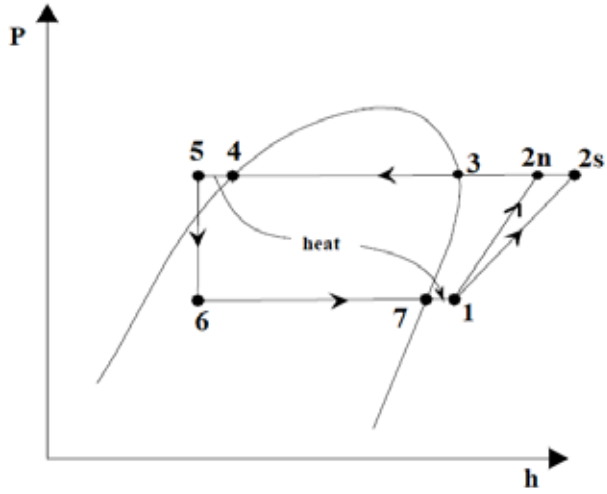

Fig 2: Pressure-Enthalpy Chart of VCR [7]

Automobile AC system works on Vapour Compression Refrigeration (VCR) cycle. The representation of cycle on schematic & (p-h) diagram is shown in Fig. 1 & 2 respectively when the vapour at the end of compression is assumed to be superheated.

Assuming that 1 kg of refrigerant flows in the system, we can analyse the system as follows with help of steady flow energy equation. Thermodynamic analysis is as follows [7].

(a) Isentropic Compressor work, W_{ci}

$$W_{ci} = h_{2s} - h_1 \text{ , kJ/kg} \quad (1)$$

Actual Compressor work, W_{ca}

$$W_{ca} = h_{2n} - h_1 \text{ , kJ/kg} \quad (2)$$

$$\text{Condenser pressure, } P_{co} = P_{sat}\,(T_{co}) \quad (3)$$

(b) Heat rejected at the condenser, q_C

$$q_{co} = h_3 - h_4 \text{ , kJ/kg} \quad (4)$$

(c) Expansion device

$$h_5 = h_6 \text{ , kJ/kg} \quad (5)$$

(d) Refrigerating effect, q_0

$q_0 = h_7 - h_6$, kJ/kg (6)

Evaporator pressure, $P_e = P_{sat}\ (T_e)$ (7)

(e) COP

$$COP = \frac{\text{Refrigerating effect,q0}}{\text{Compression work,Wca}}$$

$$COP = \frac{h7-h6}{h2n-h1} \quad (8)$$

(f) Compressor Power, W_c

$W_c = \dot{m}_r\,(h_{2n} - h_1)$, kW (9)

(g) Mass of refrigerant to be circulated, $\dot{m}_r$ per sec

$$\dot{m}_r = \frac{Q(kJ/s)}{qe(kJ/kg)} \text{ kJ/s} \quad (10)$$

(h) Specific Compressor Displacement, m^3/kJ

$SCD = v_1/q_0$ (11)

2.2.1 Given data [2]

Evaporator temp, T_7= 7.2°c; Condenser temp T_3= 55°c; Compressor inlet temp, T_1= 35°c, Expansion Valve inlet temp, T_5=46°c; Isentropic efficiency of compressor, N_i =0.8; Motor efficiency, N_m =0.70

2.3 Theoretical cycle analysis Results

Table 2: **Calculated Theoretical results of R134a for Evaporating temperature=7.2°c, Condenser temperature= 55°c, compressor inlet temperature=35°**

T_E (^{0}C)	RE (kJ/kg)	w (kJ/kg)	COP	SCD $(m^3/kJ)*10^{-3}$
0	139.3	42.06	1.971	0.582
1	139.7	40.99	2.027	0.5587
2	140	39.94	2.086	0.5364
3	140.4	38.9	2.147	0.5151
4	140.7	37.88	2.211	0.4948
5	141.1	36.87	2.277	0.4754
6	141.5	35.87	2.347	0.4568
7	141.9	34.89	2.42	0.439
8	142.2	33.91	2.496	0.422
9	142.6	32.95	2.575	0.4058
10	143	32	2.658	0.3902
11	143.4	31.06	2.746	0.3752

12	143.7	30.14	2.838	0.3609
13	144.1	29.23	2.934	0.3472
14	144.5	28.33	3.036	0.3341
15	144.9	27.44	3.142	0.3215
16	145.3	26.56	3.255	0.3094
17	145.7	25.69	3.374	0.2978
18	146.1	24.83	3.499	0.2866
19	146.4	23.99	3.632	0.2759
20	146.8	23.16	3.773	0.2657

By using given data & by making simulation program in engineering equation solver (EES), the theoretical analyses of R134a were done by varying its evaporator temperature for the given cooling capacity. Condenser temperature is 55°c and Evaporator temperature varies from 0°c to 12°c. For different evaporator temperature, the different parameters are measured. Table 2 presents the calculated theoretical (thermodynamic) data of R134a refrigerant.

III. EXPERIMENTAL CYCLE ANALYSIS

3.1 Experimental set-up

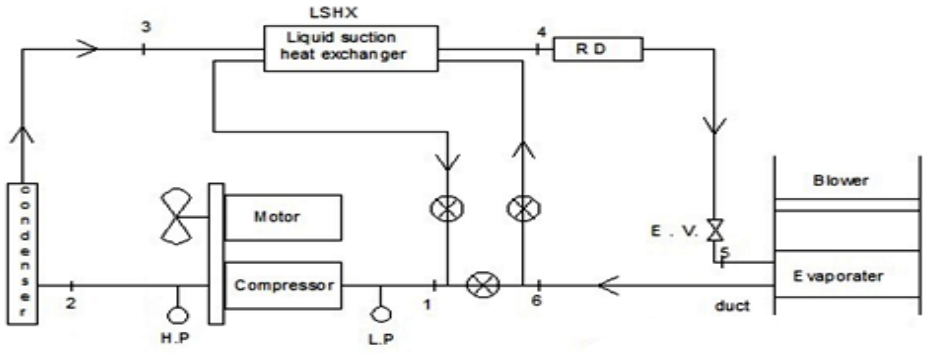

Fig 3: Schematic diagram of Experimental AAC system

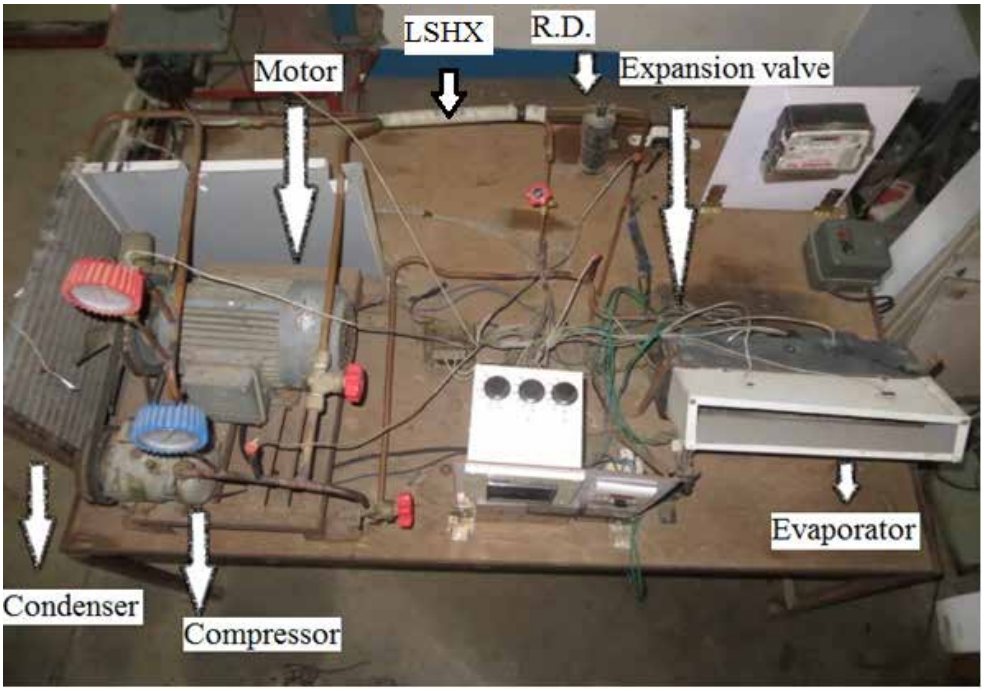

Fig 4: Set up of an Automobile AC System

Schematic diagram of experimental AAC system is shown in Fig. 3. The refrigerant temperatures were detected by the thermocouples soldered to the tube. By Bourdon tube gauges, the suction and discharge pressures of the compressor were measured. Pressure drops in the evaporator and condenser as well as in the connecting lines were neglected. With the use of a photoelectric tachometer, the compressor speed was measured. With the use of an anemometer, the air velocity at the outlet of the evaporator & condenser was measured.

Different temperature state points of refrigerant side are following as shown in Fig 3.

1. Compressor inlet temperature (after superheating if LSHX used)
2. Compressor outlet temperature / condenser inlet temperature
3. Condenser outlet temperature
4. Expansion Valve inlet temperature (after sub cooling if LSHX used)
5. Expansion Valve outlet temperature / Evaporator inlet temperature
6. Evaporator outlet temperature

The experimental Automobile AC system mainly consists of the original components from an R134a automobile air conditioning system, as shown in Fig. 4. Some auxiliary equipments were used for testing the system under the required conditions. The refrigeration circuit of the system consists of compressor, condenser, receiver drier, expansion valve, evaporator & Liquid Suction Heat Exchanger (LSHX).

The experimental set up consists of fan driven by an electric motor. The compressor was belt driven by an electric motor. The air flow passing through the condenser & evaporator can be achieved by fans and blower respectively.

3.2 Experimental Cycle Analysis Results

Experimental results of AAC system is as shown in table 3.

***Table 3*: Experimental Results**

TE (^{0}C)	RE (kJ/kg)	w (kJ/kg)	COP	SCD (m^3/kJ)*10^{-3}
2	134.4	39.42	2.029	0.552
5	136.1	36.37	2.227	0.4866
8	137.8	33.44	2.453	0.4299
10	139	31.54	2.621	0.3962
12	140.1	29.7	2.807	0.3654
15	141.7	27.02	3.121	0.3241
18	143.3	24.44	3.49	0.2878
20	144.4	22.77	3.773	0.2661

IV. RESULTS AND DISCUSSION

As shown in Fig. 5, Theoretical Refrigerating Effect is slightly higher than Experimental Refrigerating Effect for R134a.As shown in Fig. 6, Theoretical compressor work & Experimental compressor work are almost nearer to each other. As shown in Fig. 7, Theoretical COP & Experimental COP is almost nearer to each other. As shown in Fig. 8, Experimental specific Compressor Displacement (SCD) is slightly higher than Theoretical SCD.

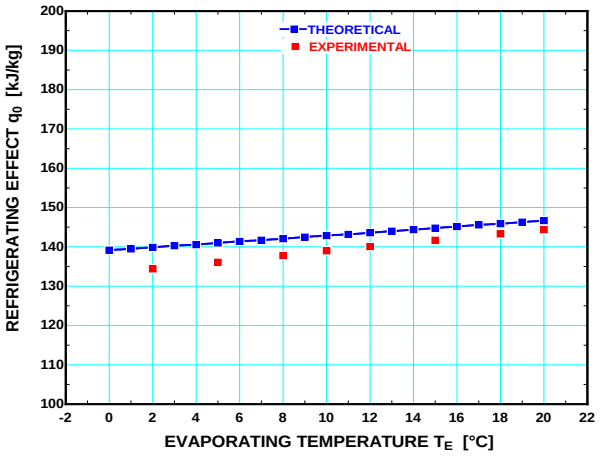

Fig 5 : RE Vs TE for Tc=58°c

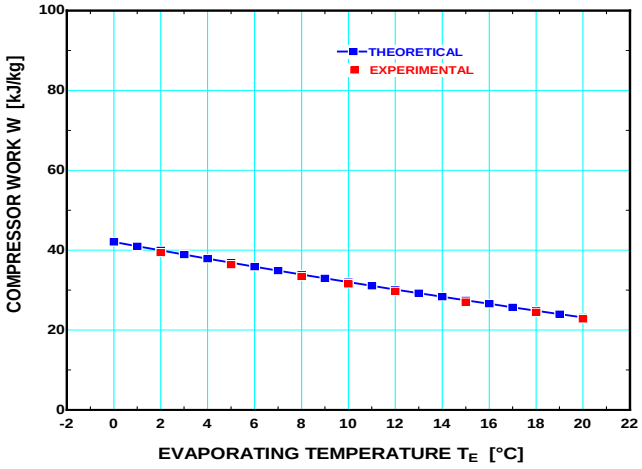

Fig 6: w Vs TE for Tc=58°c

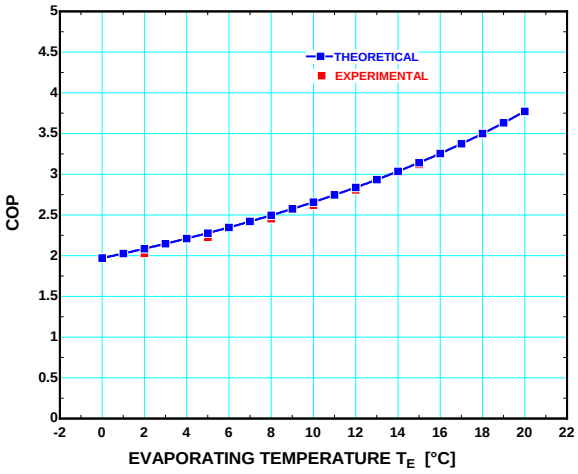

Fig 7: COP Vs TE for Tc=58°c

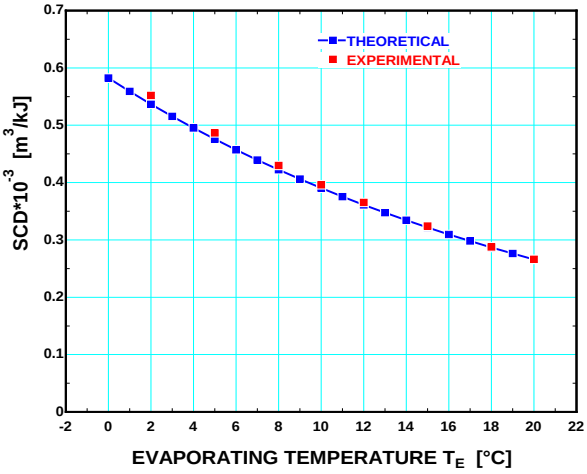

Fig 8: SCD Vs TE for Tc=58°c

Table 4: **Theoretical and Experimental cycle analysis comparisons for R134a**

Parameters	**Theoretical**	**Experimental**	**% Difference**
Refrigerant	R134a	R134a	R134a
Condenser temperature (°C)	58	58	0.00
Evaporator temperature (°C)	10	10	0.00
Refrigeration effect (kJ/kg)	143	139	-2.80
Compressor work (kJ/kg)	32	31.54	-1.44
COP	2.658	2.621	-1.39
SCD (m3/kJ)	0.3902	0.3962	1.54

Table 4 represents the theoretical and experimental cycle analysis comparisons for R134a AAC system.

V. CONCLUSION

From theoretical analysis, at 10°c evaporator temperature and 55°c condenser temperature , refrigerating effect was found to be 143 kJ/kg, compressor work was 32 kJ/kg, COP was 2.658 and SCD was $0.3902*10^{-3}$ m^3/kJ. From experimental analysis, at 10°c evaporator temperature and 55°c condenser temperature, refrigerating effect was found to be 139 kJ/kg , compressor work was 31.54 kJ/kg, COP was 2.621 and SCD was $0.3962*10^{-3}$ m^3/kJ.

From the theoretical & experimental cycle analysis comparison, it is concluded that experimental refrigerating effect was 2.8%, compressor work was 1.44% & COP was 1.39% less than theoretical refrigerating effect, compressor work & COP respectively while experimental SCD was 1.54% higher than theoretical SCD. Hence, the agreement between the theoretical results and experimental ones was within 3%.

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NOMENCLATURE

AAC	Automobile Air Conditioning
NIST	National Institute of Standards and Technology
EES	Engineering Equation Solver
ASHRAE	American Society of Heating, Refrigerating & Air Conditioning
COP	Coefficient Of Performance
CFC	ChloroFluoroCarbon
GWP	Global Warming Potential
h	specific enthalpy (kJ /kg)
CFC	ChloroFluoroCarbon
HCFC	HydroChloroFluoroCarbon
HFC	HydroFluoroCarbon
HFO	HydroFlouroOlefin
m	mass flow rate (kg/s)
ODP	Ozone Depletion Potential
P	Pressure (MPa)

q	Heat transfer (kJ/kg)
RE	Refrigerating Effect (kJ/kg)
SCD	Specific Compressor Displacement (m^3/kJ)
T	Temperature (°c)
v	Specific volume (m^3/kg)
VCR	Vapour Compression Refrigeration
w	Work (kJ/ kg)
W	Work (kW)
Subscripts	
1	refrigerant inlet condition to compressor
a	air
c	compressor
ca	compressor actual
ci	compressor isentropic
co	condenser
D or 2n	discharge
E	evaporator
r	refrigerant
sat	saturation

PARALLEL PROCESSING OF HEALTHCARE DATASETS USING MAP REDUCE

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ABSTRACT

A workflow application for efficient parallel processing of data downloaded from an Internet portal. The partitions input files into subdirectories which are further split for parallel processing by services installed on distinct computer nodes. The goal is to assess achievable speed-ups and determine which factors influence scalability and to what degree. Data processing services are implemented for assessment of context (positive or negative) in which the given keyword appears in a document. The resultant execution times as well as speed-ups are presented for data sets of various sizes along with discussion on how factors such as load imbalance and memory/disk bottlenecks limit performance. The input datasets downloaded from the internet is stored as a collection of files in a directory structure. Depending on the sizes and characteristics of the real data sets from a new technology portal, execution times and speedup are available by using Hyper threading technology. The existing programming model makes it to parallize and distribute computations and to make such computation fault-tolerant. The network bandwidth is a scarce resource. Redundant execution can be used to reduce the impact of slow machines and to handle machine failure and data loss.

Keywords: Mobile Ad Hoc Networks, Clustering, Gateway, Cluster Head Election, Node Degree.

I. INTRODUCTION

Big data is an all-encompassing term for any collection of data sets so large or complex that it becomes difficult to process them using traditional data processing applications. Big data refers to data sets whose size is beyond the ability of typical database software tools to capture, store, manage and analyze. Key enablers for the growth of Big Data are Increase of storage capacities Increase of processing power Availability of data. Effectively used Big Data can transform data into insights and intelligence, delivered where they're needed to make and implement better strategic and operational decisions.

Big data requires exceptional technologies to efficiently process large quantities of data within tolerable elapsed times. A suitable technology includes A/B testing, data fusion and integration, signal processing, simulation, genetic algorithms, natural language processing, time series analysis and visualization. Big data is a term that refers to data sets or combinations of data sets whose size (volume), complexity (variability) and rate of growth (velocity) make them difficult to be capture, manage, process or analyze by conventional technologies and tools, such as relational databases and statistics or visualization packages within the time to make them useful. The size used to determine whether a particular data set is considered big data is not firmly defined and continues to change over time, analysts and practitioners currently refer to data sets from 30-50 terabytes to multiple petabytes as big data.

The nature of big data is primarily driven by the unstructured nature of much of the data that is generated by modern technology such as that from web logs, radio frequency ID (RFID), sensors embedded in devices, Internet searches, social networks such as smart phones, GPS devices, and call center records, face book, portable computers. It must be combined with structured data (typically from a relational database) from a more conventional business application, such as Enterprise Resource Planning (ERP) or Customer Relationship Management (CRM).

Similar to the complexity, or variability, aspect of big data, its rate of growth, or velocity is largely due to the ubiquitous nature of on-line, real-time data capture devices, systems, and networks. It is expected that the rate of growth of big data will continue to increase for the foreseeable future Specific new big data technologies and tools have been and continue to be developed. Much of the new big data technology relies heavily on massively parallel processing (MPP) databases, which can concurrently distribute the processing of very large sets of data across many servers.

1.1 The Characteristics of Big Data are

Big Data has been described by its attributes are volume, velocity, variety and veracity.

Volume & Velocity- Volume and velocity refer to the sheer quantity of Big Data available – Often hundreds of terabytes or even peta bytes of data – and the speed at which data must be stored and/or analyzed, which could reach tens of thousands of transactions per second in some cases.

Fig.1. Big Data

Varity- Variety refers to the huge variation in the types and sources of Big Data are highly structured files to unstructured video and audio information.

Veracity- Veracity refers to the level of quality and trustworthiness that can be ascribed to a data set.

Complexity- Difficulties dealing with data increase with the expanding universe of data sources and are compounded by the link, match and transform data across business entities and systems.

The emergence of big data and the potential to complex analysis of very large data sets is a consequence of recent advances in the technology. If big data analytics are adopted by agencies a large amount of stress may be placed upon current ICT systems and solutions which presently carry the burden of processing, analyzing and archiving data. Government agencies will need to manage these new requirements efficiently in order to deliver net benefits through the adoption of new technologies. In particular technology includes low cost storage arrays, in memory processing, cloud based storage and processing together with a range of new software. The emergence of Cloud Computing over the last few years represents the single most important contributor with

cloud storage. Cloud Computing offers to store, and perform computational analysis on increasingly large data sets.

1.2 Hadoop

Hadoop is open source for distributed processing of large data sets across clusters of servers. Hadoop is designed to scale up from a single server to thousands of machines with a very degree of fault tolerance. The Apache Hadoop framework is composed of the following modules,

Hadoop Distributed File System (HDFS) a distributed file-system that stores data on the commodity machines, providing very high aggregate bandwidth across the cluster.

Hadoop YARN a resource-management platform for managing compute resources in clusters and using them for scheduling of users applications Hadoop MapReduce a programming model for large scale data processing.

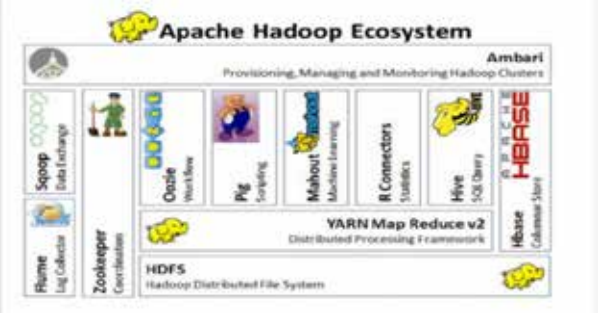

Fig.2.Components of Distributed File System

1.3 HDFS

2. HDFS is a distributed file system to distribute data.

1.4 Map/Reduce

3. It is an offline computing engine. Handles distributed Applications.

II. RELATED WORK

Several heuristics have been proposed to choose cluster heads in an adhoc network.

1. Lowest-ID Clustering Algorithm (LIC)

The node with the minimum ID is chosen to be a cluster head. Major drawbacks of this algorithm are its bias towards nodes with smaller ids which may lead to the battery drainage of certain nodes, and it does not attempt to balance the load uniformly across all the nodes.

***2.* Highest Connectivity Clustering Algorithm (HCC)**

This algorithm is also known as connectivity-based clustering algorithm. Each and every node will broadcast its ID to the neighbor nodes within its transmission range. The degree for each node is calculated and the node that contains the maximum number of neighbors is selected as the cluster head. Disadvantages are there will be lower throughputs when the degree of the node increases.

2. Weighted Clustering Algorithm (WCA)

The weighted clustering algorithm (WCA) is based on the use of a combined weight metric. i.e., the number of neighbors, distance with all neighbors, mobility and cumulative time for which the node acts as the cluster head. The weight values are broadcast by each node and so each node knows the weight values of all other nodes and other cluster heads in the system.

3. An On-Demand Weighted Clustering Algorithm (WCA) for Ad hoc Network

In this work, a weighted clustering algorithm (WCA) is presented which takes into consideration the number of nodes a cluster head can handle ideally (without any severe degradation of the system performance), transmission power, mobility and battery power of the nodes. Most of the existing clustering algorithms are invoked periodically but this algorithm is not periodic. Its invocation is adaptive based on the mobility of the nodes. More precisely, the election procedure is delayed as long as possible to reduce the computation cost. Frequent updates result in high information exchange among the nodes resulting in high communication overhead. The algorithm is executed only when there is a need, i.e., when a node is no longer able to attach itself to any of the existing cluster heads. This algorithm performs significantly better than both of the Highest-Degree and the Lowest-ID heuristics.

4. Distributed Clustering for Ad Hoc Networks

Distributed Clustering Algorithm (DCA) is presented that generalizes the previous approaches by allowing the choice of the cluster heads based on a generic weight associated to each node: The bigger the weight of a node, the better that node for the role of cluster head.

III. PROPOSED SYSTEM

A workflow application for efficient parallel processing of data downloaded from an Internet portal. The partitions input files into subdirectories which are further split for parallel processing by services installed on distinct computer nodes.

A. Parallel Data Processing Frameworks

The Map Reduce scheme is efficient for large data processing on a cluster of machines. They demonstrated how several applications could be implemented in the framework including: distributed grep for text matching, count of URL visits from server logs, web link graph, searching for most important words in documents, inverted index and distributed sort. The solution is able to cope with machine failures. The most relevant to this work is the distributed grep in which the input is split into 15000 pieces each 64 MB in size and the output reduced to 1 file. The entire computation takes approximately 150 seconds with overhead for program propagation and delays caused by the GFS system. Recently, parallel data processing in modern distributed environments has gained attention.

B. Parallel Text Processing Applications

The work is processing of data that can be gathered from the Internet, in the context of information retrieval. The latter is the process of identification and obtaining relevant documents based on a query. There are

approaches for parallel handling of queries on a multiprocessor system such as where the speed-up of 11.3 is obtained for 16 processors. There are several methods available for parallel text search. A text search mechanism on a low cost cluster with a performance model and verification of the latter against real experiments. The factor that influences performance is load balancing. Work shows performance evaluation of parallel information retrieval on a multiprocessor system with consideration of the number of CPUs, threads, disks etc. However, the number of CPUs and threads are limited to 4 and 32 respectively.

C. Workflow Modeling

In order to achieve efficient parallel processing of big data, the author proposes a workflow application depicted in Figure 3. 1. The healthcare datasets are downloaded from the portal of Inertia at http://nt.interia.pl. The downloaded datasets are stored in a designated location. The workflow considers the following steps, assuming the data is already in a designated location/ space, available as a collection of files. Service parallel process directory splits the initial directory into reasonably large subdirectories, partitions input files in a successive subdirectory and initializes parallel computations by services assess_context_of_keyword.

Service assess_context_of_keyword assesses the context of the given keyword in a list of files in parallel. The application, written in C using the Threads' library, reads file names assigned to the application and partitions into arrays to be assigned to particular threads. Each thread processes files to detect existence of the given keyword and then positive and negative descriptive words. If the keyword is present in the file (which can be an article in a portal, for example), the context of keyword within file (document, article) *a* is evaluated as fc(keyword, a) = ep(a)−en(a) where ep(a) is the number of positive descriptive words in *a* while *en*(*a*) is the number of negative descriptive words in *a*.

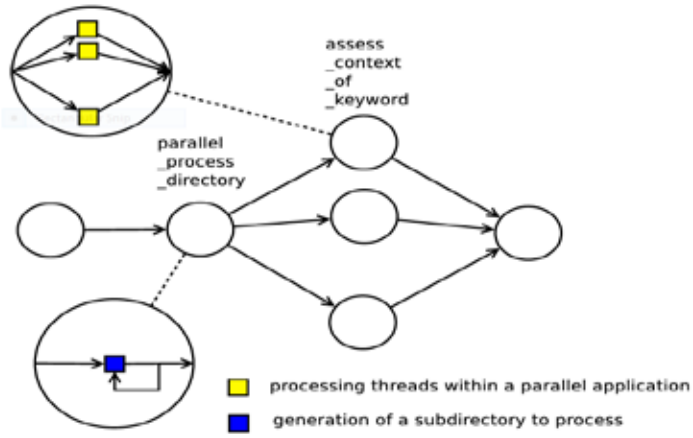

Fig.3. A Workflow for parallel processing of data

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IV. RESULTS

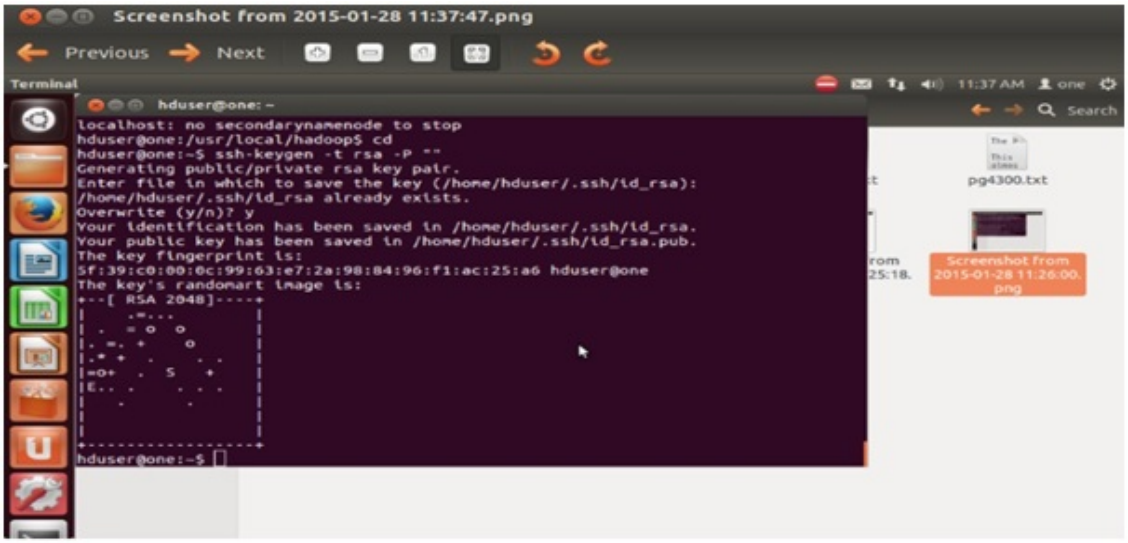

Fig 5.1 RSA Key generation

- RSA key generation for ssh configuring by accessing the system as password less.RSA key generate private and public key for secure transaction.

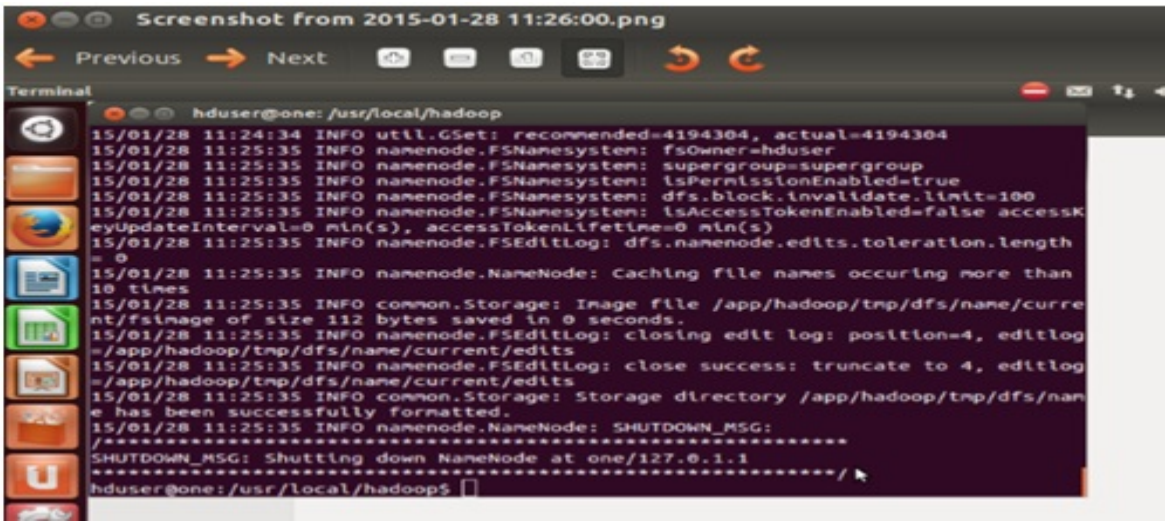

Fig 5.2 Name Node Formation

- The first step to starting up your Hadoop installation is formatting the Hadoop file system which is implemented on top of the local file system of your “cluster”.

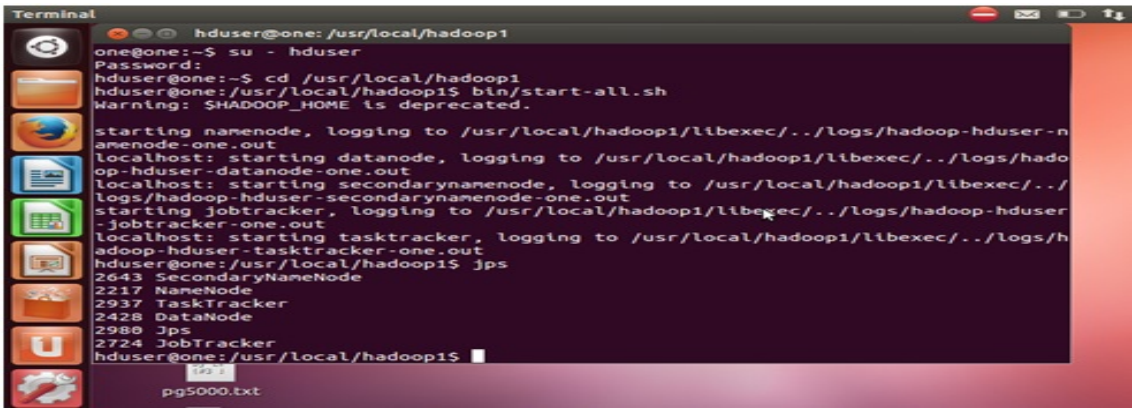

Fig 5.3 Starting Single Node

- Starting the single node cluster through name node. It starts name node, secondary name node, task tracker, data node, jps, job tracker.

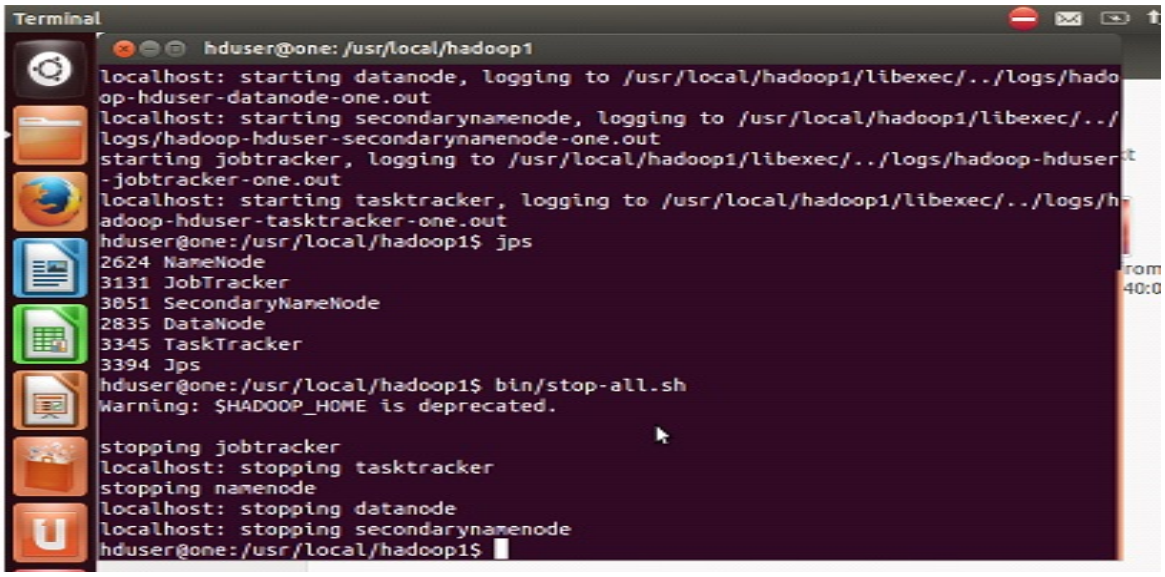

Fig 5.4 Ending Single Node

- Stopping the single node cluster. It stops name node, secondary name node, task tracker, data node, jps, job tracker.

V. CONCLUSION

The workflow application for parallel processing of data sets presumably downloaded from the Internet. Parallel processing is performed at two levels: several computers in parallel and on multiple processors/cores within each node. Optimization through partitioning of data allowing fast startup of processing was presented. Depending on the sizes and characteristics of the real data sets from a new technology portal, execution times and corresponding speed-ups in the range between 26.3 and 36.5 were obtained on 64 cores, 32 of which were available thanks to the Hyper Threading technology. Factors limiting the speed-up were discussed with impact on performance.

In the future, the author plans extending the solution to other systems including processing on GPU cards as well as Intel Xeon Phi technologies.

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