CHALLENGES TO ENERGY EFFICIENT VIRTUAL MACHINE ALLOCATION IN CLOUDS: A REVIEW

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ABSTRACT

Virtual Machine (VM) Consolidation contributed a lot in energy efficient computing in the cloud data centers. Virtualization played a great role in virtual machine consolidation by facilitating the live VMs to be migrated resulting in packing the maximum number of VMs in minimum possible physical hosts .Energy efficient computing is not only good for reducing the overall operational cost of the data centers but also provides environmental benefits. Various algorithms have been proposed for VM consolidation which utilimately leads to energy efficient computing. But only high VM consolidation ratio is not a key to energy efficient data centers. A tradeoff between the consolidation ratio and the QoS (Quality of Service) is required preventing the SLA (Service Level Agreement) violation. In this paper we have presented various challenges to energy efficient VM allocation in clouds.

Keywords: VM consolidation, Virtualization, Energy Efficient Computing

I INTRODUCTION

The traditional era of computing involves the use of software, hardware and storage to achieve the required computational service whereas cloud computing has isolated the services from resources (networks, storage, servers). The cloud is evolved as a service oriented paradigm by providing the services to users by utilizing the resources of provider[1]. Users are no longer required to purchase hardware, software or to manage storages. As data centers increase in size and computational capacity, numerous infrastructure issues become critical. There is a debate that cloud computing is green contributing to sustainability or a risk of climate change. Cloud computing if compared to traditional on-premise computing, is a cost effective, energy-efficient, scalable and on-demand computing. But as the concept of cloud computing evolved various cloud providers came in to existence like AMAZON, Google, SalesForce.com etc. working on different service models e.g. IaaS(Infrastructure as a Service), PaaS(Platform as a Service) and SaaS(Software as a Service). To provide on-demand, elastic service to the customers, the providers established the datacenters on different geographic locations. The cloud providers need to be up to date with the infrastructure all the time to handle the random, unpredictable client requests. To fulfill this requirement the servers should be active all the time consuming a lot of power resulting in lot of carbon (CO2) emission. Carbon emission leads to climate change and a health related risk to the society.

Cloud data centers use virtualization technology for provision computational resources in the form of virtual machines (VMs). Saving operating costs in terms of energy consumption (Watt-Hour) for a cloud system is highly motivated for any cloud resource owner.[2] but only packing more number of virtual machines in less number of servers is not enough for energy efficient data center. High VM consolidation ratio can leads to shortage of RAM, degradation in performance or in the worst case the failure of the physical host. So VM consolidation ratio should be bounded by the QoS constraints for better performance.

The biggest challenge to the energy efficient algorithms is the tradeoff between the minimizing energy consumption while satisfying Quality of Service (e.g. performance or resource availability on time for any reservation request) which leads to sustainable cloud computing in the near future. To explore both performance and energy efficiency, three crucial issues must be addressed. First, excessive power cycling of a server could reduce its reliability. Second, turning resources off in a dynamic environment is risky from a QoS prospective. Due to the variability of the workload and aggressive consolidation, some VMs may not obtain required resources under peak load, so failing to meet the desired QoS. Third, ensuring SLA brings challenges to accurate application performance management in virtualized environments. [3]. Virtual machine selection approach for VM migration is also greatly effects the VM consolidation quality. All virtual machines in the datacenter are not independent but normally for large applications execution, the applications are distributed between more than one virtual machines. In this case, the non-optimized virtual machine migration results in network communication which may involve network switches which leads to more energy consumption. So, the care should be taken for the VMs executing one application should be collocated such that the communication cost and energy consumption can be reduced.

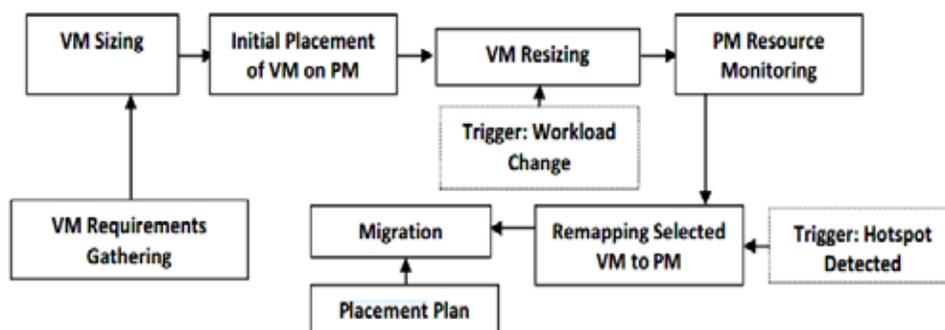## II. VM CONSOLIDATION PROCESS AND CHALLENGES

Fig 1: VM Allocation Process [4]

Figure 1 explains the VM Allocation process. VM allocation is performed in 2 phases, in the first phase according to the application size the VM is selected and the energy efficient initial placement algorithm executes and the physical machine is selected based on the algorithm. The second phase is the optimization of the VM allocation process called VM consolidation. The VM consolidation is based on the workload on the physical host. Most of the algorithms rely on the CPU utilization for the workload calculation. Based on the workload the mapping of virtual machine to physical machine is changed. The mapping is changed based on the optimized placement plan. The

placement plan should be such that the energy consumption of the data center can be reduced. Virtual machine allocation and virtual machine migration are the backbone of the VM consolidation. The VM consolidation algorithm is divided in 4 sub-algorithms:

1) Host Overload Detection
2) Host underload Detection
3) VM Selection
4) VM Migration

There are various challenges to the energy efficient placement plan those needs to be addressed for all the above sub-algorithms. The challenges to the energy efficient VM allocation are as follows:

2.1 Energy Efficient Consolidation Vs Quality of Service

The biggest challenge to the energy efficient virtual machine allocation is allocating the virtual machines in such a way that the energy consumption in the datacenters is administered by the quality of the service normally defined in the form of SLA. It is therefore essential to carry out a study of Cloud services and their workloads in order to identify common behaviors, patterns, and explore load forecasting approaches that can potentially lead to more efficient resource provisioning and consequent energy efficiency. Host overload detection and underload detection can be predicted by their historical behavior. The statistical methods play a great role in forecasting the host overload and underload behavior. The IaaS cloud shows non-stationary workload behavior so the researchers can use the statistical methods based on the non-stationary behavior for the predictions. [3].

2.2 Virtual Communication Topologies

Large scientific applications often are executed in more than one virtual machine at a time and the virtual machines executing the same application often communicates with each other establishing a group and the communication topology. Due to the VM migration and the non-optimized virtual machine allocation the VMs in the same group may be allocated on different data centers situated in geographically dispersed area. The communication between the VMs requires the network devices like routers, network switches consuming a lot of power. Thus, VM migration should also consider the communication topology while deciding a particular machine to be migrated.[3]

2.3 Excessive Power Cycling Vs Reliability

Power cycling is the act of turning a piece of equipment, usually a computer, off and then on again. Reasons for power cycling include having an electronic device reinitialize its set of configuration parameters or recover from an unresponsive state of its mission critical functionality, such as in a crash or hang situation. Power cycling can also be used to reset network activity inside a modem. Frequently power cycling a computer can cause thermal stress and can reduce the overall reliability of the server. Second, turning resources off in a dynamic environment is risky from a QoS prospective. Due to the variability of the workload and aggressive consolidation, some VMs may not obtain required resources under peak load, so failing to meet the desired QoS.

2.4 Workload Variablity Vs Resource Availability

The workload in the IaaS is non-stationary means that the workload fluctuates depending on the user demand. Due to the variability of the workload it is very difficult to predict the utilization behavior of the host. The resource allocation in such a dynamic environment is a challenge. Though statistical methods can be applied to predict the behavior but we can't rely on statistical methods fully because of uncertain and dynamic behavior of the user demand. The aggressive consolidation in such an environment results in unavailability of the resources under peak load,, so failing to meet the desired QoS. While defining the VM consolidation plan the resource availability should also be keep in mind so that SLA is not violated.

2.5 High VM Consolidation Ratio Vs Performance

To avoid the overutilization and underutilization of cloud resources, virtual machine consolidation needs to be performed to minimize the energy consumption. If a physical machine fails due to some hardware failure or software failure before the completion of tasks then more number of virtual machines than the consolidated virtual machines need to be created again and execution of the tasks have to start again. This will increase great overhead in terms of energy consumption and resource utilization. [6] So only high VM consolidation ratio (the consolidation ratio is the number of virtual servers that can run on each physical host machine) only is not a key to performance. There should be a trade-off between VM consolidation ratio and performance.

2.6VM Selection For Migration

The major benefit of VM migration ais to avoid hotspots; however, this is not straightforward. Currently, detecting workload hotspots and initiating a migration lacks the agility to respond to sudden workload changes. Moreover, the in memory state should be transferred consistently and efficiently, with integrated consideration of resources for applications and physical servers.[8]

VM Selected for migration also affects the energy consumption of the data center. If the VM is a part of an application group and selected for the migration then again the communication topology will affect the energy consumption. The problems of convergence and local optimization have been challenging the research direction. On the other hand, we know that a data center doesn't have abilities in predicting the size and type of the next workloads. As a consequence, the optimal policy which the proposed algorithms have found out over a short period of time isn't necessarily the optimal solution over a long period of time. In a word, the global best which of some VM the proposed algorithms have found out in an algorithm cycle may be a local best in a long-term process. Moreover, since the capability with which the current random migration policy and optimal migration policy adapt to a dynamic cloud environment isn't excellent enough, they may cause many failure events of live VM migration in a real and dynamic cloud environment.

2.7 Host Selection for Migration

The selection of the physical host for allocation of the VM is also challenging. Various factors like network traffic between two virtual machines, energy efficiency, topology should be considered for selection of the physical machine However, due to the limitation of computing resource, it is impossible to locate all connected VMs into a partition. In order to reduce the whole data center traffic cost, VMs with heavy weight communication should have higher priority to be located close to each other, while ones with low weight communication have lower priority. However, to host two heavy weight communication VMs on a PM may increase the total power consumption and traffic cost instead of reduce them. If two VMs running network aware applications, which have low CPU usage, are hosted on a PM, the traffic cost for that connection is decreased. However, due to the low CPU usage, the PM utilization is low. Consequently, more PMs are turned on, thus increase the whole system traffic cost and energy consumption.

2.8 CPU Load Vs CPU Utilization

Virtual machine consolidation not only increases the utilization of the servers but also reduces the hardware requirement which ultimately reduces the energy consumption contributing to the reduction in overall operating cost of the data center. Most of the Virtual machine consolidation algorithms are based on predicting the CPU utilization of the servers and perform the Virtual machine migration approach to pack the maximum number of VMs on the minimum number of Servers. The CPU utilization of the servers (hosts) only is not enough for VM consolidation approach. The actual load of the server is determined by combining the CPU utilization with CPU load. The CPU load is defined by the number of application waiting to be executed on the queue which is a challenging task in such a dynamic environment like cloud.

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THE YOUNG INDIAN ADULT: HEALING YOUNG MINDS WITH EMOTIONAL INTELLIGENCE AND POSITIVE PSYCHOLOGY

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ABSTRACT

Though India is on the road to becoming a developed country and is being rooted as the country with the youngest labour force, findings of the IRIS Knowledge Foundation in collaboration with UN-HABITAT, in their report 'State of the Urban Youth, India 2012: Employment, livelihood, Skills', state that with increasing population, decreasing mortality there is an exponential increase in the under/unemployment rate. These unemployed youth, in the age bracket of 15- 24 years, are at the greatest risk of exhibiting violent behavioural patterns towards the society, as the feeling of hopelessness at the inability to attain a satisfying livelihood suppresses all social/civil behavior. These youth (the 'have-nots') are filled with anger, hatred, angst which is directed towards the society, a class which they see as un-achievable (the 'haves'). The unequal access to opportunity and the lack of emphasis on education remains a persistent problem.

A closer analysis of the urban youth suggests that greater political participation, engagement at the policy level and urgent attention to improving their quality of life can ensure that India enjoys the benefits of being a young country. Apart from these, timely interventions at all levels- the individual, community, school- through the use of Emotional Intelligence and Positive Psychology can help preventing children at risk (impoverished backgrounds, shady neighbourhoods, lack of schooling) form getting initiated into the world of crime. Moreover, youth who are already embroiled in violent activities and behavior, can be brought back into mainstream society by programs developed on the basis of Emotional Intelligence and Positive Psychology, where they are made to feel and realize their potential and increase their sense of self-worth.This paper makes an attempt to throw light on the two major risk factors for the youth of India, viz.: unemployment/underemployment and initiation into violent behavior at adolescence. It ends by highlighting the crucial need of introducing Emotional Intelligence and Positive Psychology as a part of not only the curriculum, but also as part of their social upbringing.

Key Words: Emotional Intelligence, Positive Psychology, skill development, Un/Underemployment, violent behavior, Youth bulge.

I INTRODUCTION

By 2020, India is set to become the world's youngest country with 64% of its population in the working age group (15- 35 years) The working age population will expand by about 45% , spurring rapid growth of labour force and the number of job seekers. Major changes in economic policy and strategy will be needed to eliminate the current back log of more than 34 million unemployed job seekers [2]. This youth bulge is spread over the wide demography of India. However, it is also evident that this youth bulge is not able to avail the various opportunities like structured education or training in skilled labour which could improve their chances of securing employment. The urban rural divide also becomes an obstacle as a majority of the youth bulge is found in areas other than metropolitan cities [3]. This youth bulge is unable to gain access to proper education/training which would be required to maintain a satisfying livelihood. This has led to high rates of unemployment; and the failure to provide employment opportunities to this population is inviting a 'demographic disaster'. The disability to sustain a content livelihood leads to discontentment amongst the youth and ends up becoming one of the multifarious factors which contribute to the increase in violence, insurgency and crimes amongst the youth.

The purpose of this paper is to identify and focus on the prime causes for the exponential increase in youth related crimes in the last decade as cited in the National Crime Records Bureau. It will go on to impress that lack of proper skills/training/education, unemployment and/or the lack of satisfactory employment are some of the major factors which could lead to this increase. The other related factors being nature, nurture (genetic makeup and the environment that the youth is brought up in), the type of education received or the lack of it and the quality of life led by them.

The paper, then, goes on to suggest that the use of Emotional Intelligence along with Positive Psychology via various types of interventions would play a key role in ameliorating the circumstances that lead to violence, crime and insurgency among the youth. This has been substantiated by citing examples of research experiments done the world over where similar situations have been successfully tackled by using interventions of Positive Psychology and Emotional Intelligence.

II YOUTH AND UNEMPLOYMENT

Viewed through the experiential lens of flow, a good life is one that is characterized by complete absorption in what one does [4]. And in order to achieve this level of a satisfying life one needs to have a job which sustains the youth and his immediate liabilities. Youth unemployment and underemployment is prevalent around the world because young people lack skills, work experience, job search abilities and the financial resources to find employment [5]. In a country like India, which is a developing country, this situation is aggravated by poverty and the competitive pressures that result from the rapidly growing labour force. However, unemployment tends to be higher among the youth of our country. The open unemployment rate in India, particularly in the age bracket 15- 19 and 20 – 24, is extremely high among both males and females, as shown in table 1

Table 1: Youth Unemployment rate (%) (Usual and current daily status), 2009-10

Age group	Usual status (UPSS)				Current daily status (CDS)			
	Rural male	Rural female	Urban male	Urban female	Rural male	Rural female	Urban male	Urban female
15-19	8.02	5.13	12.17	10.59	15.92	16.25	17.19	16.52
20-24	5.54	6.05	9.68	18.78	11.89	13.92	12.89	22.07
25-29	1.85	3.22	4.33	11.71	7.22	7.91	6.65	16.66
15-59	1.62	1.51	2.86	5.48	6.44	7.96	5.14	9.09

Note: The reference period for the usual status definition of unemployment is 365 days. It excludes individuals employed in a subsidiary capacity. The current daily status is based on the daily activity pursued during each day of the reference week.
Source: NSS 66th Round, Schedule 10 – Employment and Unemployment, 2009-10.

Such high unemployment rates, at least partly, reflects the mismatches between skills demand and supply. The youth age bracket which joins the labour market early have a low skill set as they often happen to be school dropouts and haven't had the opportunity to undergo vocational training [6]. Therefore India needs to increase education and skill levels amongst its youth. However, with the dependency ratio expected to rise from 2040, India faces a pressing challenge to increase education and skill levels amongst its population to take advantage of this unique moment in history [3]

III YOUTH AND VIOLENCE

National self-report studies indicates that the age of highest risk for the initiation of serious violent behavior is age 15-16 years, and the risk of initiating violence after age 20 years is very low. The highest rates of participation in serious violence are at ages 16-17. Most violent behavior is learned behavior. Unfortunately, for too many youth, violence is either the only or the most effective way to achieve status, respect and other basic social and personal needs. There is little prosocial modeling of alternative ways of dealing with conflict [7]. These kind of behavioural changes are prevalent in India as well as evidenced in the various news reports of the last five years which involve crime by and against the youth (in the age bracket of 14- 26 years). One of the many reasons apart from lack of proper education and high rates of unemployment/ underemployment, is the absence of effective social bonds and controls, together with a failure of parents to teach (and children to internalize) conventional norms and values, which puts children at greater risk for later violence.

Research also shows that high chronic unemployment results in social isolation from legitimate labour markets which in turn could lead to violent behavior in order to satisfy financial, social and personal goals. Among those employed at age 21 in a legitimate job, the likelihood of getting married and 'settling down' was high. Therefore the likelihood of resorting to violence were low even if they belonged to a poor neighbourhood. The insurgency issue is very much in the limelight which is indeed related to the challenges of youth unemployment and underemployment [7]. There is evidence also that growing up in a poor disorganized neighbourhood inhibits a normal course of

adolescent development. Youth from these neighbourhoods have lower levels of personal competence, self efficacy, social skills and self-discipline [7]. And India has a larger portion of the youth population in this category. Regions with inadequate employment opportunities have witnessed serious problems.

Young people, as is evidenced in developing countries, are not only increasingly more likely to be perpetrators of violence, but are also much more likely to be the victims of violent crime [8]. Usually, these youth who have initiated their life in crime at a younger age, end up in incarceration, where the root of the problem is generally never addressed. Three of the prime reasons discussed in this paper, viz. lack of proper education beginning at the pre primary level, lack of training in employable skills and high rate of unemployment in the youth bulge, added to which is a large percentage of youth who are below the poverty line. Violence among these youth must be understood as more than just an expression of aggressive individual behavior. It must be seen as part of a larger cultural phenomenon [8].

IV RESOLUTION: EMOTIONAL INTELLIGENCE (EI), POSITIVE PSYCHOLOGY & THE PROCESS OF HEALING

The aim of Positive Psychology is to catalyze a change in Psychology from a preoccupation only with repairing the worst things in life to also building the best qualities in life. At the individual level it is about positive personal traits – the capacity for love and vocation, courage, interpersonal skills, aesthetic sensibility, perseverance, forgiveness, originality, future mindedness, high talent and wisdom. At the group level it is about the virtues and the institutions that move individuals towards better citizenship: responsibility, nurturance, altruism, civility, moderation, tolerance and work ethic [9,10]. EI represents the ability to perceive, appraise and express emotions accurately and adaptively, the ability to understand emotion and emotional knowledge, the ability to access and/or generate feeling when they facilitate cognitive activities and adaptive action; and the ability to regulate emotions in oneself and others [11]

The primary issue to be addressed in the healing process of the affected Indian youth, who is not only the perpetrator of the violence but the victim as well is the lack of basic moral and social value education, along with the academic curriculum. EI as a tool to heal the youth needs to be used hand in hand with Positive Psychology so as to catalyze a change in the psychology of the system obsessed only with repairing the worst things in life, to also building the best qualities in life. Among the strengths that can be built are courage, interpersonal skills, rationality, insight, optimism, honesty, perseverance, realism, capacity for pleasure, putting troubles into perspective, future mindedness and most importantly finding an 'achievable' purpose.

Since growing up in poor, disorganized families and neighbourhoods can effect violent behavior in the youth, adding to which limited employment opportunities (over which he has no control) makes his transition into adulthood strenuous and stressful, thereby reducing his chances of a stable and secure life. Youths exposed to multiple risks were notably more likely than others to engage in later violence [12].The first step towards healing would be to ameliorate those social conditions which generate and support violent lifestyle. The most effective strategy for accomplishing this is to ensure a healthy course of child and adolescent development for all youth, so

that they are prepared to enter productive, responsible adult roles. It has to be ensured that these roles are easily accessible [7]. For the troubled youth who are already deep in the mire of violence and degenerate / antisocial behavior, we need to incorporate Interventions at various levels.

1. Individual Level Intervention: Identify and amplify the strengths that teens already have. A teenage who is future minded, who is interpersonally skilled, who derives flow from an activity such as sports, is not at a risk from substance abuse. Such positive human traits should be the focus and should be strengthened so that it acts as a buffer against psychopathology.

2. Intervention in Education: Teachers can cultivate EI in school children. There has been an increasing interest in the last two decades in developing school based programs in the US and Europe. In India too, EI curricula should be developed for elementary school with units on Self Awareness, Managing feelings, Decision Making, Managing Stress, Personal Responsibility, Self Concept, Empathy, Communication, Group Dynamics and Conflict Resolution. This would aid in reducing feelings of hopelessness which usually affects a child who does not have adequate moorings in the social and familial set up.

3. Learned Optimism: A self reinforcing skill in positive psychology, where children and adults are taught to recognize their own catastrophic thinking and to become skilled disputers [9]. Instead of resorting to violence as an answer to his problematic situation, the troubled youth is enabled to dispute with himself to find the cause and deal with it. The youth has to learn to be future minded and interpersonally skilled.

4. Community Intervention: A program based on the lines of Real Alternatives Project(RAP, Berkley) which was created in 1988 with the intention of serving as a model opportunity program for troubled youth,[8] can be created for the troubled Indian adult who is at a risk. A central practice of RAP involved the provision of culturally relevant services, including tutoring, part time employment, mentoring, recreational activities, helping the aged and disabled in their area of residence.

V CONCLUSION

A large number of these interventions at various levels are already put in practise over the last two decades in the US and Europe with positive result. Since violence related behavior were consistent and remarkably similar across geographically and culturally dissimilar developed countries, it could imply that teens across different nations are basically alike in their nature and are likely to be prone to various risk behaviours. India has an added factor of large scale unemployment/underemployment which needs immediate attention and solution. It is imperative to identify and build a teen's strongest positive quality, help them find their rightful place in society where they can best express and use these positive qualities for their own well being and the well being of others. Future research can be based on developing units in academic curriculum which integrate EI and positive Psychology to help enhance the personality of the Indian Youth. This has to be done keeping in mind factors such as the ever rising population, the availability of infrastructure, differing economic backgrounds.

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SECURE AND TRUSTY STORAGE SERVICES IN CLOUD COMPUTING

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ABSTRACT

Security and authentication to the data stored in the cloud is the major challenge. The paper presents major three aspects. First, it not only provides the binary status about the storage information but provides integration of the storage correctness information and data error localization (i.e. locates the misbehaving servers). Second, it supports data integrity to the dynamic operations such as update, delete and append. Third, the system is highly efficient and resilient against failures, data modifications, and even server colluding attacks. Inorder to provide the correctness and availability of the data stored in the cloud the paper provides basic tools from coding theory that is needed for file distribution across cloud servers. Then, a token which is homomorphic in nature is introduced. Subsequently, it shows the challenge response protocol for verifying the correctness and detecting the misbehaving servers. The technique for error retrieval based on erasure correcting code is also outlined. Finally, it describes how to enhance the scheme to third party auditing with only slight modification of the main design.

Keywords: Binary, Homomorphic, Integrity, Localization, Resilient

I. INTRODUCTION

In those days people look upon the sky to see the clouds moving and to seek whether there is any signs for rain (especially the farmers to accomplish the harvest). But now as the science and technology as improved and with the evolution of engineers, organizations and people look upon the cloud as a system that provides the services required by people along with storage capabilities. Several trends are opening up the era of internet based and computer technology which results in cloud computing technology. The high speed processors along with the software provides an increased pool of cloud computing services. The increase in bandwidth and reliability has resulted in transforming the information from the local machines to remote data centers. By moving the data to cloud it provides great convenience to users because they need not care about the hardware complexities in the local machines. The pioneer of Cloud Computing vendors, Amazon Simple Storage Service (S3) and Amazon Elastic Compute Cloud (EC2) are both well known examples.

This increase in internet based online services provides users with huge space for data storage but leads the users to the mercy of the cloud service providers for the availability and integrity of data. Eventhough the cloud computing services are easier and efficient than other personal digital storages the internal and external threat on the integrity of data still remains the same. Since, the users erase the copy of data from their local machines after transforming into cloud the Cloud Service Providers (CSP) behave untrustworthy in retrieving the users data from the cloud. Inorder to increase the profit margin by reducing the cost CSPs discard the data that are least

accessed by the users. This poses a greater threat on users data and both the enterprise and individual cloud users are very keen on obtaining the integrity and availability of their information from the CSPs. However, the fact that users no longer have physical possession of data in the cloud prohibits the direct adoption of traditional cryptographic primitives for the purpose of maintaining the data integrity. Hence, the cloud storage verification must be conducted without explicit knowledge of the whole data files.

The storage in cloud is not a data warehouse users also perform the primitive operations such as update, append and deletion on the data provided in the cloud. Thus, it is needed to integrate this feature along with the correctness of data provided in the cloud which is an added challenge. The deployment of Cloud Computing is powered by data centers running in a simultaneously distributed manner. It is more advantage for individual users to store their in a redundant manner to overcome the integrity threats. Thus, protocols for storage correctness assurance will be of most importance in achieving robust and secure cloud storage systems.

The description of the entire paper is as follows: After surveying the related works in Section 2, the services and technology offered by the cloud and threats that follow it are dealt in detail in Section 3. The problem definition of the proposed system is dealt in Section 4. The analysis of the proposed system is explained in Section 5. Finally, the conclusion of the paper is provided in Section 6.

II. RELATED WORKS

Juels et al. described the "Proof Of Retrievability" (POR) model that combines spot checking and error correcting code that ensures possession and retrievability of data from archived machines which in turn ensures data integrity. Shacham et al. built a model and constructed a random linear function based homomorphic authenticator which enables unlimited number of challenges and requires less communication overhead [1]. Bowers et al. proposed a framework that generalizes both Juels and Shacham models.

Later, in the subsequent works Bowers extended the POR model to distributed systems. All these models are designed for static data. The models are effective for the preprocessing steps that rest upon the file before the user outsources it. Any changes made to the file must go through the error correcting code and the shuffling process which increases the computation and communication overhead. Recently Dodis et al. gave theoretical studies on the different variants of the POR model. Ateniese et al. proposed the "Provable Data Possession" (PDP) model for ensuring the possession of the file by using a public key based homographic tags for auditing the file. The pre-computation of the tags impose a heavy overhead and it is costly.

In the subsequent works Ateniese et al. proposed a PDP scheme that uses only the symmetric key and also allowed the primitive operations on the file such as insertion, deletion and updation. This reduces the computation overhead and it is better than the previous model proposed by Ateniese et al. but, it works on only a single server. So if any crash occurs the data will be lost. Thus it leaves both the distributed servers and data availability scheme unexplored. The support of data dynamics was further studied. Wang et al. combined the homomorphic authenticator with the Merkley hash tree and provided the fully data dynamics, while Erway et al. proposed a skip list based scheme with full data possession and dynamics [3]. The cryptography work done by Bellare et al. proposed a set of cryptographic functions such as hash, MAC and signature which enables storage integrity while performing dynamic operations on data. Curtmola et al. worked on providing multiple replicas of data across distributed systems.

Lillibridge et al. proposed a scheme in which blocks of data are dispersed across peers using an erasure code. Peers can request the data blocks from their backup peers and verify integrity using the keyed hash function located on each block. This scheme can identify the data loss but cannot guarantee that the data is unchanged . Filho et al. proposed RSA based hash to provide uncheatable data possession in peer-to-peer networks to ensure data integrity [4] [5]. Schwarz et al. proposed static file integrity across distributed servers using the erasure coding and block level file integrity techniques. In this paper we overcome all the drawbacks of the previous models by inclusion of many technical aspects.

III. CLOUD COMPUTING TECHNOLOGY

The three main services provided by the cloud are Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service(SaaS). In IaaS compute, storage, networking are provided by the IaaS providers. Users use them via internet, VPN or network connection and pay for their usage. In PaaS all the hardware, software that are needed for the cloud based applications are provided by the PaaS providers and the users use them for pay and it can be utilized throughout the lifecycle. In SaaS the software runs on the computers owned by the SaaS providers and installed and managed on computers owned by users. Apart from these services there are various other services such as Communication as a Service, Utility as a Service, Security as a Service, etc. The threats on cloud computing services include loss of data, traffic hijacking, insecure interfaces and APIs, Denial of Service (DoS), malicious insiders, cloud abuse, insufficient diligence, technology vulnerabilities.

3.1 Understanding the Types of Clouds

The different types of cloud includes: Public cloud, Private cloud, On-premise private cloud, Externally hosted private cloud and Hybrid cloud. Public cloud is provided to all individual users at a "pay-for-use" rate. This enables the users to share the services of the cloud and store their information in the cloud. Private cloud is provided to individual enterprise.
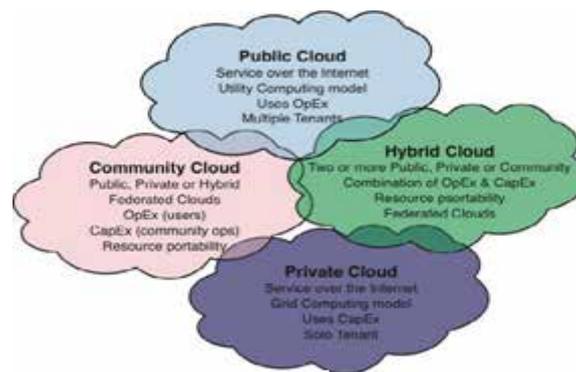

Fig.1. Types of Clouds

The aim is to share and store the enterprise information securely. On-premise private cloud also known as internal cloud is hosted in one's own data center. This provides more security of information but it is not scalable. Externally hosted private cloud is hosted externally with the cloud providers. The cloud providers provide an exclusive cloud with full security. Hybrid cloud is a combination of the private and public cloud. With the hybrid cloud the cloud providers utilize the third party in a partial or full manner thus increasing the flexibility of computing.

3.2 Challenges of Cloud Computing

The challenges of the cloud include Data Protection, Data Recovery and Availability, Regulatory and Compliance Restrictions, Management Capabilities. Data Protection refers to the security which the enterprise requires from the cloud providers. In the existing model the enterprise build their own firewalls at their data centers to protects their confidential information. In the cloud model the cloud providers are responsible for maintaining the privacy for the enterprise and the enterprise has to rely upon the cloud providers. Data recovery and availability refers to the refers to recovery during disaster and availability of data, replication of data, runtime governance and performance management.

Even though there may be different cloud providers management capabilities are still in its infancy. Features like "auto-scaling" is a crucial requirement. Providers need to work upon this and load balancing factor. The government of European countries requires the personal information of the people to store in a exclusive data center within the country and provide information when required at high privacy. This is a big challenge to the cloud providers.

IV. PROBLEM DEFINITION

4.1 System Model

Three entities are play a major role in the cloud service storage architecture: Users, Cloud servers and Third Party Auditor(TPA). Users are those who have their storage in the cloud and rely upon the cloud providers for security assurance and data integrity. Cloud servers are maintained by the Cloud Service Providers and they are responsible in providing the availability and data integrity of the information of the users. TPA are trusted third party who on behalf of the cloud users expose the risk of the cloud storage. They have capabilities that the users do not have.

Fig.1. Cloud Storage Service Architecture

Cloud users store their data in a redundant manner because there is huge availability of data. This can be achieved by erasure correcting code to impose fault tolerance as the user data grows in size and importance. The point-to-point communication between the CSP and the users are reliable and secure. Users perform block level operations and our model provides file oriented features rather than non-file oriented features such as social networking.

4.2 Adversary Model

From the user's point of view adversary model refers to the integrity of user's data from threats. There are two types of attacks the CSPs face in maintaining the integrity of user's data: Internal and External attack. Internal attack refers to the malicious threat within the system. Inorder to overcome it the CSPs may move the less accessed data to a lower tier or even may hide it due to management errors. The external attack is due to certain parties outside the CSPs boundary who may attack at economical interest. The CSPs do not have control over the these threats.

Adversary is responsible for polluting the data and introducing fraudulent data instead of the original data and it becomes impossible for the users to access it. This also refers to external threat. Our model provides facilities that prevents fraudulent attack by the attackers and provides integrity of users data.

V. ANALYSIS OF THE SYSTEM

5.1 File Distribution Preparation

Erasure correcting code allows files to be distributed across distributed servers. We use a technique to disperse the data file F redundantly across a set of n = m+ k distributed servers. An (m, k) Reed-Solomon erasure-correcting code is used to create k redundancy parity vectors from m data vectors in such a way that the original m data vectors can be reconstructed from any m out of the m+k data and parity vectors. By placing each of the m+k vectors on a different server, the original data file survives the failure of any k of the m+k servers without data loss and overhead.

5.2 Challenge Token Pre-Computation

The assurance of data storage correctness and data error localization is achieved simultaneously by pre-computed verification tokens. Before file distribution the user pre-computes a certain number of short verification tokens on individual vector G(j) (j ∈ {1, . . . , n}), each token covering a random subset of data blocks. When the user make sure the storage correctness by challenging the cloud servers with a set of randomly generated block indices. Upon receiving challenge, the cloud server computes a short "signature" over the specified blocks and returns them to the user.

5.3 Correctness Verification and Error Localization

Error localization is important for eliminating the erroneous servers. Other systems only provide binary results. But in our model we use the challenge response protocol to eliminate the erroneous servers and thus protect the users information and provide data integrity and availability.
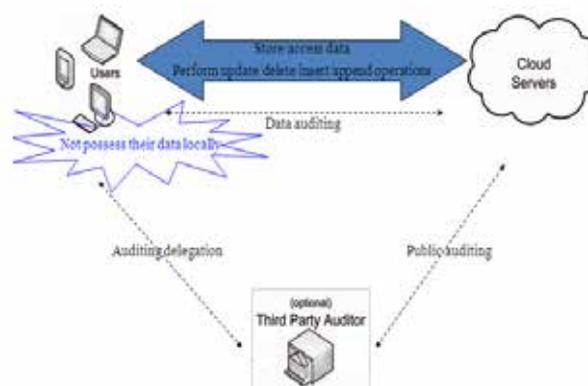

Fig.3. System Architecture

VI. CONCLUSION

In our paper we provide the protocol extension for privacy-preserving and also discuss the cloud storage services. We have included correctness analysis of proposed storage verification design. We have presented detailed discussion on the strength of our bounded usage for protocol verifications and its comparison with state-of-the-art.

In future we revise the challenge response protocol and privacy preserving protocol to achieve better communication and space overhead.

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GPS RECEIVER PATCH ANTENNA

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ABSTRACT

In this paper, a microstrip antenna structure is proposed for global positioning system (GPS) applications. This structure is intended to reduce the antenna size at low cost in order to fulfil the increasing needs of mobile devices with GPS functions. Thus, dielectric slabs with low relative permittivity, which can be commonly available on the market at a low cost, are employed. The size reduction is achieved by cutting slits and L-slots on the surface of the microstrip metal patch in order to lower the resonance frequency of the structure. The numerical and experimental results verify that the antenna design can improve the wide-angle axial ratio in addition to size the reduction with insignificant reduction of the operation-frequency bandwidth (still fully sufficient to cover the GPS frequency band).

Index Terms: GPS, L-Slots.

I. INTRODUCTION

Global Positioning System (GPS) is widely used for car-navigation system all over the world. At present, GPS system employs only the frequency of 1.575 GHz in the civilian use. Recently, to improve the positioning accuracy, GPS modernization enterprise is scheduled and executing. In this paper, we propose compact, small, and low profile microstrip antennas for the GPS system. Many automotive-oriented mobile telecommunication services are rapidly spreading in the last few years. Vehicles are increasingly being equipped with on-board electronics systems—such as Global Positioning System (GPS), Mobile Phone and Digital Communication System.

In particular, for high-precision GPS applications, such as differential GPS, GPS-based spacecraft attitude determination or geodetic surveying, a receiving antenna with rejection to multipath signals is required. Multipath arises when the GPS transmitted signal takes different paths to the receiving antenna and, being the signals from these paths added with different phases, this results in a significant amplitude and phase distortion. Microstrip antenna is a resonator type antenna, usually designed for single mode operation that radiates mainly in linear polarization. For circular polarized (CP) radiation, a patch must support orthogonal fields in equal amplitude but in phase quadrature. This requirement can be accomplishment by a single patch with proper excitation or by an array of patch with appropriate arrangement and phasing. The conventional antennas for GPS applications are very compact and expensive.

In this work, a compact GPS Microstrip patch antenna for tracking purposes. The antenna consists of a coaxial feed line, a substrate, and a ground plane. Compared to the other antennas, the proposed antenna in this letter not only achieves desired frequency of 1.575 GHz but also has a rather simple structure that is easy to fabricate. Meanwhile, the measured results represent that the antenna shows a good multiband characteristic to satisfy the requirement of GPS applications. Details of the antenna design are described in the later, and simulated results are presented. The antenna is simulated using Ansoft HFSS v.13.The result shows good agreement.

II. ANTENNA GEOMETRY WITH AND WITHOUT NOTCH FREQUENCY

2.1 Design for the propose antenna

The proposed antenna is the simple rectangular micro strip patch antenna. As shown in Figure. 2.1 the configure ration of the compact GPS micro strip antenna is designed and fabricated on a substrate with FR4, relative permittivity of 4.4, and a loss tangent of 0.02. The entire size of the antenna is only 168x196x1.6 mm^3.
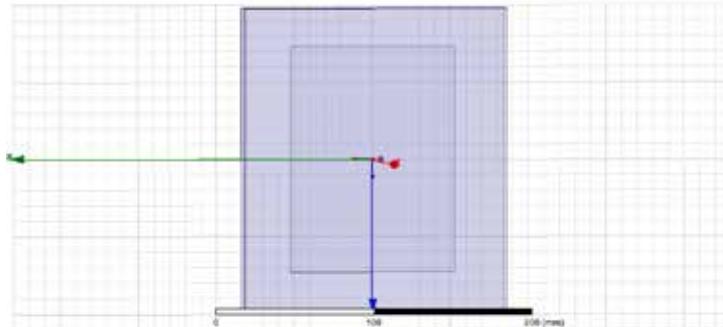

Figure. **2.1 Top view of the proposed antenna**

In the given proposed antenna, the dielectric substrate FR4 is sandwiched between the patch and ground plane. Firstly the patch antenna is designed to provide a frequency of 1.575 GHz. For increasing steepness of the cut-off slop, and to increase the stop band range of the microwave filters, moreover, compact filter and antennas can also be achieved using this technique. In the (TMmn mode), the resonance frequency of antenna given by

$$f = \frac{c}{2p\sqrt{e_r}}\sqrt{\left(\frac{mp}{L}\right)^2 + \left(\frac{np}{W}\right)^2}$$

Velocity of light given by

$$c = 1/\sqrt{m_0 e_0}$$

The calculation can be improved by adding a "fringing length extension" DL to each edge of the patch to get an "effective length" L_e.

$$L_e = L + 2\mathrm{D}L$$

And

$$\mathrm{D}L \gg 0.5\ h$$

This condition is applied to the proposed antenna $W/\ L = 1.5$

2.2 Return Loss

Return loss or reflection loss is the reflection of signal power from the insertion of a device in a transmission line. When feed position is taken away from centre then return loss decreases. When the length and width of ground are increases then return loss increases.

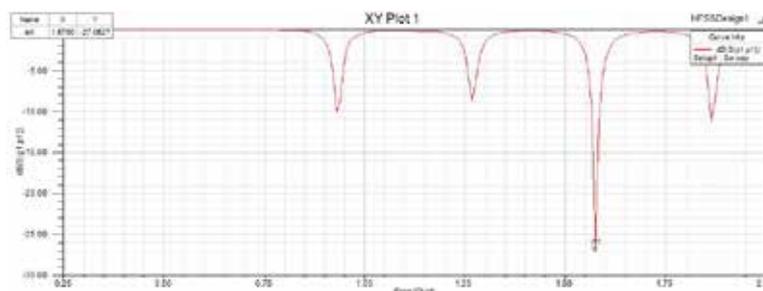The simulated return loss plotted in Figure 2.2

Figure 2.2: Simulated Results for Return Loss Vs Frequency (GHz)

The return loss for the given antenna frequency 1.575 GHz is -27.05 dB.

2.3 Bandwidth

It is defined as "The range of usable frequencies within which the performance of the antenna, with respect to some characteristic, conforms to a specified standard." Bandwidth of the microstrip antenna is closely dependent on the dielectric substrate, that is also depends on the dielectric constant of substrate. Low dielectric constant produces high BW. It is also depends on the probe radius and the height of substrate. As probe radius and height of substrate increases the BW is also increases and vice versa.

First frequency 1.575 GHz resonates between the bands of 1.5686 to 1.5842 GHz.

2.4 VSWR

The value of VSWR should be between zero and two for efficient performance of an antenna.
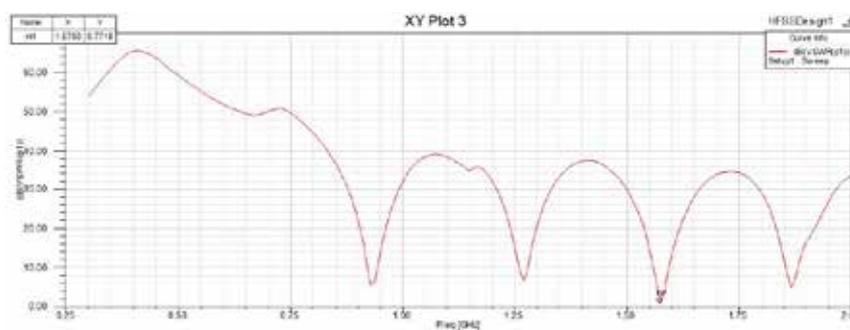
Figure 2.3 Plot of VSWR Vs Frequency (GHz)

The VSWR for the frequency 1.575 GHz is 0.7716.

2.5 Input Impedance

The input impedance of the microstrip patch antenna should be in the range of 48-53ohm. For the better coupling, the input should be 50 ohm. In addition, the imaginary characteristic should be less than zero. When the probe radius increases then the input, impedance decreases.

The input impedance for the given frequency 1.575 GHz is 50.46 ohm so that the proposed antenna provide the efficient coupling.

The simulated result for input impedance shown in the plot:
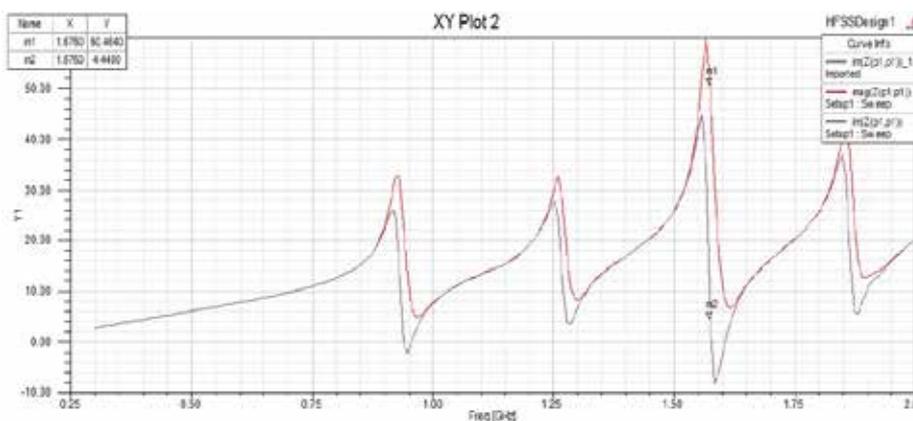
Figure 2.4 simulated result for input impedance Vs Frequency (GHz)

2.6 Radiation Pattern

The antenna parameter is a graphical representation in three-dimensional of the radiation of the antenna as the function of direction. It is a plot of the power radiated from an antenna per unit solid angle, which gives the intensity of radiations from the antenna. Antenna gain is the ratio of maximum radiation intensity at the peak of main beam to the radiation intensity in the same direction, which would be produced by an isotropic radiator having the same input power.Isotropic antenna is considered to have a gain of unity. Simulated result for the radiation pattern of antenna is given by:
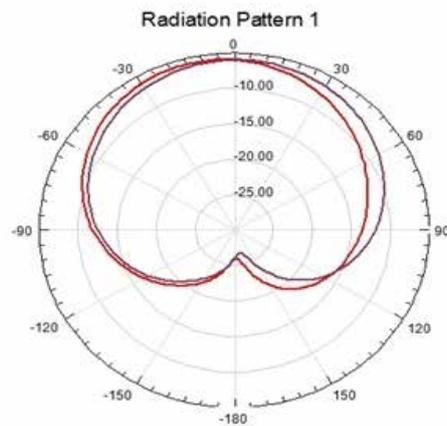
Figure 2.5Simulated result for the radiation pattern

III. CONCLUSIONS

A Compact GPS Microstrip Patch Antenna thinner and cheaper than thin ceramic patch antennas which used for GPS and automotive applications. Several concepts related to microstrip patch antenna technology have been summarized. The fundamental characteristics of microstrip patch antennas have been presented; methods to couple power to and from the printed antenna have been summarized; techniques to enhance the bandwidth and efficiency have been reported; and how to reduce the conductor size of a patch antenna. The proposed antenna can be used in many applications like Radar and advanced communication applications, such as synthetic aperture radar (SAR), the global positioning system (GPS) and vehicular communication.

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IMPACT OF MUSIC ON ADVERTISEMENTS AND BRAND PREFERENCE

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ABSTRACT

This paper extends research to find out whether background music in advertisements has an impact on brand preference and brand remembrance.Specifically, this paper examines how the music in advertisements and the branding of the product may affect the attitude towards the brand preference and brand remembrance. The research methodology comprises of a survey which aims to measure how people describe their perceptions of music and how do they relate music to the brand. The important variable of the research is to identify how music will have a positive effect on the customer's minds and preference. Popular music in advertising helps people effectively in remembering the brand and getting attracted to it. Thereby the study would result in creating better advertisements which customers can easily relate to. However, relatively little is known when the advertisements carry out the favorite song and so its effect.

Keywords: Advertisements, Brand preference, Music, Brand remembrance

I. INTRODUCTION

Advertising is the means by which one party attempts to convince another into purchasing a particular product or service. Music has become an important part of the marketing toolfor attracting people. With the intense usage of TV and radio as the means of communicating with the consumers, music and jingles have a crucial role to play. Music can serve the overall promotional goals in one or more of several capacities. "Jingle" is the most common musical technique used in advertisements for making people to remember the brand and also the product remembrance. Some of the biggest companies are successful and became popular with the product just because of the jingle in their advertisements and less likely on customer satisfaction.

A good jingle catches the customer's attention and makes them recall the product. But on the contrary, if the advertisement uses poor music, company'sbrand image gets affected and stops people from looking at a certain brand. Previously, similar works are done on the similar base with different contents of advertisements and on a different location. This research deals with determining the relations between brand preference and the use of music or jingles in its advertising.

The next section deals with the literature review of this particular research. Section three includes the research framework. Section four includes methodology of the study describing in detail about the sample, data collection and data analysis tools required to attain the required results. Fifth section deals with analysis. The last and final section constitutes the findings and conclusion of the study.

II. LITERATURE REVIEW

2.1 Definition of Advertising

Advertising is the important aspect of any business or product or service. It mainly comes into role when a company tries to make people know about the product and spread knowledge about it. The mass communication tools like advertising, sales promotion and public relation tools are widely used by all the companies as they are the basic modes of creating awareness about the product among the consumers and educate them about the product. As it's based on a larger audience the tools help to communicate message to a larger audience at a lower cost per person. It is moreover a persuasive process as the need to create an advertisement which is more appealing to every group of persons and in order to make them competitive is very tough. (Evans Brako Ntiamoah, 2014)Kotler (1988) sees advertising as one of the four major tools companies use to direct persuasive communications to target buyers and public noting that "Advertising represents any paid form of non-personal presentation and promotion of ideas, goods, or services by an identified sponsor." According to him it's to reach the potential consumer by providing information, persuading and recalling the product and also making them as a prospect consumer of the product whereby showing why the product is being offered. (Adeolu B. Ayanwale, 2005)Dunn et al. (1978) considered advertisements as an important functional and a paid medium used by business firms in order to effectively communicate their ideas to every individual.

2.2 Advertising Effects On Brand Preference

(Sawant, December 2012)The advertisements are used for the purpose of identifying the brand and its goal is to position the product in the minds of the consumers thereby ensuring a successful brand. More over advertisements must make people recall, prefer and relate with the brand. These are three metrics commonly used to assess the quality of advertising. Advertisers try to seek consumer engagement with the advertisements, thereby making a purchase decision. To find out the best advertisements is tough as their needs vary a lot in terms of liking and also mainly because of the changes in the technology and so the advertisements must be in an upgraded way and so the pressure is shifted to the advertisers. The advertisements add value to the product and services which shows what the consumer feel and think about the product. It replicates the product and also the brand.

(Keller, 2009) Brand image comes into play at this point where the brand image notifies how the product has to be perceived by the consumer.Brand image defines the attributes which creates items describing the attitude towards the brand and it is very crucial in creating a quality brand perception in the consumer minds. Advertisements are one of the effective tools in positioning quality brand image. This enriches consumer trust. Brand personality is influenced by a person's neighborhood, friends, and activities just as the personality of a person. This concept can be inscribed into a person through advertisements. In order to create such a brand personality, human nature as characters are transferred to the characteristics of the brand. Consumers repurchase only if they are satisfied with the brand or if it happens to create an emotional connect with them. The reason being consumers always looks for benefits which they derive from their lifestyle.

2.3 Music Effects on Advertisements

(Wallace, 1991)Said that music has been defined as an important aspect on advertisements and how it makes to remember the brand. It's difficult to get a jingle out of the person's mind after he hears it's several times even if it'snot relevant and people can't just stop humming it. There might be also some preference when the well know music is played in the advertisements. One well-known example is Airtel music, when the brand name is said, automatically the music in the advertisement comes to our minds.It is still remembered even after several years. There is some experimental evidence to support the notion that music can improve brand recall (Wallace, 1991).

III. RESEARCH FRAMEWORK

The study is to understand the impact of advertisements music on brand preference. In order to proceed with the research the hypotheses are framed.

3.1 Hypothesis

Respondent's relationship to music has a positiveimpact on the preference of music in advertisementsand also in the preference of the brand.

IV. RESEARCH METHODOLOGY

Research methodology involves a quantitative survey where the responses are collected both online and offline. The questionnaire analyses the relationship of music with the brand and how people conceptualize the brand and the music involved in the advertisements of the particular brand. The questionnaire consists of 3 parts:

The first section consists of ten questions involving the music preference of people, brand remembrance and the brand equity in relation with music. Among them, a particular question is asked relating to the different types of advertisements. There are 7 options to choose from ranging from funny, creative to commercial advertisements. This is crucial for our research because it possibly measures the liking towards a particular kind of advertisement. Another important factor is identified in this section which is the people's relationship with music. Effectiveness of jingles and the reason for effectiveness is another important variable measured in this section.

In the second section, few examples of brands with popular advertisements are given and the respondents are asked to rate them in terms of their musical content. These responses would probably identify what kind of music better influences a person and makes the brand a successful one. And also about the forms of music which they do like when the brand is being projected. The third section records the demographics of the respondents. It includes age, income level, educational status and employment. Each of these seven demographic factors has different options below it for people to choose from.

The respondents are 146. The target group included students and working population. The reason being is that the people in the group are more inclined to the new changes and attracted more to new products moreover the companies try to make advertisements which attracts them. The questionnaire was aimed at analyzing factors such as brand remembrance with respect to music in advertisements, effectiveness of jingles and purchase

behavior influenced by advertisements. Quantitative data analysis was performed using the statistical software called SPSS. Findings were interpreted and tested for the hypothesis.

V. ANALYSIS

5.1 Logistic Regression Model Is Used To Test The Hypothesis.

Relationship Between The Type Of Ads And Music As An Influential Tool

TABLE 1 (COEFFICIENTS)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.748	.418		11.355	.000
	Funny ads	-.062	.139	-.040	-.446	.656
	Creative ads	-.263	.182	-.128	-1.446	.150
	Unique ads	.240	.134	.166	1.788	.076
	Informative ads	-.297	.137	-.198	-2.168	.032
	Emotional ads	-.035	.122	-.024	-.283	.778
	Genuine ads	.122	.148	.079	.827	.410
	Commercial ads	-.225	.184	-.110	-1.228	.222

a. Dependent Variable: Music as an influential tool in promotions

The table 1 shows the different type of advertisements and its influence of music in the advertisements. In that among the different type of advertisements, unique advertisement and genuine advertisement have a strong influence with respect to the music content in those particular advertisements and in the case of other advertisements the influence is low. This shows that the music plays an important role in unique and genuine advertisements in making the people to prefer the most.

TABLE 2 (COEFFICIENTS)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.043	.294		10.352	.000
	Relationship to music	.232	.072	.259	3.224	.002

a.   Dependent Variable: Music as an influential tool in promotions

b.   Predictors: (Constant), Relationship to music

The table 2 shows the One-way Anova result shows 0.002 significance which implies to that the result shows that relationship to music does have an impact on the preference of music as an influential tool in advertising.

From the table3, we can observe that the significant value is 0.023 which conveys that people who consider jingles to be effective also feel that that music plays an influential tool in promotions.

TABLE 3 (Coefficients)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.492	.233		19.259	.000
	Effectiveness of jingles	-.477	.207	-.188	-2.300	.023

a. Dependent Variable: Music as an influential tool in promotions

From the table 4 we can find out that there exists a significant relationship between different types of advertisements and the age group of respondents. As seen in the following table, informative ads are not highly preferred by people of the age group 18 to 24. Instead, they are inclined towards the other kind of ads such as funny, creative and unique advertisements. And the age group 25- 34 yrs prefer informative ads more than others.

TABLE 4 (Informative ads * Age of respondents Cross tabulation)

		Age of respondents			Total
		18 to 24 yrs	25 to 35 yrs	36 to 45 yrs	
Informative ads	yes	34	18	1	53
	no	72	18	3	93
Total		106	36	4	146

TABLE 5

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Relationship_Music	.438	.285	2.365	1	.124	1.550
	Effectiveness_jingles	1.401	1.183	1.403	1	.236	4.060
	Influence_jingle	-.964	.757	1.622	1	.203	.381
	Music_influential_tool_promotions	-.660	.355	3.448	1	.063	.517
	Melodious_Slow	-.521	.525	.983	1	.321	.594
	Peppy_fast	.429	.621	.478	1	.489	1.536
	Elevating	-.383	.699	.300	1	.584	.682

Constant	1.918	2.146	.798	1	.372	6.808

a. Variable(s) entered on step 1: Relationship_Music, Effectiveness_jingles, Influence_jingle, Music_influential_tool_promotions, Melodious_Slow, Peppy_fast, elevating.

From the table 5 we can find out that there doesn't exist a significant relationship between the purchasing behavior and the preferences and attitude. As seen in the following table, people don't prefer products only because they like the jingle it depends upon the many other factors and it's not dependent on the music alone. And from the figure 1 you can see that the 88% of the respondents says that jingles helps a lot in the brand remembrance and in the figure 2 you can see that 79% of the respondents says that they don't prefer the products just because the like the jingle. So jingle plays an important part in the brand remembrance but the in the case of purchasing the product lot more factors are considered than the jingle alone.
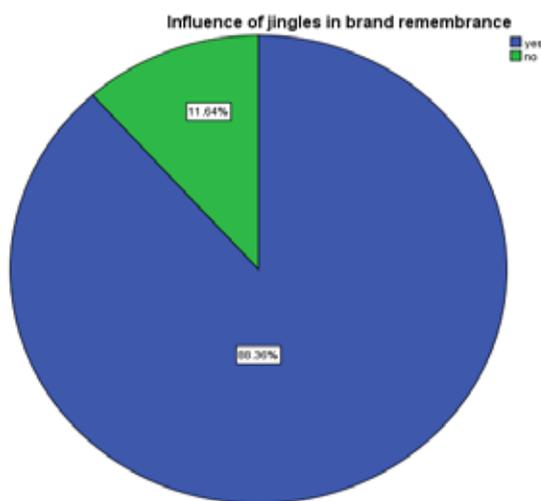
FIGURE 1   **FIGURE 2**
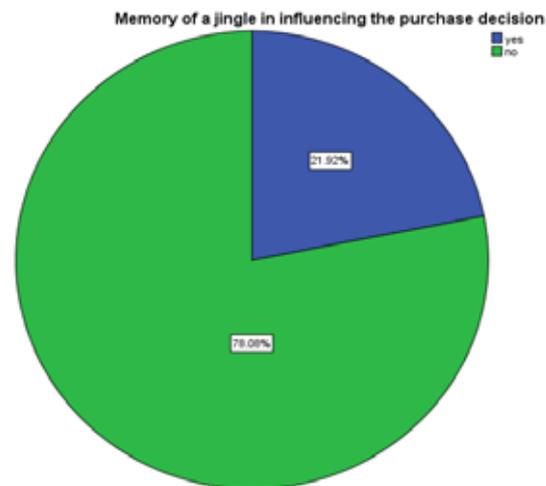
VI. CONCLUSION

Music has always been an effective tool in advertisements and it has become inevitable in the recent form of branding and advertising since it directly impacts the brand image. It strongly influences brand preference and remembrance. On the contrary, not all jingles are successful in achieving their objectives of brand preference and brand remembrance. It mainly depends on the content of the advertisements. The study concludes that people's relationship to music, impacts their preference of music as an influential tool in advertising which means people who relate strongly with music consider it to be an influential tool as well.Results show that music influences the content of advertisements. Unlike the conventional advertisements, unique and creative advertisements have a strong influence with respect to the music content in those particular advertisements. Hence music has a role to play in explaining the nature of advertisements too. Thus we can conclude music has an inevitable role in advertising but constrained to situational factors.

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CIRCULAR RE-RANKING FOR VISUAL SEARCH

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ABSTRACT

Conventional approaches to visual search re-ranking empirically take the "classification performance" as the optimization objective, in which each visual document is determined relevant or not, followed by a process of increasing the order of relevant documents. First show that the classification performance fails to produce a globally optimal ranked list, and then formulate re-ranking as an optimization problem, in which a ranked list is globally optimal only if any arbitrary two documents in the list are correctly ranked in terms of relevance. This is different from existing approaches which simply classify a document as "relevant" or not. To find the optimal ranked list, we convert the individual documents to "document pairs," each represented asa "ordinal relation." Then find the optimal document pairs which can maximally preserve the initial rank order while simultaneously keeping the consistency with the auxiliary knowledge mined from query examples and web resources as much as possible. To develop two pair wise re-ranking methods, difference pair wise re-ranking (DP-re-ranking) and exclusion pair wise re-ranking (EP-re-ranking), to obtain the relevant relation of each document pair. Finally, a *round robin criterion is explored to recover the final ranked list.* Visual search can take place with or without eye movements.

Keyword: Avoid Ambiguity Problem, Re-Ranking Methods, Semantic Video Search, Text Queries, And Visual Search.

I. INTRODUCTION

Visual search is a type of perceptual task requiring attention that typically involves an active scan of the visual environment for a particular object or feature (the target) among other objects or features (the distracters). Visual search can take place either with or without eye movements.

The proliferation of digital capture devices and the explosive growth of community-contributed media contents have led to a surge of research activity in visual search. Due to the great success of text document retrieval, most existing visual search systems rely entirely on the text associated with the visual documents (images or video clips), such as document title, description, automatic speech recognition (ASR) results from videos, and so on.

However, visual relevance cannot be merely judged by the text-based approaches, as textual information may fail to precisely describe the visual content. For example, when users search for images with a warm color, the images cannot be easily measured by any textual description. To address this issue, visual search re-ranking has

received increasing attention in recent years .It can be defined as reordering visual documents based on the initial search results or some auxiliary knowledge, aiming to improve search precision.

The research on visual search re-ranking has proceeded along three dimensions from the perspective of how external knowledge is exploited:

Ø   self-re-ranking, which mainly focuses on detecting relevant patterns (recurrent or dominant patterns) from the initial search results without any external knowledge;

Ø   example-re-ranking, in which the query examples are provided by users so that the relevant patterns can be discovered from these examples;

Ø   Crowdre-ranking, which mines relevant patterns from the crowd sourcing knowledge available on the web. The first dimension, i.e., self-re-ranking, although relies little on the external knowledge, cannot deal with the "ambiguity problem" which is derived from the text queries.

Ø   Taking the query "jaguar" as an example, the search system cannot determine what the user is really searching for, whether it is "an animal" or "a car."

II.LITERATURE SURVEY

2.1 Multimodal Fusion For Multimedia Analysis: A Survey

 This survey aims at providing multimedia researchers with a state-of-the-art overview of fusion
Strategies, which are used for combining multiple modalities in order to accomplish various multimedia analysis tasks. The existing literature on multimodal fusion research is presented through several classifications based on the fusion methodology and the level of fusion (feature, decision, and hybrid). The fusion methods are described from the perspective of the basic concept, advantages, weaknesses, and their usage in various analysis tasks as reported in the literature.

2.1.1 Disadvantages

 Several distinctive issues that influence a multimodal fusion process such as, the use of correlation and independence, confidence level, contextual information, synchronization between different modalities, and the optimal modality selection are also highlighted.

2.2 Multimedia data mining: State of the art and challenges

Advances in multimedia data acquisition and storage technology have led to the growth of very large multimedia databases. Analyzing this huge amount of multimedia data to discover useful knowledge is a challenging problem. This challenge has opened the opportunity for research in Multimedia Data Mining (MDM). Multimedia data mining can be defined as the process of finding interesting patterns from media data such as audio, video, image and text that are not ordinarily accessible by basic queries and associated results. The motivation for doing MDM is to use the discovered patterns to improve decision making. MDM has therefore attracted significant research efforts in developing methods and tools to organize, manage, search and perform domain specific tasks for data from domains such as surveillance, meetings, broadcast news, sports, archives, movies, medical data, as well as personal and online media collections. This paper presents a survey on the problems and solutions in Multimedia Data Mining, approached from the following angles: feature

extraction, transformation and representation techniques, data mining techniques, and current multimedia data mining systems in various application domains.

2.2.1 Disadvantages

We review current multimedia data mining systems in detail, grouping them according to problem formulations and approaches. The review includes supervised and unsupervised discovery of events and actions from one or more continuous sequences. We also do a detailed analysis to understand what has been achieved and what are the remaining gaps where future research efforts could be focused. We then conclude this survey with a look at open research directions.

2.3 Trecvid 2005 By Nus Pris

The effectiveness of a video retrieval system largely depends on the choice of underlying text and image retrieval components. The unique properties of video collections (e.g., multiple sources, noisy features and temporal relations) suggest we examine the performance of these retrieval methods in such a multimodal environment, and identify the relative importance of the underlying retrieval components. In this paper, we review a variety of text/image retrieval approaches as well as their individual components in the context of broadcast news video. Numerous components of text/image retrieval have been discussed in detail, including retrieval models, text sources, temporal expansion methods, query expansion methods, image features, and similarity measures.

2.3.1 Disadvantages

A series of retrieval experiments on TRECVID video collections to identify their advantages and disadvantages. To provide a more complete coverage of video retrieval, we briefly discuss an emerging approach called concept-based video retrieval, and review strategies for combining multiple retrieval outputs.

III.PROBLEM DESCRIPTION

3.1 Existing System

The existing system on visual search re-ranking has proceeded along three dimensions from the perspective of how external knowledge is exploited:

- Ø   Self-re-ranking- which mainly focuses on detecting relevant patterns (recurrent or dominant patterns) from the initial search results without any external knowledge;
- Ø   Example-re-ranking- in which the query examples are provided by users so that the relevant patterns can be discovered from these examples;
- Ø   Crowd re-ranking, which mines relevant patterns from the crowd sourcing knowledge available on the web.

3.1.1 Disadvantages

- Ø   The first dimension, i.e., self-re-ranking, although relies little on the external knowledge, cannot deal with the "ambiguity problem" which is derived from the text queries.
- Ø   To address this problem, the second and the third dimensions leverage some auxiliary knowledge to better understand the query. Specifically, the second dimension, i.e., example-re-ranking, leverages a few query examples to train the re-ranking models. However, the typical model-based approaches usually assume the

availability of a large collection of training data, which cannot be satisfied as users are reluctant toprovide enough query examples while searching.

Ø   To address the limitation of lack of query examples, the third dimension, i.e., crowd-re-ranking, leverages crowdsourcing knowledge collected from multiple search engines. It is reported that much higher improvements can be obtainedsince different engines can inform and complement the relevant visual information for the given query. However, it still cannot avoid the ambiguity problem as current visual search engines mainly support the text query.

3.2 Proposed System

The leverage both query examples and crowd sourcing knowledge simultaneously. Furthermore, under the framework, we develop two pair-wise re-ranking methods and give detailed solutions. The basic idea of our content based re-ranking procedure is that an image which is visual close to the visual model of a query is more likely to be a good answer than another image which is less similar to the visual model. To evaluate the similarities between the Real images and a topic, to obtain a low-level description of that particular topic. To create a visual model (a positive set of images Real image which depicts the concept) using Web images downloaded from Google Image and Yahoo! Image.

3.2.1 Advantages

Ø   Visual search re-ranking that aims to improve the text-based image search with the help from visual content analysis

Ø   Query-independent re-ranking model will be learned for all queries using query-dependent re-ranking features.

Ø   To improve the results of semantic-theme-based video retrieval.

IV.SYSTEM ARCHITECTURE
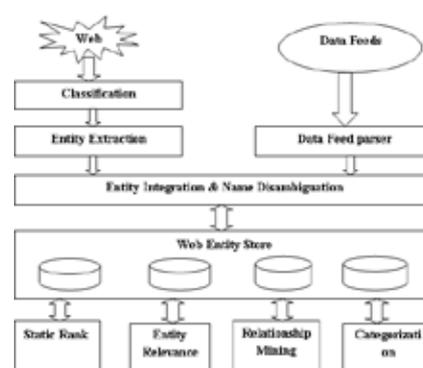
Figure. No: 4.1 System Architecture

V. METHODOLOGY

5.1. Image Search

Our system works directly on top of Image Search, with almost the same Web interface. After typing a query keyword, the original result of Live Image Search based on text is presented to user. The user can then drag an

image to the Key Image pad, and initiate a content-based query. Module, first feed the text query to a visual web search engine and collect the visual documents along with the associated text.

Figure. No: 5.1.1 Image Search Module

5.2. Query Example

The module are developing the code for query example algorithm. To avoid the ambiguity problem, we then use the query examples to filter the web results and get more clean "web examples."
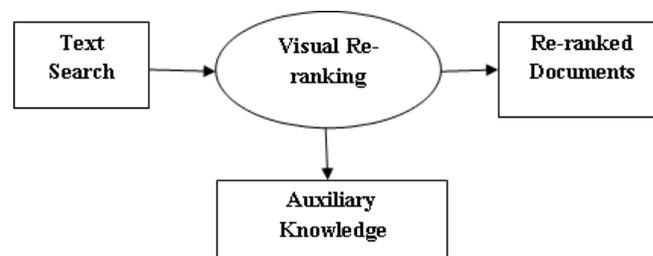
Figure. No: 5.2.1 Query Example Modules

5.3. Distance Definitions

The module discusses the three distances incf, i.e., ranking distance, knowledge distance, and smooth distance. our ranking distance is calculated by using the ordinal scores of the "document pairs" after converting the ranking list to a pair set.

The following two strategies of ranking distances are applied over the result from the above module:

Ø Ranking distance I: difference square

Ø Ranking distance II: accumulated exclusion

Figure. No: 5.3.1 Distance Definitions

5.4. Pair Optimization

Based on the distance defined in module that use optimization problem as difference pairwise re-ranking (DP-re-ranking) and exclusion pairwise is re-ranking (EP-re-ranking).
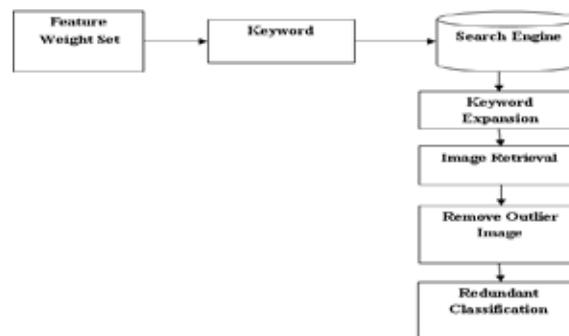
Figure. No: 5.4.1 Pair Optimization

5.5. Recovery of the Re-ranked List

The module define Round Robin Algorithm, to obtain the final re-ranked list, a "round robin ranking" method is explored based on the ordinal scores of visual document pairs. The round robin ranking first assigns real-value ordinal scores to the first document of each pair, while the second document of each pair is assigned 0. All the scores assigned to the same document are then added together.
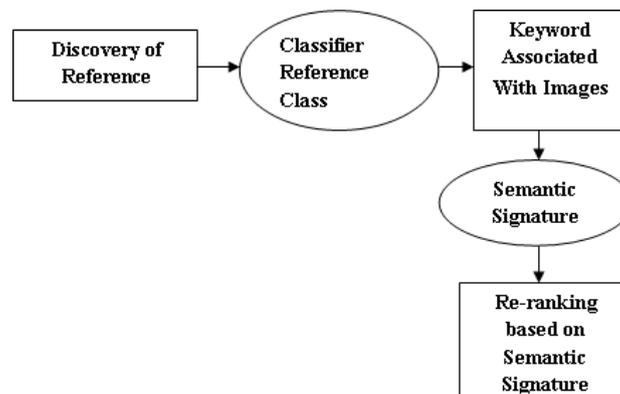
Figure. No: 5.5.1 Recovery of the Re-ranked List

VI. CONCLUSION AND FUTURE WORK

Visual re-ranking which explores information exchange and reinforcement for visual search re-ranking. Particularly, we analyze the placement of modalities in the circular framework which could lead to the highest possible retrieval gain in theory for search re-ranking. To verify our claim have presented approaches based on the existing works in the literature for predicting the modality importance to sort and weight the modalities accordingly for circular re-ranking. Experiments conducted for image and video retrieval basically validate our proposal and analysis. Performance improvement is also observed when comparing to other re-ranking techniques such as linear fusion based on oracle setting and fixed weights learnt from training examples. The degree of improvement, though, is limited by how accurate the modality importance and fusion weights can be estimated, which could be noticed from our empirical results when comparing to the oracle setting of circular re-ranking. In Future, Thus future works include more in-depth studies of how fusion weights could be determined to boost the effectiveness of circular re-ranking. The improvement is observed in different types of queries. For instance, the images relevant to the queries "animal" and "flower" are diverse in appearance, resulting in poor

performance by Bow or CM alone. Instead, text feature is found to be more helpful for these queries. *Cir+* successfully boosts up the normalized NDCG of both queries to 1.

V. ACKNOWLEDGEMENT

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BIOGRAPHY

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EXTRACTION OF RETINAL BLOOD VESSEL BY COMBINING GABOR FILTER AND GENERALIZED LINEAR MODEL

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ABSTRACT

Here we are combining Gabor filter and Generalized Linear Model (GLM) for extraction of blood vessels of retina, with this use clarity in extraction can be improved. Since retina is a complex and delicate ocular structure, a huge effort in computer vision is devoted to study blood vessels network for helping the diagnosis of pathologies like diabetic retinopathy, hypertension retinopathy, retinopathy of prematurity or glaucoma. To carry out this process many works for normal and abnormal images have been proposed recently. These methods include combinations of algorithms like Gabor filters, histogram equalization, combined corner/edge detectors, neural networks, morphological operators etc. To apply these algorithms pre-processing tasks are needed. Most of these algorithms have been tested on publicly retinal databases. This paper presents a review of algorithms for detection of blood vessels by combining Gabor filter and generalized linear model from retinal images.

Keywords: Gabor Filter, Image Segmentation, Machine Learning, Vessels Extraction.

1. INTRODUCTION

Diabetic retinopathies, hypertension retinopathy, retinopathy of glaucoma are one of the major causes of blindness in the world. It occurs when diabetes affects the circulatory blood system of eye retina and damages the blood vessels in the retina which leads to partial or complete blindness. The effect of blood leakage from these vessels creates certain lesions in eye retina, e.g., Micro aneurysms, Hemorrhages, Neovascul-arisatio, hard exudates, Soft exudates, Cotton wool spots, and venous loops. Non proliferative DR (NPDR) and Proliferative DR (PDR) are two types of DR. Stages of DR can be classified as Mild NPDR, Moderate NPDR, Severe NPDR, and PDR [1].

Manual image segmentation of retinal blood vessels is a long and tedious task which also requires training and skill. It is commonly accepted by the medical community that automatic quantification of retinal vessels is the first step in the development of a computer-assisted diagnostic system for ophthalmic disorders. A large number of algorithms and techniques have been published relating to the detection of retinal blood vessels. Here we have surveyed of algorithms particularly focusing on the detection of blood vessels. The examination of the retinal images, generally do it with high definition ophthalmology camera, for example RetCam (Clarity Medical Systems Inc., Pleasanton, CA, USA)

The input for algorithms is fundus color images and the requirement is to be able to classify each pixel as vessel or non-vessel. For doing this complex task, researchers use and improve many algorithms like Gabor filter,

histogram equalization, matched filter, combined corner/edge detector; neural network etc., some of them can be combined to get better results also improvements in analysis as well as predictions. There are cases where deterrotion may occur by doing this. Hence forth careful selection of methods for combination is required [2].

II PROCESSES

2.1 Retinal Photography

Retinal photography requires the use of a complex optical system, called a fundus camera. It is a specialized low power microscope with an attached camera, capable of simultaneously illuminating and imaging the retina. It is designed to image the interior surface of the eye, which includes the retina, optic disc, macula, and posterior pole. In Color photography the retina is examined in full color under the illumination of white light. In Red-free photography, the vessels and other structures are improved in contrast and the imaging light is filtered to remove the red colors. The fluorescent angiograms are acquired using the dye tracing method. A sodium fluorescein or indocyanine green is injected into the blood, and then the angiogram is obtained by photographing he fluorescence emitted after illumination of the retina with blue light at a wavelength of 490 nanometers [3].

2.2 Image Preprocessing

In order to remove the imperfections like lighting variations, poor contrast and noise, a preprocessing comprising the following steps is applied: vessel central light reflex removal, background homogenization, and vessel enhancement

BLOCK DIAGRAM

.
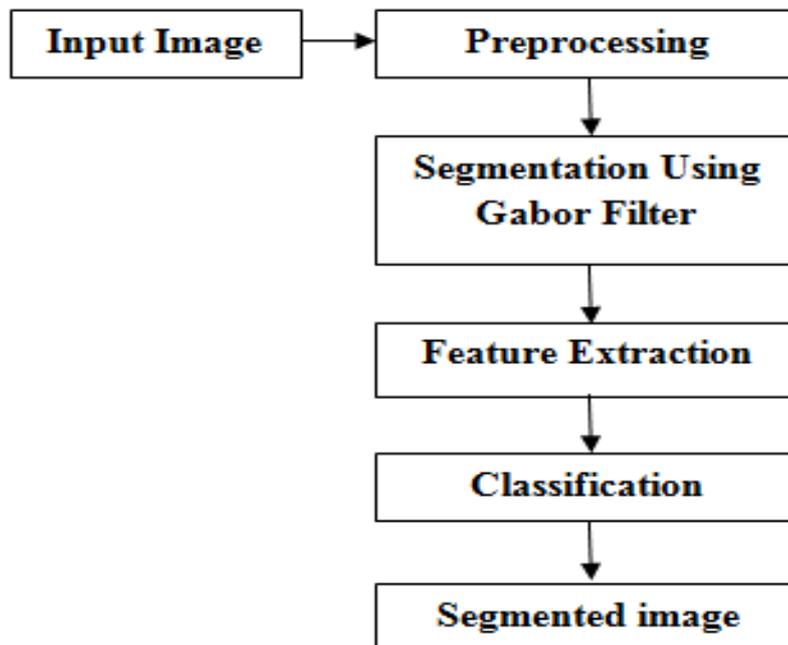
2.2.1 Vessel Central Light Reflex Removal

Retinal blood vessels have lower reflectance; they appear darker than the background. In the vessel cross-sectional profile, some blood vessels include a light reflex which runs down the central length of the blood vessel. To remove this brighter strip, the green plane of the image is filtered by applying a morphological

opening as shown in Fig. 1(b). Disc diameter was chosen as a minimum value to reduce the risk of merging close vessels. I_J denotes the resultant image for future references.

2.2.2 Background Homogenization

In fundus images background intensity variation is due to non uniform illumination. With the purpose of removing these background lightening variations, a shade-corrected image is accomplished from a background estimate. This image is obtained by applying a 3x3 mean filter and subsequently convolving the resultant image with a Gaussian kernel. A background image I_B , is produced by applying a 69x69 mean filter [Fig. 1(b)]. Then, the difference D between I_J and I_B is calculated for every pixel.

$$D(x,y)=I_s(x,y) - I_B(x,y)………………(1)$$

Finally, a shade-corrected image I_{SC} is obtained by transforming linearly values into integers covering the whole range of possible gray-levels ([0-255], referred to 8-bit images). Fig. 1(c) shows the corresponding to a no uniformly illuminated image. The proposed shade correction algorithm is observed to reduce background intensity variations and enhance contrast in relation to the original green channel image. Significant variation in image intensity is reduced by a homogenized image [Fig. 1(b)] produced as follows: the histogram of is displaced toward the middle of the grayscale by according to the following gray-level transformation function:

$$g_0=\begin{cases} 0 & if \quad g < 0 \\ 255 & if \quad g < 0 \\ g & otherwise \end{cases}…………………(2)$$

Where $g=g_I+128-g_{IM}$

g_I and g_O are the gray-level variables of input and output images. The variable denoted by g_{IM} defines the gray-level presenting the highest number of pixels in g(x,y)

.
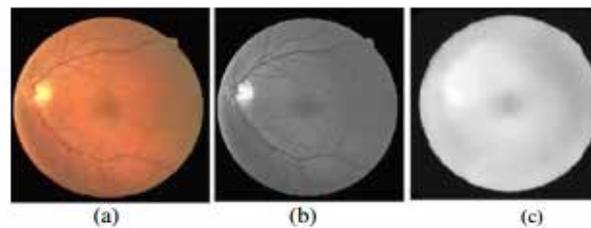
Fig: 1. Illustration of the preprocessing process: (a) RGB Image. (b) Green channel of the original image. (c) Background image.

By means of this operation, pixels which correspond to the background of the retina are set to 128 for 8-bit images. Fig. 2(b) shows this effect for fundus images in the STARE database.
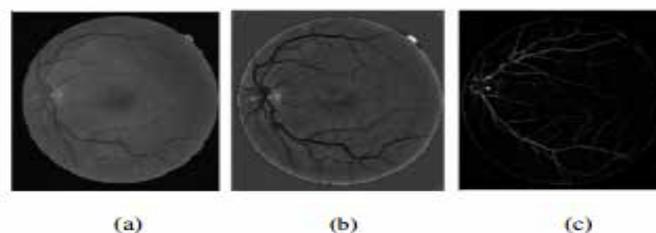

Fig: 2. Application of the preprocessing with different illumination conditions. (a) Green channel of the original images.(b) Homogenized images. (c) Vessel-enhanced images.

2.2.3 Vessel Enhancement

The final preprocessing step consists on generating a new vessel-enhanced image, which proves more suitable for further extraction of moment invariants based features. Vessel enhancement is performed by estimating the complementary image of the homogenized image, and subsequently applying the morphological Top-Hattransformation[Fig.2(c)].

$$I_{VE} = I^C_H - \gamma (I^C_H) \ldots\ldots\ldots\ldots(3)$$

where ɣ is a morphological opening operation using a disc of eight pixels in radius. Thus, while bright retinal structures are removed, the darker structures remaining after the opening operation become enhanced (i.e., blood vessels, fovea, possible presence of microaneurysms or hemorrhages).[4]

2.3 Retinal Vessel Segmentation

2.3.1 Pixel Processing Based Methods

The pixel based methods frequently use a two-step approach. The first step is an enhancement procedure, usually a convolution operator, with the main purpose of selecting an initial set of pixels to be further validated as vessels in the second step. The emphasis given to each one of these two phases justifies the subdivision proposed in several distinctive solutions are described in the literature for pixel processing-based methods. Matched filters method employs a two-dimensional linear structural element (kernel) that has a Gaussian cross-profile section, extruded or rotated into three dimensions to identify the cross-profile of the blood vessel, which typically has a Gaussian or a Gaussian derivative profile. The kernel is rotated into many different orientations (two or 12) to fit into vessels of different configuration. The images are then threshold (an arbitrary chosen grey level divides all features into a binary classification, depending on whether they have a greater or lesser intensity level than the „brightness threshold) to extract the vessel silhouette from the background. This works reasonably well on images of healthy retina. In diseased states such as diabetic retinopathy, there are problems associated with detecting very fine neovascularisation, partly due to image resolution and also smaller vessels are more prone to changes in background intensity and there is a reduced contrast-to-noise ratio. To overcome this, non-linear tram-line filters have been used, utilizing the contrast between central lines oriented along the vessel and satellite tram-lines at either side. However, using too long structuring element may have difficulty in fitting into highly tortuous vessels. Matched filters do not operate in isolation, but as part of an algorithmic chain, requiring thresholding into a binary vessel/non-vessel image. [4]

2.3.2 Gabor Filter

Gabor filters [6] have been used extensively by researchers for texture detection, classification and image retrieval purposes. The real part of 2D Gabor filter used in the context of retinal vessel segmentation is defined in the spatial domain g(x, y) as follows

$$g(x,y) = exp\left[-\pi \left(\frac{x_p{}^2}{\sigma_x} + \frac{y_p{}^2}{\sigma_y}\right)\right] cos(2\pi f x_p) \ldots\ldots\ldots\ldots(4)$$

Where

$x_p = x \cos\theta + y \sin\theta$

$y_p = -x \sin\theta + y \cos\theta$

Where

θ=orientation of the filter

f=frequency of pass band

σ_x=standard deviation 0f Gaussian in x direction.

σ_y=standard deviation of Gaussian in y direction.

2.4 Feature Extraction

Many features such as colour, appearance, gist, location and texture can be extracted from superpixels for classification[9]. Here some features are below discussed.

2.4.1 Morphological Processing

The term mathematical morphology is used as a tool for extracting image components that are useful in the representation and description of region shapes such as features, boundaries. Morphological operators apply structuring elements (SE) to images, and are typically applied to binary images but can be extended to gray-level images. The two main morphological operators are dilation and erosion. Dilation expands objects by a defined Structuring Element, filling holes, and connecting the disjoint regions. Erosion shrinks the objects by a Structuring Element.

Morphological processing for identifying specific shapes has the advantage of speed and noise resistance. The main disadvantage of exclusively relying upon morphological methods is that they do not exploit the known vessel cross-sectional shape. In addition the use of an overly long structuring element may cause difficulty in fitting to highly tortuous vessels [3]

2.5. Classification of Retinal Vessel Segmentation

A classification procedure assigns one of the classes (vessel) or (nonvessel) to each candidate pixel when its representation is known. In order to select a suitable classifier, the distribution of the training set data in the feature space was analyzed and it shows that the use of a non linear classifier was necessary.

In this generalized linear model, the signal flows from the input unit to the output unit in a forward direction. This is useful over single layer net in the sense that, it can be used to solve more complicated problems.

The bright pixels in this image indicate higher probability of being vessel pixel. In order to get a vessel binary segmentation, a thresholding structure on the probability map is used to decide whether a particular pixel is part of a vessel or not. Therefore, the classification procedure allots one of the classes C1 or C2 to each candidate pixel, depending on if its associated probability is greater than a threshold.

Some misclassified pixels looked as undesirable noise in the classified image. Moreover, for some vessels, only their boundaries were ordered, so that it was needed to do post processing by using morphological tools to obtain the final desired segmentation. Finally, to optimize the vessel contours, morphological operations have been applied, beginning by area open to eliminate small noisy components.

2.5.1 Generalized Linear Model

Generalized Linear Model is nothing but a Extreme Learning Machine approach.ELM parameters can be analytically determined rather than being tuned. This algorithm provides good generalization performance at very fast learning speed. From function approximation point of view ELM [7] is very different compared to the traditional methods. ELM shows that the hidden node parameters can be completely independent from the

training data.ELM meant for Single Hidden Layer Feed-Forward Neural Networks (SLFNs) will randomly select the input weights and analytically determines the output weights of SLFNs. This algorithm tends to afford the best generalization performance at extremely fast learning speed. The structure of ELM network contains an input layer, hidden layer and an output layer.

Extreme Learning Machine Training Algorithm

The ELM algorithm works as follows:

Given a training set N, activation function g(x) and hidden neuron $\tilde{N}$, Assign random value to the input weight w_i and the bias b_i , i=1,.. $\tilde{N}$. Find the hidden layer output matrix H. Then find the output weight β,using $\hat{\beta}=H^+T$ where β , H and T are defined in the same way they were defined in the SLFN[4].

III EXPERIMENTAL RESULTS

3.1 Feature Extraction

The acquired image is subjected to training and testing.These processes carryout for half of the images.The next step is to perform Gabor transforms with varying Gabor filters to the training image, and the transformed images as features. Gabor filter is used for edge detection.Here first initialize the parameters for gabor transform like the shape of the filter can be varied by altering layer and an output layer.The size of the envelope with 'sigma',the direction of the sinusoid with 'theta' and frequency of the sinusoid with 'F'.
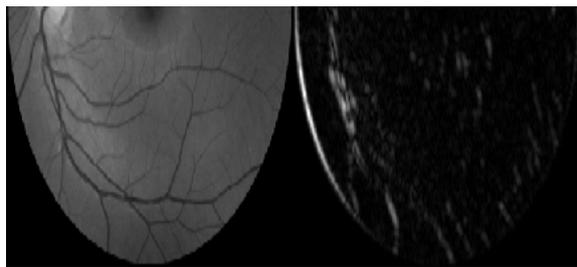
Fig: 3(a) Testing image and Gabor transformed image   (b) Gabor filter F:0.30 t:2.75 k:2
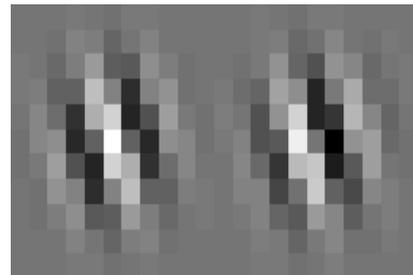
3.2 Fit GLM with features and location of vessels

Now the generation of GLM using the features extracted above and also location of the vessels in the training image carried out.
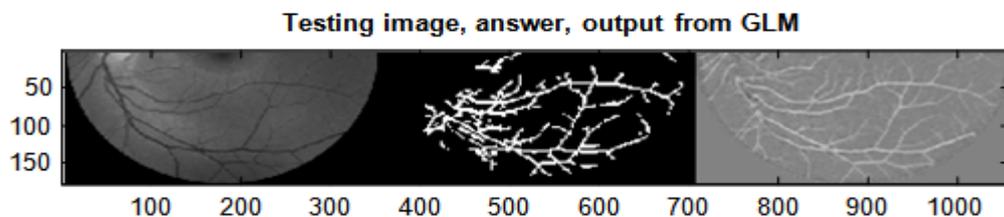
Fig4: a) testing image   b) Gabor output   c) output from GLM

The above figure shows the testing image and the output image can be observed from the generalized learning features

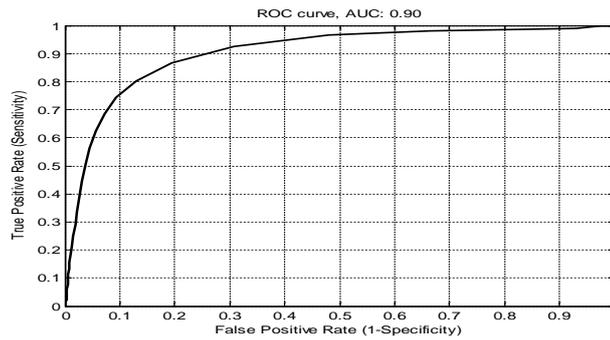### 3.3 Receiver Operating Characteristics

Fig 5: ROC curve

The curve shows the Receiver Operating Characteristics (ROC) curve shows the true positive rate versus false positive rate (equivalently, sensitivity versus 1–specificity) for different thresholds of the classifier output and also shows the Area Under the Curve (AUC).

Sensitivity gives the percentage of pixels correctly classified as vessels and specificity gives the percentage of non-vessels pixels classified as non-vessels.

3.4 Output

The below figure shows the original image ,GLM output and Thresholded output from GLM.
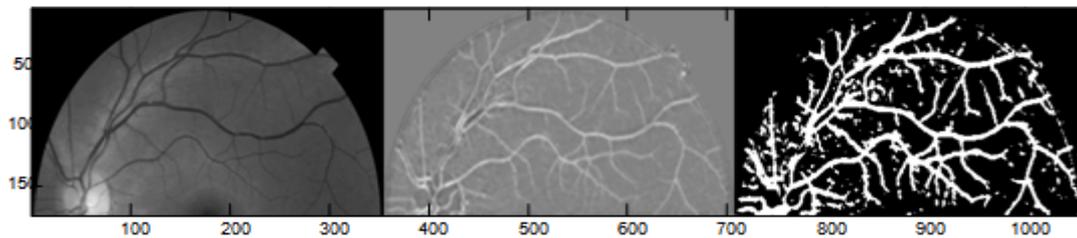
Fig 6:   A) Original Image   B) Output from GLM   C) Thresholded Output from GLM

As you can see from the ROC curve, by training half of the retinal image, the proposed method is able to detect the other half of the image with satisfactory performance (area under the curve of 0.90).

3.5 Tabular column

Method	Sensitivity	Specificity
1.FUZZY[8]	60.42	25
2.ANFIS[8]	60.42	25
3.GENERALIZED LINEAR MODEL(GLM)	60.52	48.88

On observation the values of sensitivity & specificity are improved when compared to the values obtained inFUZZY[8] &ANFIS[8].

Proposed algorithm was evaluated in terms of sensitivity (Se), specificity (Sp).Assume TP and TN show the blood vessel pixels and background pixels which correctly detected, respectively. FP shows the pixels not belonging to a vessel but recognized as blood vessel pixels and FN shows the pixels belonging to a vessel but recognized as background pixels, mistakenly.

$$S_e = \frac{TP}{TP+FN}$$

$$S_e = \frac{TN}{TN+FP}$$

IV CONCLUSION

This method presents a new supervised technique for blood vessel extraction in digital retinal images. This novel approach uses a Generalized Linear Model (GLM) approach for pixel classification. The performance of the proposed approach is evaluated on the DRIVE and STARE databases. It is observed that the proposed approach provides significant.

V ACKNOWLEDGEMENT

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PERFORMANCE IMPROVEMENT IN WIRELESS SENSOR NETWORK BASED TECHNOLOGIES

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ABSTRACT

Wireless Sensor Network (WSN) is type of network which consists of collection of tiny device called sensors nodes. Sensor node has a resource constraint (i.e. battery power, storage and communication capability). In this paper, the review of Wireless Sensor Network based technologies such as WIMAX and ZIGBEE by using PHY layer and MAC layer parameter like energy consumption, battery remaining, number of nodes, throughput, average delay, packet loss percentage and jitter.

Keywords: MAC, PHY, Wimax, WSN, Zigbee

I. INTRODUCTION

A wireless sensor network is a large scale network which consists of tens of thousands of nodes having low memory, low processing power and limited communication capacity. These nodes collect, process and co-operatively pass this collected information to a central location. A wireless sensor network (WSN) consists of sensing devices, processing and communication ability that can provide quantifying and detecting facility to users and gives reaction to particular events and phenomena in sensing field. A sensing device is that which provides information from sensing physical characteristics such as temperature, pressure and sound etc and transmits that data to the base station through radio on time basis or demand basis. A base station is a powerful device having more memory, high processing power and high communication capacity. A sensor network may consist of number of sensor nodes, working in synchronized and coherent manner to fulfill a common task depending on application.[1], [2].

1.1 Zigbee

The term Zigbee is derived from the bees zigzag dance, that enables them to share information, and it is a low cost and low power consumption Wireless Personal Area Network (WPAN) standard, which can be used in many different wireless sensor network applications such as home/building automation, consumer electronics, industrial controls, medical sensor applications, etc. In other words, applications of IEEE 802.15.4 devices are: i) industrial control, ii) environmental and health monitoring, iii) home automation, entertainment and toys, iv) security, location and asset tracking, v) emergency and disaster response.

ZigBee is the name of a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4 standard. The technology is intended to be simpler and cheaper than other WPANs such as Bluetooth. ZigBee protocols are intended for use in embedded applications requiring low data rates and low power consumption. Though WPAN implies a reach of only a few meters, 30 feet in the case

of ZigBee, so designed as to enable intrapersonal communication within the network, connection to a network of higher level and ultimately an uplink to the Web.[8]

The Zigbee Standard has evolved standardized sets of solutions, called **'layers'**. [9] These layers facilitate the features that make Zigbee very attractive such as : low cost, easy implementation, reliable data transfer, short-range operations, very low power consumption and adequate security features. These layers and their respective operation are given below:

   I. Network and Application Support layer*:* The network layer has been designed to allow the network to spatially grow without requiring high power transmitters. The network layer also can handle large amounts of nodes with relatively low latencies. The Application support sub-layer's responsibilities include maintenance of tables that enable matching between two devices and communication among them, and also discovery, the aspect that identifies other devices that operate in the operating space of any device.

   II. Physical layer: The IEEE 802.15.4 physical layer accommodates high levels of integration by using direct sequence to permit simplicity in the analog circuitry and enable cheaper implementations.

   III. Media access control layer: The IEEE 802.15.4 media access control layer permits use of several topologies without introducing complexity and is meant to work with large numbers of devices.[8]

1.2 Wimax

The IEEE 802.16, the Air Interface for Fixed Broadband Wireless Access Systems, also known as the IEEE Wireless MAN air interface, is a suite of standards for fixed, portable and mobile BWA in MAN. These standards are issued by IEEE 802.16 work group that originally covered the wireless local loop (WLL) technologies in the 10.66 GHz radio spectrum, which were then extended through amendment projects to include both licensed and unlicensed spectra from 2 to 11 GHz.

The IEEE 802.16 standard is versatile enough to accommodate time division multiplexing (TDM) or frequency division duplexing (FDD) deployments and also allows for both full and half-duplex terminals. WiMAX uses microwave radio technology to connect computers to the Internet. WiMAX works like cell phone technology in that reasonable proximity to a base station is required to establish a data link to the Internet. Users within 3 to 5 miles of the base station will be able to establish a link using non line- of-sight (NLOS) technology with data rates as high as 75Mbps. Users up to 30 miles away from the base station with an antenna mounted for line-of-sight (LOS) to the base station will be able to connect at data rates approaching 280Mbps [11].

1.2.1. Applications of WIMAX

WIMAX allows people to go from their homes to their cars, and then travel to their offices or anywhere in the world, all seamlessly. [10] WIMAX can serve the business, residential and mobile segments. The applications in these areas are listed below:

   i. Residential users

•Basic voice services, low cost domestic & international calls

•Basic (dialup speed) to advanced (over 1Mbps) data connections

•Bundled voice and data services

   ii. Business users

• Basic data connectivity for small businesses

• Advanced data services to medium and large businesses

• Feature-rich, low cost voice services (VoIP)

   iii.   Mobile users (mobile WIMAX only)

• Data connectivity for mobile workforce

• Data connectivity for international visitors

II. LITERATURE SURVEY

IEEE 802.15.4 was developed to work in all-wireless environment supporting either peer-to-peer or star network topology. The performance based on commonly known metrics such as throughput, packet delivery ratio, and average delay. The 802.15.4 standard defines physical (PHY) and medium access control (MAC) layer protocols for supporting relatively simple sensor devices that consume minimal power and operate in an area of 10m or less. The point of service (POS) may be extended beyond 10m but this requires additional energy to operate.
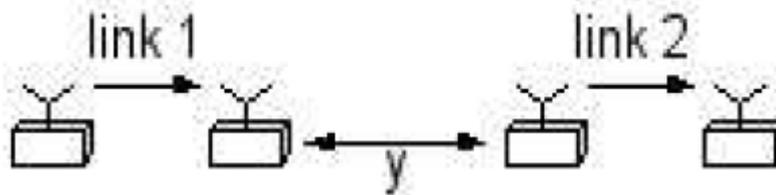

Fig 1: Topology Setting for Investigating the Impact of Packet Collision[3]

In the figure.1, for the inter-node distance y three possibilities can arise which are as follows:

(1) contention free and collision free region,

(2) collision and contention free region, and

(3) contention and collision region.

 The region is meant to investigate the effect of collisions due to `hidden node'which is a source of performance degradation in high rate traffic scenario. Two traffic loads of 50 kbps are established on link 1 and link 2. There is high throughput utilization for low application traffics, i.e. 10 and 20 kbps in the case of End-To-End Throughput vs Optimum traffic load. However in case of End-to-End Packet Delivery Ratio vs optimum traffic loads, the traffic load increases the performance slumps, delivering less than 50% for traffics beyond 70 kbps. The effect of varying number of hops and traffic loads on throughput gives the maximum throughput recorded for interference free (and error free) traffic which is about 40 kbps.[3]. Another problem faced in Wireless sensor networks is that power and/or energy is often limited. Various parameters of physical layer are tuned depending on applications. The equation is:

$$Eb = \frac{1}{(1-pb)^{L+a}}[SNRr\gamma(ud^2-1)+\beta]\frac{L+a}{RL} \tag{1}$$

Where, Eb = Average energy consumption per bit

$$\mu = \sqrt{\frac{4\pi}{\lambda Gt Gr}}.(1+n)$$

γ = PN. FN

PN = noise power

SNRr = signal-noise power ratio at the receiver

FN = noise figure

L = size of payload

a = size of header

GT/ R = transmit/receive antenna gain

R = Data rate

d=transmitting distance

β = Po,TX . Po,RX

Po, TX =transmit overhead power, is the power consumed by all the transmit chain circuitry except for the amplifier

Po,RX = receive overhead power, is the power consumed by all the receive chain circuitry

The foremost characteristics of IEEE 802.15.4 are minor power, minor bit rate and short range and ZIGBEE is better suited and has long battery life. A model for physical layer and is proposed [4] that automatically optimizes transmission power, throughput and latency and proposed that increased battery lifetime depends upon bit rate, payload size and distance. After that a system using Wimax gateway that is proposed [5] for wireless sensor networks to communicate and share information conveniently as WIMAX has good coverage and capacity it can easily access sensor nodes that are scattered or remotely deployed. Sensor networks may work on different protocols like ZIGBEE, Bluetooth so it calls for different gateways to access network. With WIMAX gateway sensor nodes can exchange information with ease. The connectivity and delay of system shows that the nodes are well connected with acceptable delay. WIMAX and UMTS networks are compared in [6], using three algorithms with the main focus on mobility and Quality Of Service (QOS). The QOS parameters tested are off rate, delays, jitter and Packet Loss Ratio. Result shows that performance of WIMAX is superior to UMTS. The speed of UMTS is estimated to be 90-100 km/h and WIMAX is up 130-150 km/h. WIMAX can enable both mobile and broadband services. Further, a dynamic uplink weight scheduling approach has been proposed for WIMAX networks [7] and the performance of the proposed algorithm is compared with Weighted Round Robin (WRR) algorithm and Modified Deficit Round Robin (MDRR) algorithm is presented by using OPNET simulator which shows that the proposed algorithm outperforms in terms of parameter such as throughput, delay, jitter and load as functions of the number of subscriber stations. The Variably Weighted Round Robin (VWRR) algorithm and WRRs can be used with channel-aware algorithms. An overview of application, range, frequency range, data rate, topology and attributes of Wi-Fi, Zigbee and Wimax are discussed [8].

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LOSSLESS LINEAR PREDICTIVE CODING FOR SPEECH SIGNALS

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ABSTRACT

Speech coding techniques have been used effectively to represent the speech signals at reduced bit rates. Linear predictive coding (LPC) has been the most effective technique in the past for representing the speech while preserving the intelligibility and the quality of reconstructed speech. The proposed algorithm uses voice- excited linear predictive model to accomplish the task. This technique provides better accuracy and preserves high quality of speech signals. The technique has been tested on male and female speech signals. The trade-offs between bit rates, signal to noise ratio and computational complexity were analysed. It results in a low bit rate and a better signal to noise ratio.

Keywords- Autocorrelation, Discrete Cosine Transforms, Linear Predictive Coding,Mean Square Error, Power Signal To Noise Ratio, Bit Rate.

I. INTRODUCTION

Digital transmission is used to provide more flexibility, reliability and cost effectiveness and in addition, it provides more privacy and security. Due to these reasons, there is a continuous need of digital transmission today in many applications. Since, the applications like satellite, radio and storage media like silicon memory, CD ROMs etc.is band limited, it is essential to reduce the number of bits of the transmitted signal.

Speech coding is still a major issue in the area of digital speech processing in which the speech signal is analysed in order to obtain its important parameters and to compress it in order to make maximum use of available bandwidth. But compression of speech signals should be such that it does not harm the intelligibility and quality of transmitted speech signals. Speech coding is conducted by employing vocoders or voice coders which are of three types: waveform coders, source coders and hybrid coders. Waveform coders operate at high bit rates which lead to very good quality speech. Source coders operate at very low bit rates and reconstructed speech is 'robotic' sounding. Hybrid coders use elements of both waveform and source codersand produces good reconstructed speech at average bit rates. [1]

The speech coding here is accomplished by employing a modified version LPC-10. It is a type of hybrid vocoder. The speech coder developed is analysed using subjective and objective analysis. Subjective analysis includes listening of encoded speech and making the judgement of its quality which will depend on the opinion of the listener. Objective analysis includes computation of power signal to noise ratio between original and encoded speech signals which will be included within the summary of results. [2]

II. TECHNICAL APPROACH

In this section, speech coding using LPC technique is explained.

2.1 LPC Model Implementation

The principle behind LPC is to minimize the sum of squared difference between original and reconstructed speech signal over a finite duration.It does not produces thereplica of an input signal at the output, instead an appropriate set of Source Parameters is generated to characterize the input Signal as close as possible for a given finite period of time.[3] The process involved in LPC is explained by following subsections using Fig.1:
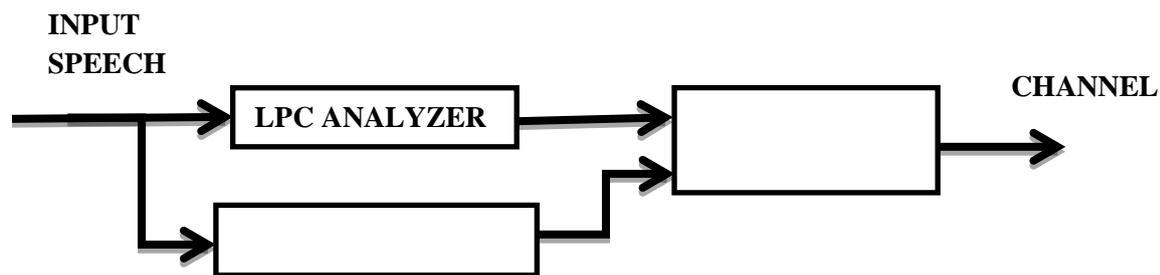

Fig.1 Block Diagram of LPC Vocoder

2.1.1 Sampling

Thespeech signal is sampled at an appropriate frequency to capture all the necessary frequency components needed for speech processing and recognition. 10 kHz is typically the sampling frequency as most of the speech energy is included in frequencies below 4kHz (but some women and children violate from this fact).

2.1.2 Segmentation

Properties of speech signal change with time. Thus, to process effectively, it is necessary to work frame by frame for which speech is segmented into blocks. The length of the blocks in LPC analysis is between 10ms and 30 ms as within this small interval, the speech signal remains roughly constant.

2.1.3 Pre- emphasis

The spectral envelope of speech signal has high frequency roll off due to radiations of sound from lips and these high frequency components have low amplitude that increases the dynamic range of speech spectrum.
The speech signal is processed using time- varying digital filter, defined by equation(1).

$$H(z) = 1 - \alpha z^{-1} \quad (1)$$

The filter described in (1) is a pre-emphasis filter which is used to boost the high frequencies in order to flatten the spectrum. Denoting x[n] as input to filter and y[n] as output, the difference equation (2) is applied.

$$Y[n] = x[n] - \alpha x[n] \qquad\qquad (2)$$

Value of α is near 0.9. To maintain same spectral shape for synthetic speech, it is filtered by de-emphasis filter, defined by equation (3), whose system function is the inverse of pre-emphasis filter.

$$G\ (z)\ =\ 1/\ (1-\alpha z^{-1}) \tag{3}$$

2.1.4 Voice Detector

The purpose of voicing detector is to determine which frame is voiced or unvoiced. Voice detector is one of the most critical components of LPC coder as misclassification of voicing will result in disastrous consequences on the quality of synthetic speech. A simple voicing detector can be implemented by employing 'Zero Crossing Rate (ZCR)' technique in which if rate is lower than a certain threshold then the frame is considered out to be voiced else unvoiced. ZCR of frame ending at time instant, m is given by equation (4).

$$ZCR(m)\ =\ \frac{1}{2\sum_{n=m-N+1}^{m}|sgn\ (y[n])-sgn\ (y[n-1])|} \tag{4}$$

where, sgn (.) is the sign function returning ±1 depending on the operand.

2.1.5 Pitch estimation

Pitch or fundamental frequency is one of the most important parameters of speech analysis. Here, autocorrelation function is employed to estimate correct pitch period for voiced or unvoiced frames. If frame is unvoiced then white noise is used with pitch period, T=0 and if frame is voiced, impulse train with finite pitch period, T becomes the excitation of LPC filter as represented by Fig.2.
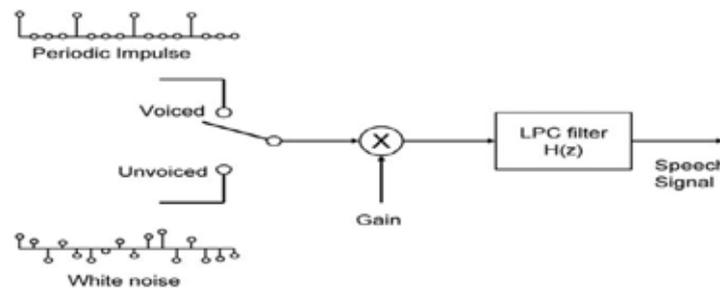

Fig.2 Mathematical Model of Speech Production

2.1.6 Coefficient determination

The prediction coefficients which can be estimated by minimizing the mean square error between the reconstructed and the original speech signal using equations (1) and (2). For efficient estimation, Levinson-Durbin Recursion algorithm is employed.

2.1.7 Gain Calculation

For unvoiced case, prediction error is given by equation (5).

$$p\ =\ 1/N\sum_{n=0}^{N-1}e^2[n] \tag{5}$$

where, N as the length of frame

For voiced case, prediction error is given by equation (6).

$$p\ =\ 1/[N/T]\ T\sum_{n=0}^{[N/T]T-1}e^2\ [n] \tag{6}$$

And N is assumed to be N > T.

For unvoiced case, gain (G) is given by equation (7).

$$G = \sqrt{p} \quad (7)$$

For voiced case, the impulse train power having amplitude of G and pitch period, T and interval of [N/T] T must be equal to p.

2.1.8 Quantization

Quantization of the intermediate values is carried out instead of direct quantization of coefficients. These intermediate values are called line spectral frequencies (LSFs). This ensures high accuracy and stability of coefficients.

2.2 Voice- excited LPC vocoder

To improve the quality of sound, voice-excited LPC vocoder is employed. Fig.3 represents the block diagram of voice-excited LPC vocoder. [4] Its main difference to plain LPC is use of excitation detector instead of pitch detector in plain LPC.

The main purpose behind voice-excited LPC is to avoid the detection of pitch and use of impulse train for synthesizing the speech. Instead, it is better to estimate the excitation signal. As a result, input signal is filtered with the estimated system function of LPC analyser. The filtered signal thus obtained is called residual signal which when transmitted to the receiver will result in good quality. Also, high compression rates can be achieved by computing discrete cosine transform (DCT) of residual signal in which the most of the energy is contained in first few coefficients.
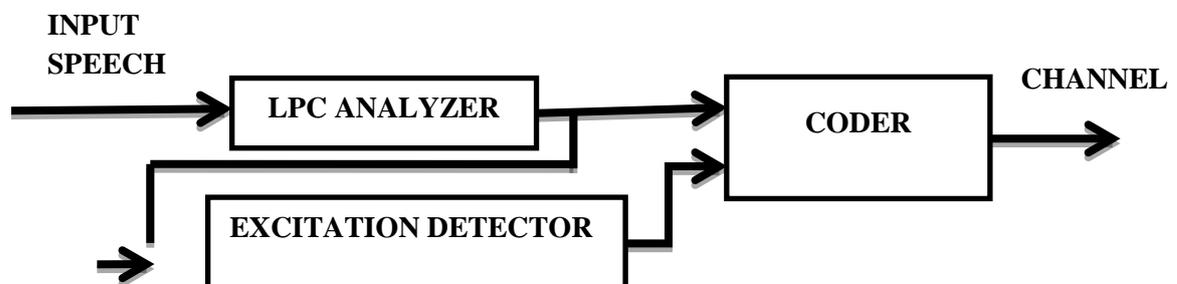

Fig.3 Voice-Excited LPC Vocoder

III. MEAN SQUARE ERROR

The difference between the original and reconstructed speech signal is called error signal, denoted by 'err' and mean square error is computed by taking average of squares of sample values of err. MSE should be as low as possible and is given by equation (8).

$$MSE = \{\sum err^2\} \quad (8)$$

IV. PERFORMANCE ANALYSIS

The original speech signal is compared with the plain LPC and voice-excited LPC reconstructed speech signal. In both the cases, the reconstructed speech signal has lower quality than original speech signal. The plain LPC reconstructed speech signal has low pitch and sound seems to be whispered. But, the reconstructed speech signal of voice-excited LPC appears to be more spoken; less whispered and appears closer to original speech signal.

4.1 Power Signal to Noise Ratio

It is given by equation (9).

$$PSNR \ = \ 10\log_{10}\{[\max(A)]/MSE\} \tag{9}$$

where, A is the number of samples of original speech signal. It is found that PSNR of plain LPC is negative i.e. it is more noisy and noise is much stronger than the original signal but for voice-excited LPC, PSNR is positive i.e. it is better but still does not sounds exactly like original speech signal.
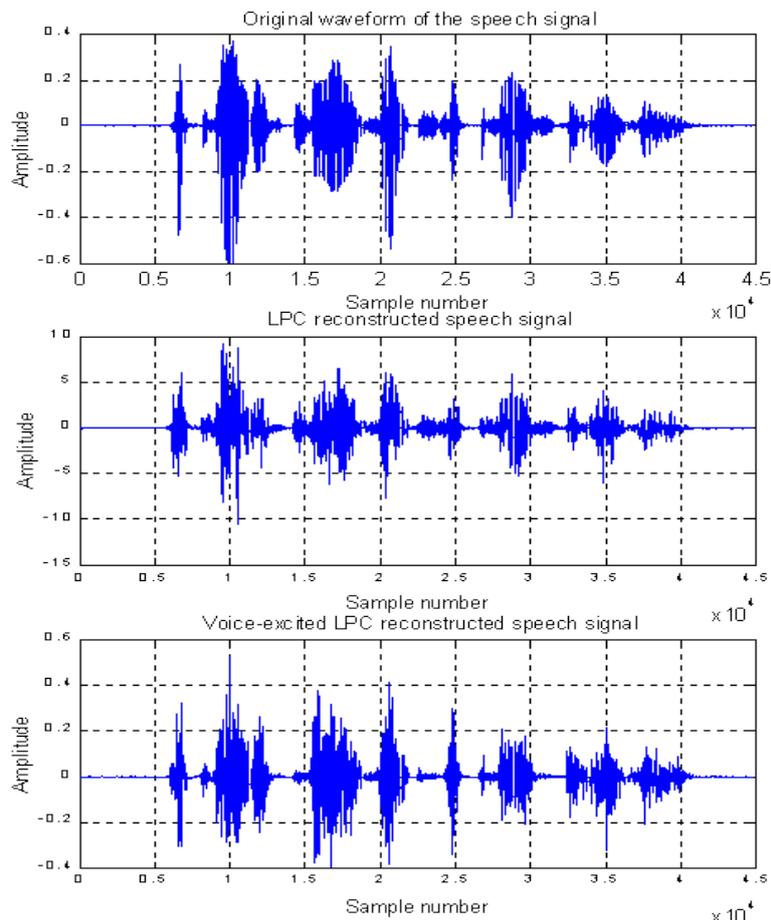

Fig.4 Waveforms of the sentence "A pot of tea helps to pass the evening" (a) original speech signal, (b) plain LPC reconstructed speech signal and (c) voice-excited LPC reconstructed speech signal

4.2 Bit Rates

Bit rates in both the cases are low i.e. below 16 kbps. But voice-excited LPC needs twice the bandwidth needed in plain LPC. This bandwidth increase results in better sound but still not perfect.

4.3 Computational Complexity

In voice-excited LPC, autocorrelation employed in Plain LPC is omitted and instead DCT and its inverse are employed. But the total number of operations per frame are more in voice-excited than that of Plain LPC. Thus, the improved quality needs higher number of FLOPS (Floating-point Operations per Second). [5]

V. CONCLUSION

Speech compression has been carried out using two LPC techniques: Plain LPC and Voice-excited LPC. It has been found that the results achieved from Voice-excited LPC are intelligible whereas from Plain LPC, the results are poor and barely intelligible. But the improved quality of compressed speech signal through Voice-excited LPC requires more number of bits per sample that leads to increase in bandwidth of the signal. At the same time, SNR for both the techniques were computed and compared and it has been found that sounddue to Plain LPC has negative SNR that results in noisy and whispered sound. On the other hand, Voice-excited LPC has far better sound and positive SNR.Since, the voice-excited LPC gives pretty good results with all the required limitations, and we can try to improve it. A major improvement can be the compression of the errors. If we send them in a loss-less manner to the synthesizer, the reconstruction would be perfect. An idea to this can be the use of Huffman code for the DCT.

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NFS AND SSH

From a Linux Cluster Point of View

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ABSTRACT

Network File System (NFS) developed in 1984 is a distributed file system allowing a user on a client to access files over a network as it would have done in case of its local memory. Secure Shell (SSH) is a cryptographic network protocol for securing data communication. It establishes a secure channel over an insecure network in a client-server architecture, connecting an SSH client application with a SSH server. Common applications include remote command-line login, remote command execution.NFS and SSH play a key role in the setting up of a Linux cluster. The cluster can also be set up using NIS server and creating the same user on every node. Here we use demonstrate and analyse the NFS and SSH in order to set up a Linux cluster on Ubuntu (14.04 LTS).

Index Terms: Client server architecture, NFS, Linux cluster, SSH.

I INTRODUCTION

Setting up a Linux cluster follows a typical client server architecture with server containing the required shared files using NFS. MPI (Message Passing Interface) provides a mechanism through which user level processes communicate with each other. Now communication involves invoking the right process securely. For authentication SSH is used. SSH involves a typical public and private key authentication. Thus for communicating with n nodes 2n keys are required. SSH generates keys as an ordered pair of public and private key. Considering this ordered pair as a key we require n keys.

NFS is both a specification and implementation of a software system for accessing remote files across LANs (or even WANs). NFS is an example of client-server network file system[1]. SSH is a cryptographic network protocol for securing data communication. It establishes a secure channel over an insecure network in a client-server architecture, connecting an SSH client application with a SSH server. Common applications include remote command-line login, remote command execution, but any network service can be secured with SSH.

II CLIENT-SERVER ARCHITECTURE

In this architectural model a subsystem, the server, provides services to other subsystems called the clients, which are responsible for interacting with the clients. In case of a cluster the request for a service is usually done via a remote

procedure call mechanism. The control flow in the clients and the server is independent except for the synchronization to manage requests or receive calls.
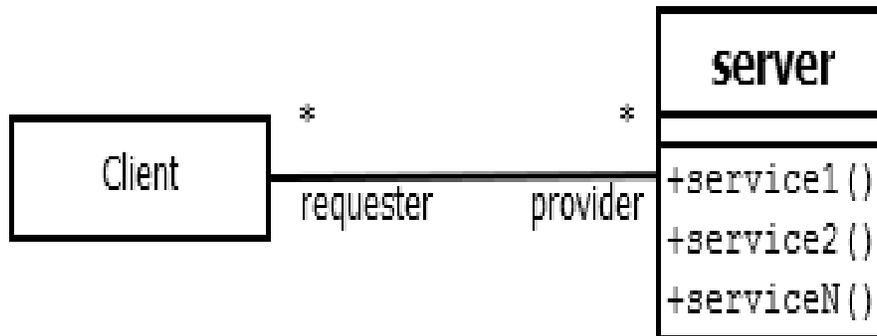

Fig 1. Client/Server architectural style

The client server architectural style is a specialization of repository in which the central server is managed by a process. It is possible that in this architecture that there are multiple servers serving multiple clients and multiple clients requesting from multiple servers [2].

III NFS (NETWORK FILE SYSTEM)

NFS views a set of interconnected workstations as a set of independent machines each having its own set of independent file systems. The main aim of NFS is to allow some degree of sharing among these file systems. Sharing is permitted between any two machines and this affects only the client machine and no other machines. In a typical cluster there exists one server on which a directory is shared between all the workstations. Then from any workstation the required program can be executed just by specifying the number of processors available.

The NFS specification distinguishes between the services provided by a mount mechanism and the remote-file access service. Thus there are two protocols: mount protocol and NFS protocol.

3.1. The Mount Protocol

The mount protocol initially establishes the initial logical connection between a server and a client. Here a server process is present on each machine outside the kernel performing the protocol functions. This includes the name of the remote directory and the name of the server storing it. The server maintains an export file that specifies the local file system that it exports for mounting. In Ubuntu this file is fstab located in /etc/fstab. These can be edited only with root access. Using this file static mounting preconfiguration is established at the boot time.

3.2. The NFS Protocol

This protocol contains a set of RPCs for remote file operations which include:
    1. Searching for a file within a directory.

2. Reading a set of directory entries.

3. Manipulating links and directories.

4. Accessing file attributes.

5. Reading and writing of files.

Some other features are:

1. Stateless servers.

2. File operations must be idempotent.

3. Server crash invisible to client

4. Performance upgrades by using disk cache of each processor.

However maintaining a list of clients does violate the statelessness of a server. But this list is not essential for correct operation of the client or the server. Thus it need not be restored after as server crash. It might also contain inconsistent data. Thus it is treated only as a hint.

3.3. Remote operations

There exists a one-to-one correspondence between regular UNIX system calls for file operations and the NFS protocol RPCs. Thus a remote file operation can be translated directly to the corresponding RPC. No direct correspondence exists between a remote operation and an RPC. Instead file blocks and file attributes are cached locally. These form the two caches. When a file is opened, the kernel checks with the remote server to determine whether to fetch or revalidate the cached attributes. By default cached attributes are discarded after 60 seconds.

3.4. Implementation in the Operating System

NFS is integrated into the OS using VFS (Virtual File System). The following illustrates a typical operation on an already open remote file is handled: The client initiates the system call with a regular system call. The OS maps this to a VFS operation on the appropriate node. The VFS identifies file to be on a remote node and invokes appropriate NFS procedure. An RPC call on the VFS of the remote system finds it to be local and invokes the appropriate file operation [2].

3.5. Setting up a NFS server and client.

Step 1: Install NFS

    Server   : sudo apt-get install nfs-server

    Client   : sudo apt-get install nfs-client

Step 2: Sharing master folder

    Server   : sudo mkdir/share

where, share = Name of the shared folder.

Then share the contents of this folder located on the server node to all the other nodes. In order to this we edit the /etc/exports file on the master node to contain the additional line

*/share *(rw,sync)*

Then the nfs service is restarted on the master node to parse the configuration once again using the command:

    sudo service nfs-kernel-server restart

Step 3: Mounting master in nodes

In /etc/fstab/ of all the clients we write:

    master:/share   share   nfs

        where,

            master   = Name of the master node

            share   = Name of the shared file

The above steps are sufficient for NFS to be set up on client server architecture. But in case of setting up a cluster, a user must be created on all machines having the same name and same user id, and then on each machine the ownership of the 'share' file is given to the user created above. [3]
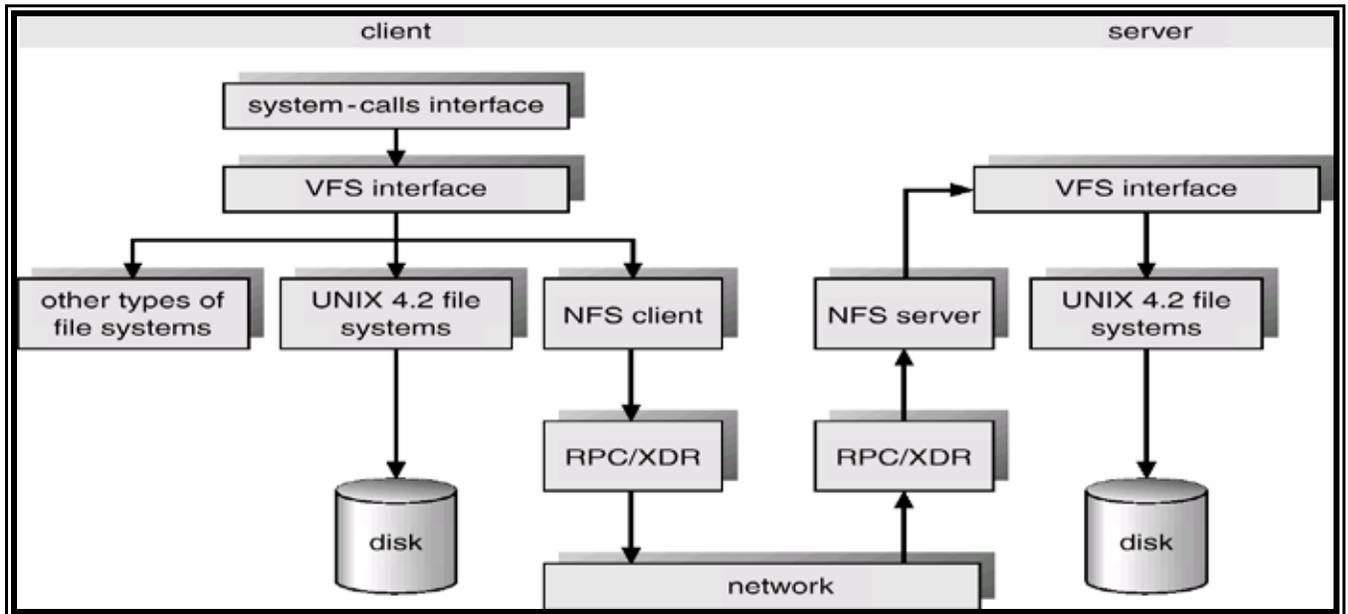

Fig 2. Schematic view of NFS architecture

IV OPEN SSH

OpenSSH is a suite of network-level security tools based on the SSH protocol which help to secure network communications via the encryption of network traffic over multiple authentication methods and by providing secure

tunneling capabilities.Secure Shell (SSH) is a cryptographic network protocol for securing data communication. It establishes a secure channel over an insecure network in a client-server architecture, connecting an SSH client application with an SSH server. Common applications include remote command-line login, remote command execution, but any network service can be secured with SSH.

Now from the cluster point of view: Setting up a cluster involves first creating a shared directory through which the files can be shared, then for process to process delivery OpenMPI. OpenMPI requires password less SSH to be implemented. The main purpose of implementing password-less SSH is to permit remote login. A remote node A can login virtually from to another node B and vice versa. Here we explain the mechanism through which we implemented the password-less SSH.

4.1. Installing OpenSSH

While doing this make sure that the OpenSSH server is installed only on the server. Here we have a user shared among all the nodes connected in a cluster. For our ease we have used static IP addresses. The command below is executed on the server after logging on the shared user from the server.

  Server : sudo apt-get install openssh-server

4.2. Generating Key and fingerprints

Once the OpenSSH server is installed then, the next step is to generate the key that will be used for authentication. The following command is used for generating the key. Here we generate an RSA key pair. The command creates one private and one public key.

  Server : ssh-keygen -t rsa

Now we add this key to authorized keys. In order to do this we use the following commands:

  Server : cd .ssh

  Server :.ssh$ cat id_pub.rsa >> authorized_keys

4.3. Testing SSH run

In order to test SSH run use the following command. First run the command at the server and then at the client.

  Server : ssh client-name host-name

  where

     client-name is the name of the client machine

     host-name is the name of the host

Here while first executing the above command we were prompted whether to set up a fingerprint and add the client permanently to the list of authorized users for the server. Here we answered yes. After successful creation of fingerprint the client is added to the list of authorized user for the server.

The above process has to be repeated for all the client machines that you want to connect to the server. Thus for 'n' clients there are 'n' distinct fingerprints.

4.4. Try remote logging in

Now try the following command from server/client

    Server   : ssh client-name

    Client   : ssh host-name

In both of the cases, remote login works.

4.5. Fingerprinting

Here we explain some part of fingerprinting needed for the above procedure. Fingerprinting is basically creation of a fingerprint for the client that can be used for authentication by the client. Fingerprint is basically a hash value created at the server side and transmitted by the server to the client. Now we have generated an RSA key pair at the server side, now we hash this value on the basis of session and various other parameters and this is then sent and stored at the client side. In order to check the fingerprint created for a client the following command is used.

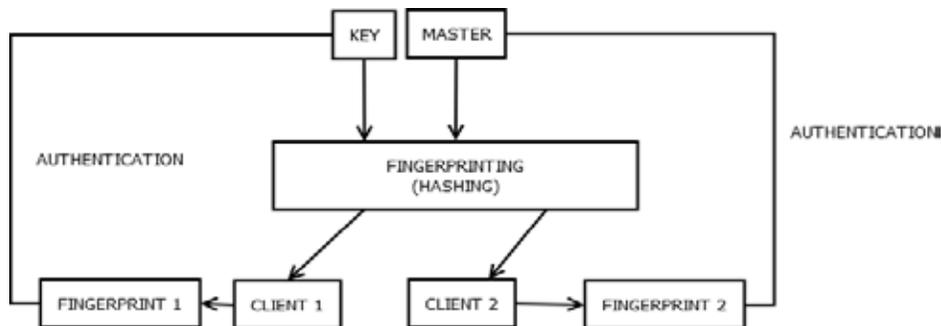   Client   : ssh-keygen –l –f/etc/ssh/ssh_host_rsa_key

Fig 3. Fingerprinting for authentication

V CONCLUSION

The basics needed for setting up the cluster are studied and implemented in Ubuntu 14.04LTS. The flow of data from a cluster can be seen as master to process, then process to process delivery which uses OpenMPI and authentication using password-less SSH. Then the data is processed at the client and then client sends the data back to the server in a similar fashion. From NFS point of view, NFS is integrated in the operating system using the VFS. Each and every operation on a shared file is mapped using the VFS layer to the appropriate vnode.

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