IMAGE DISEASE DETECTION IN AGRICULTURE USING CLOUD COMPUTING.

Dissertation submitted in fulfilment of the requirements for the Degree of

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in

INFORMATION TECHNOLOGY

By

CHANDANDEEP KAUR

11501517

Supervisor

MR. MOHIT ARORA

School of Computer Science and Engineering

Lovely Professional University

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Supervisor Name : Mohit Arora **UID :** 15980 **Designation :** Assistant Professor

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SR.NO.	NAME OF STUDENT	REGISTRATION NO	BATCH	SECTION	CONTACT NUMBER
1	Chandandeep Kaur	11501517	2015	K1520	9646570361

SPECIALIZATION AREA : Software Engineering **Supervisor Signature:** _____

PROPOSED TOPIC : Cloud computing in Agriculture Development

Qualitative Assessment of Proposed Topic by PAC		
Sr.No.	**Parameter**	**Rating (out of 10)**
1	Project Novelty: Potential of the project to create new knowledge	6.80
2	Project Feasibility: Project can be timely carried out in-house with low-cost and available resources in the University by the students.	6.80
3	Project Academic Inputs: Project topic is relevant and makes extensive use of academic inputs in UG program and serves as a culminating effort for core study area of the degree program.	7.40
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ABSTRACT

In India national source of income comes from the agriculture sectors. But still there are some rural areas which follow traditional procedures that results in less productivity and speed of modernization agriculture is slow. These traditional procedures are followed by farmers which results in a gap between supply and demand chains of agriculture products. In current situation there is huge loss in agriculture departments due to pest infestation in crops. This is a negative impact to farmers benefit as well as national income of the country. So there is need to implementing technologies to improve the modernization in agriculture sectors. A cloud computing is technology which is based on Internet-computing where different computing resources are provided to an organization through the internet. The cloud computing technology has good impact in agriculture department to improve the growth of production. Cloud services deliver the software, infrastructure and storage via internet based on user demand. It provides various techniques to detect the pests in crops. Cloud computing provide the smart way to farming which helps to improve the level of information and increase the productivity of crops. Using smart way of farming it is easy to detect the diseases in crops.

DECLARATION BY SCHOLAR

I hereby declare that the research work reported in the dissertation entitled " IMAGE DISEASE DETECTION IN AGRICULTURE USING CLOUD COMPUTING" in partial fulfilment of the requirement for the award of Degree for Master of Technology in Information Technology at Lovely Professional University, Phagwara, Punjab is an authentic work carried out under supervision of my research supervisor Mr. Mohit Arora. I have not submitted this work elsewhere for any degree or diploma.

I understand that the work presented herewith is in direct compliance with Lovely Professional University's Policy on plagiarism, intellectual property rights, and highest standards of moral and ethical conduct. Therefore, to the best of my knowledge, the content of this dissertation represents authentic and honest research effort conducted, in its entirety, by me. I am fully responsible for the contents of my dissertation work.

Signature of Candidate

Chandandeep Kaur

11501517

SUPERVISOR'S CERTIFICATE

This is to certify that the work reported in the M.Tech Dissertation entitled "**IMAGE DISEASE DETECTION IN AGRICULTURE USING CLOUD COMPUTING**", submitted by **Chandandeep Kaur** at **Lovely Professional University, Phagwara, India** is a bonafide record of her original work carried out under my supervision. This work has not been submitted elsewhere for any other degree.

Signature of Supervisor

Mr. Mohit Arora

Date:

Counter Signed by:

1) **Concerned HOD:**
   HoD's Signature: _____

   HoD Name: _____

   Date: _____
2) **Neutral Examiners:**

   External Examiner

   Signature: _____

   Name: _____

   Affiliation: _____

   Date: _____

   Internal Examiner

   Signature: _____

   Name: _____

   Date: _____

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I am grateful to **Mr. Dalwinder Singh,** head of the department, computer science and engineering for providing me the necessary opportunities for working on thesis. I also thank the other faculty and staff members of my department for their invaluable help and guidance.

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CHAPTER 1

INTRODUCTION

1.1 Introduction to Cloud Computing

Cloud computing is internet based computing where the shared resources, data and information are provided to computer on demand. Cloud computing mean storing, accessing the data and information over the internet instead of personal computer's hard drives. The cloud computing is started in the late 1980s with the concept of grid computing when large number of systems were applied to single problem usually scientific in nature. Grid computing is bit different than cloud computing. The grid computing refers to several computers in parallel to solve the particular problem or to run the specific application. In cloud environment computing and extends IT and business such as server, storage, network, application can be dynamically shaped out from the underlying hardware infrastructure. In 1990s the concept of virtualization is introduced. It uses the virtual severs to higher level of abstraction including storage and network resources. In cloud environment computing and extended IT and business resources such as service , storage, network, application and processes can be dynamically shaped or craved out from underlying hardware infrastructure and made available to a workload. The concept of cloud computing has evolved from the concept of grid, utility and software as service. It is an emerging model through which users can gain access to their applications from anywhere at any time through connected devices. Companies can choose to share these resources using public and private depending on their specific needs. A number of companies including Google, Amazon, IBM, and Microsoft have built enormous datacenter based computing capacity all over the world to support their web service offerings. In cloud environment computing and extended IT and business resources such as service , storage, network, application and processes can be dynamically shaped or craved out from underlying hardware infrastructure and made available to a workload. In cloud environment computing and extended IT and business resources such as service ,

storage, network, application and processes can be dynamically shaped or craved out from underlying hardware infrastructure and made available to a workload.[1] It is an emerging model through which users can gain access to their applications from anywhere at any time through connected devices. The architecture of cloud computing is described in following figure.

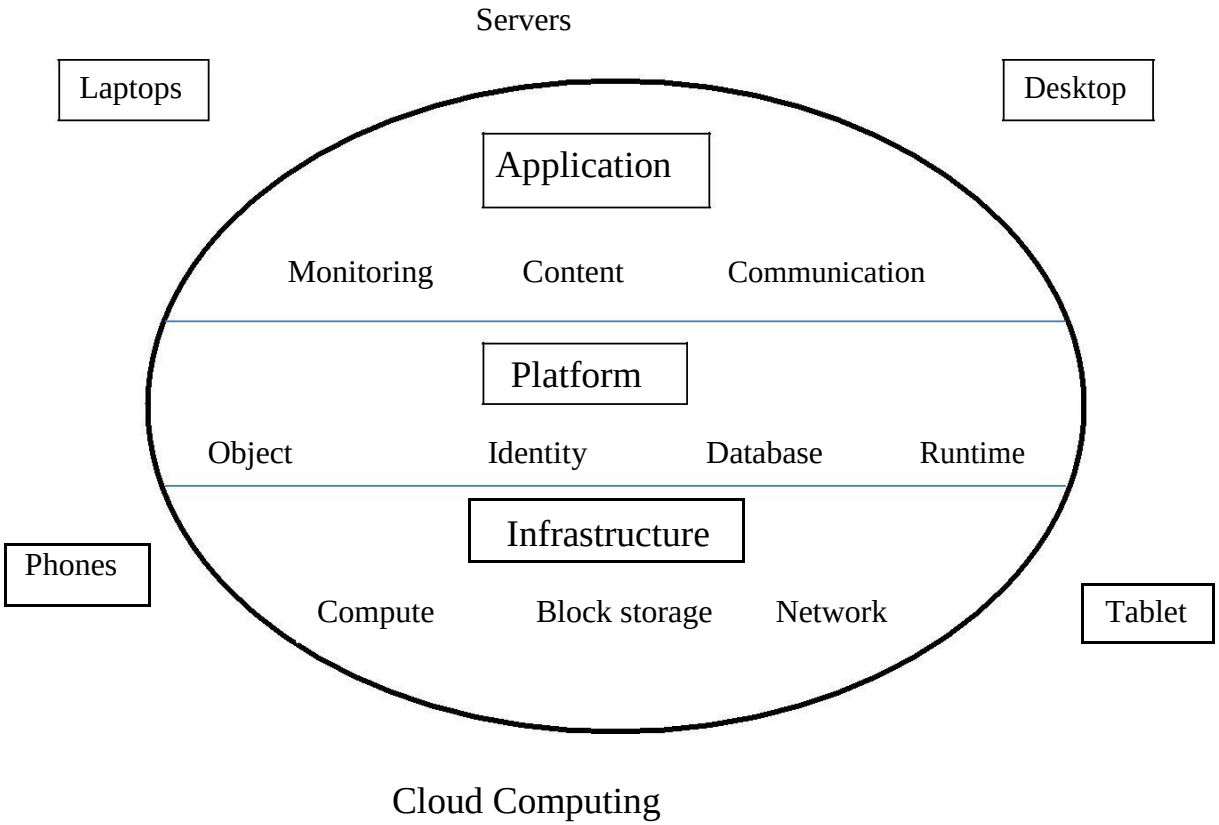

Figure 1.1 Cloud Computing

1.2 Characteristics of Cloud Computing

- **On Demand Capabilities**

  By using cloud computing user can access the services and also can change the cloud services. Customer can add or delete the more users.

- **Resource Pooling**

  This is helpful for multiple business offices. Physical and virtual system is dynamically allocated as needed. The concepts of pooling mean hiding the location of resources like virtual machine, virtual memory.

- **Broad Network Access**

  It includes private cloud that operates within company's firewall. The cloud is available over the internet using specific methods which provides the independent access to many kinds of clients. All registered clients can access these services. They can use smartphones, laptops, and tablets.

- **Rapid Elasticity**

  For immediate business needs cloud is flexible and scalable. User can add or delete software features and other resources. The system can add resources and also can cut the resources.

- **Measured Services**

  Client is charged on the basis of services which are used by client. For example client use how much of network storage, number of transactions.

- **Lower Costs**

  With the use of shared resources and shared network it reduces the cost of the system.

- **Reliability**

  The cloud provides load balancing and failover services which makes reliable system to client.

- **Green Technology**

  Cloud computing is green technology because it allow to useshared resources among customer. This technology minimizes the number of data centers and reduces pollution.

- **Virtualization**

  The cloud computing gives the concept of virtualization which provides virtual machine, virtual memory, virtual network.

1.3 Services of Cloud Computing

- **Software as Services**

  It provides all the functions through web browser. Software as service is an operating environment with effective user interface and management. User can use the software through web browser by using internet facility. All software

versions are same which makes it more compatible. The distribution and maintenance cost can be reduced by using this service. Example: - yahoo, google, skype.

- **Platform as Services**

  In platform as services user can deploy its own application. It provides the platform to develop the application. The user can interacts with application. It also provides the deployment framework, virtual machines and operating system. In this the service provider manages the cloud infrastructure

- **Infrastructure as Services**

  Infrastructure as services provide shared resources to contracted client. It provides virtual infrastructure like machines, storage, infrastructure and other hardware as resources.

1.4 Deployment Models of Cloud Computing

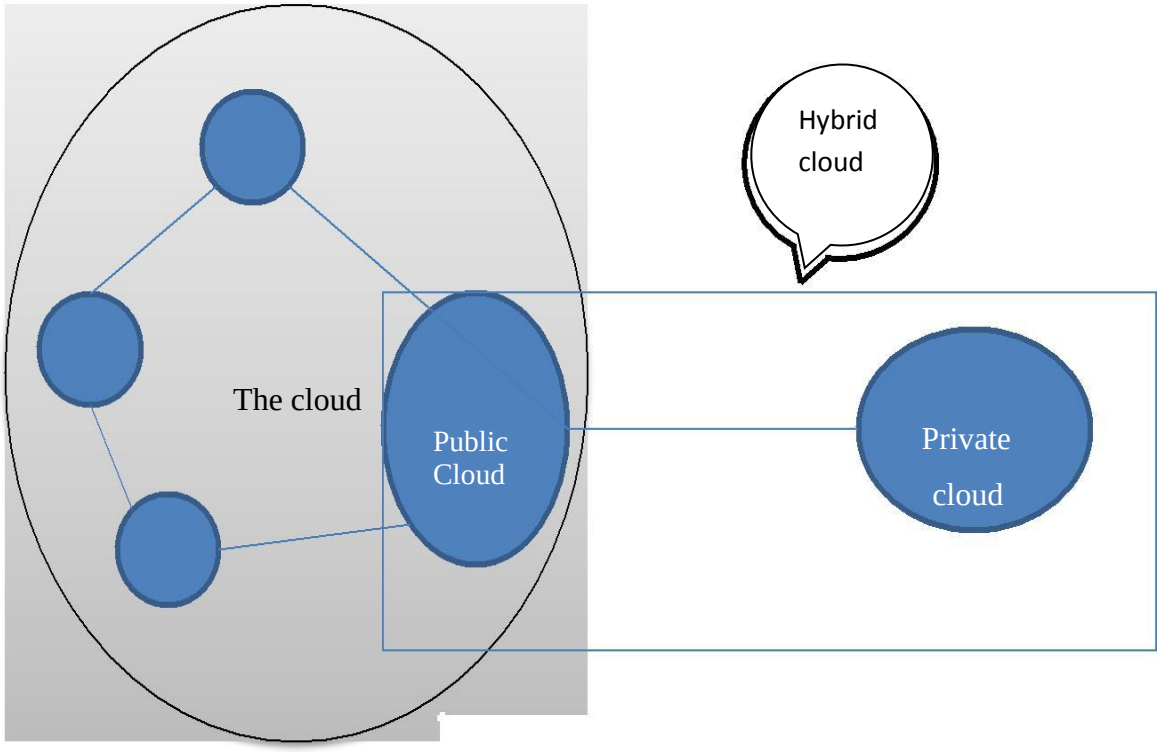

Figure 1.2 Deployment model

- **Public Cloud**

  Public cloud services which are accessible publically and owned by third party cloud provider. The cloud services are provided over network which is open for public usage. Services in this layer are offered via internet in a standardized, self-service, and pay-per-usage way. Amazon.com is example of public cloud that handles huge volumes of identical services without individual customer interactions. [2]

- **Private Cloud**

  Private cloud infrastructure is operated for use of an organization. It is deployed within organization's internal datacenter. Private cloud is similar to intranet because cloud services and application are managed by organization which is different from public cloud.

- **Hybrid Cloud**

  Hybrid cloud comprised the two or more different cloud deployment models. In hybrid cloud many clouds are combined as a unit but they have unique identification. The standardized access to data and applications are provided by hybrid cloud.

- **Community Cloud**

  For specific community of consumers which have limited accessthe community cloud is deployed. In this the community of consumers is working on specific task.

1.5 Advantages of Cloud Computing

- **Reduced Cost**

  Cloud computing reduce the cost of the system. The charging model is pay according to utilization

- **Increased Storage**

  Large volume of data can be stored on cloud easily. Huge infrastructure is provided by the cloud providers to store the data

- **Flexibility**

  The cloud computing technology is more flexible than traditional methods. For peak times more capacity can be provisioned.

- **Improved Collaboration**

  Using cloud computing dispersed group people can share information easily in real time and via shared storage. This capability also improves the product development and customer services.

1.6 Disadvantages of Cloud Computing

- **Data Protection**

  Data Security is an important element. Enterprises are reluctant to purchase an assurance of enterprise data security from merchants. They fear losing data to competition and the data confidentiality of consumers. In numerous instances, the actual storage location is not disclosed, including onto the security concerns of enterprises. In the current models, firewalls are used over data center to ensure the sensitive information. [3]

- **Data Recovery and Availability**

  Operational team is an important part in management of service level agreements and runtime governance of applications. It support following features.

  - Appropriate clustering and Fail over
  - Replication of data
  - Monitoring of the system
  - Maintenance
  - Recovery from Disaster
  - Management of Capacity and performance.

- **Management Capabilities**

  Management has great potential to improve on the scalability and load balancing. In order to achieve requirements, cloud providers have a setup for data which need a focus or a storage site inside the country. [4]

1.7 Plant Disease Detection

Agriculture has turned out to be a great deal more than essentially a way to encourage regularly developing populations. Plants have turned into an important wellspring of vitality, and are a fundamental piece in the baffle to solve the issue of an unnatural weather change. There are a few approaches to recognize plant pathologies. A few diseases don't have any visible symptoms related, or those seem just when it is past the point where it is possible to act. In those cases, normally some sort of sophisticated analysis, more often than not by method for powerful microscopes, is necessary. In different cases, the signs must be identified in parts of the electromagnetic range that are not visible to humans. The methods that embrace this approach regularly employ computerized picture processing tools to accomplish their goals. The stripped eye perception method is by and large used to choose diseases seriousness in the generation practice however results are subjective and it is unrealistic to gaug**e** the disease extent precisely**.** To classify disease an automated system has been executed utilizing calculation, for example, back propagation, PCA and SVD techniques of neural network.

1.8 Artificial Neural Networks

On the basis of the neural structure of the brain, the artificial neural networks are built. There are various situations in which the BP NN technique can provide various benefits:

- There can be various inputs as well as outputs achieved.
- The complexity of a solution can also be given.
- For creating various examples of accurate performance, there are no complications seen.
- Using the input as well as output parameters, the solution might be changed accordingly.

There are various applications such as recognition of characters which are handwritten, matching of pictures from databases, minimal content loss, etc. [5]

1.8.1 Error Back Propagation

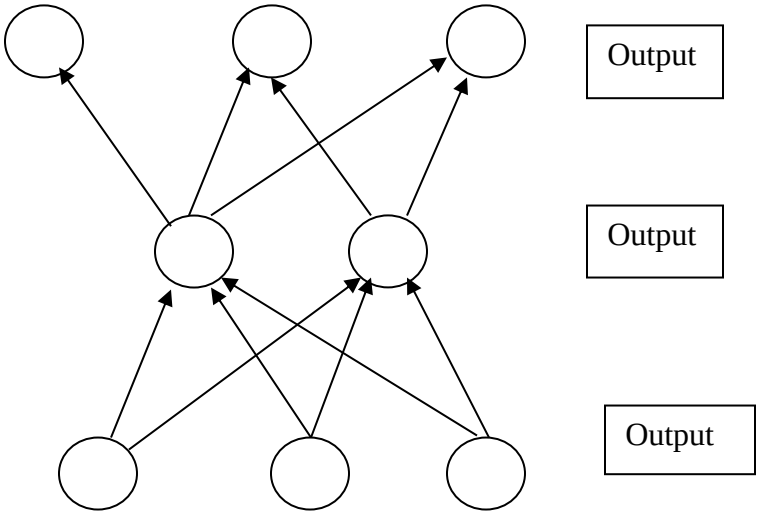

Figure 1.3 Diagram of Back propagation

The back propagation technique provides a method for training the networks which might involve any number of hidden units which might be arranged in any number of layers in the network. There is no need to organize the network into various layers. It allows any kind of patter for connectivity which might permit the ordering of nodes from input to output. There are various ways to be ordered which provide the connections from input to output. There are no cycles to be involved in the in the connection pattern. The constraints for which the networks are important are known as the feed forward network. A directed acyclic graph is formed utilizing the connection patterns. [6]

1.8.2 Basic Procedure To Detect Plant Disease

There are various steps which are used to detect the disease in plant explained in the following diagram:

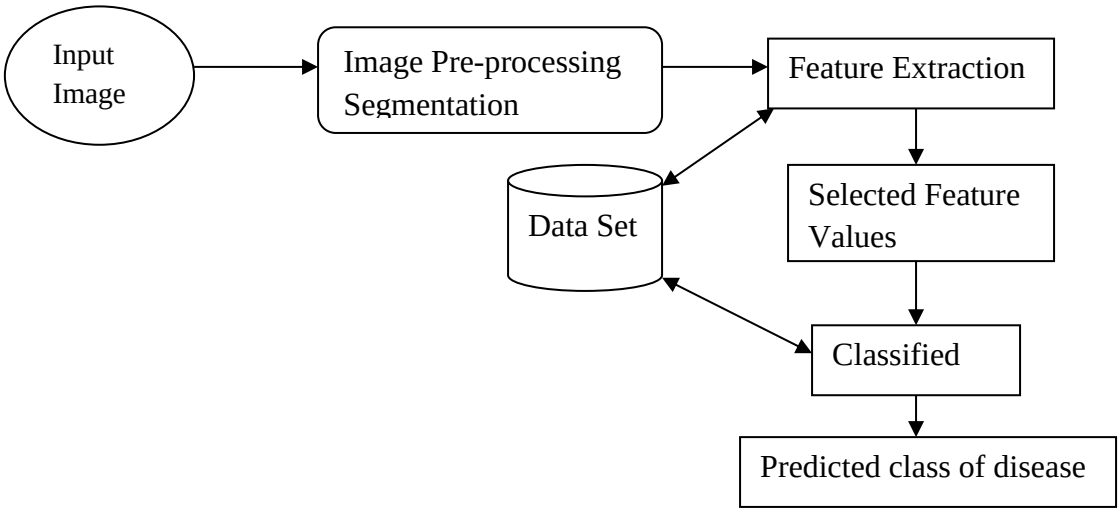

Figure. 1.4: Basic steps to detect the Plant Disease

1.8.3 Training an Artificial Neural Network

There are two types of training required for providing trained sets. They are supervised and unsupervised training. The supervised training provides the network with desired outputs from the inputs given manually or by giving the desired inputs. In the case of unsupervised training, the network makes intellect of the inputs without taking any external help .The supervised training involves numerous amounts of nodes in it.[8]

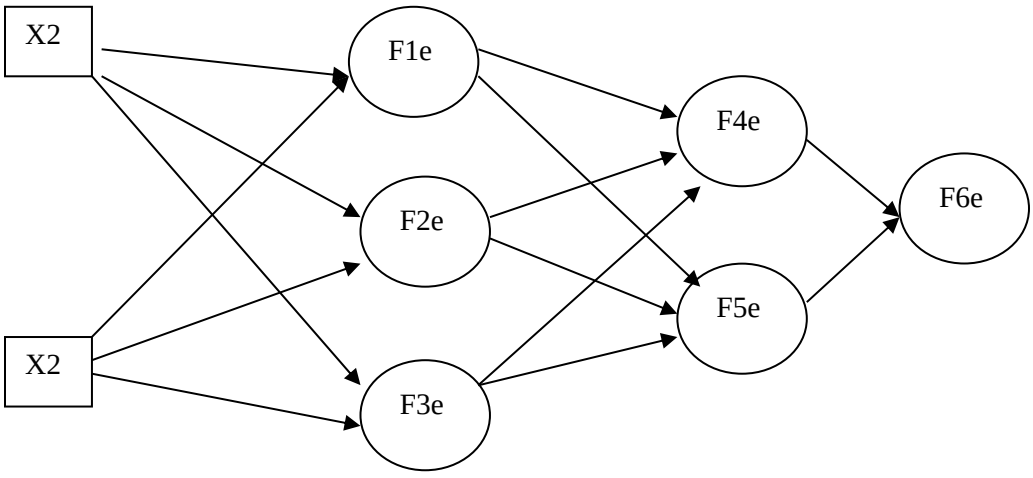

Figure 1.5: Unsupervised Learning

There are two units involved in each neuron. The products of weights coefficients as well as input signals in placed on the first unit. The non-linear function known as the neuron activation function is realized by the second unit.

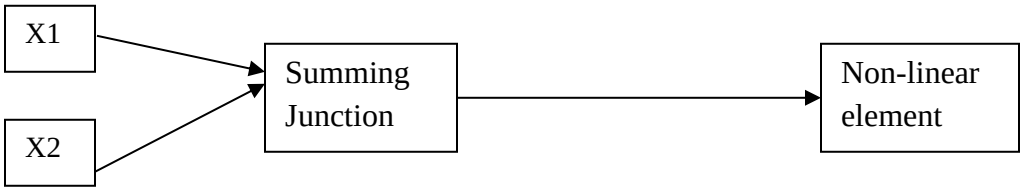

Figure 1.6 Diagram of Training of Neural Network

The reason of training neural networks, the data set is required to be trained. There is a number of input signals (x_1 and x_2) which have to achieve a target or desired output denoted as z. The new data is to be provided from the data set for each iteration. Here, the weight coefficients of the nodes are modified. Using the algorithm explained below, the modification is calculated. Both the input signals from each training set are used for beginning the process of teaching. The output signals of a neuron are determined in the next step within the network layer. Next, the signal propagation through the network is determined.

1.8.4 Principal Component Analysis

To convert linear projection of high dimensional data into a lower dimensional subspace PCA is used. There is maximum variance retained here. There is a reduction in the least square reconstruction error. Within the data analysis, PCA is the most commonly utilized dimensionality reduction technique. There are three properties which are responsible for its common use. The second property states that from the data, directly the parameters can be calculated. The third property states that for the given parameters, the compression and decompression operations can be performed. The only requirement here is the matrix multiplications. The algorithm has following steps:

1. Mean center of data
2. Calculate covariance matrix of the dimensions
3. Find eigenvectors of covariance matrix
4. Sorting of eigenvectors in decreasing order of eigenvalues
5. Project onto eigenvectors in order

1.8.7 Radial Basis Function

The feed forward networks which include the hidden layer of radial kernels and the output layer of linear neurons are known as the radial basis functions. There are complete different roles to be played by the two RBF layers. A non-linear transformation of input space is to be performed by the hidden layers. The dimensionality of the resulting hidden space is higher as compared to the input space. For the purpose of predicting the desired targets, the output layer performs linear regression. Only on the basis of the distance from the origin, the value of the real-valued function depends. For the purpose of approximating the given functions, the sum total of the radial basis functions are utilized. Within the support vector classification, the RBFs are utilized as a kernel.

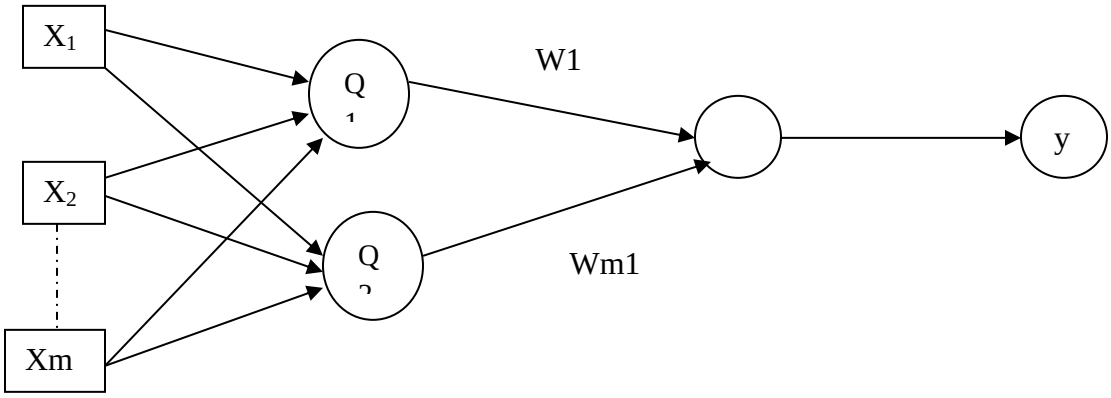

Figure 1.7 Radial Basis Function

1.9 Cloud Simulation

The cloud service provider offers various services like on-demand, polling, measured infrastructure and software services. In these services user have the control over ta operating system, storage and applications. These all resources are provided over the geographical regions. Cloud Simulation is tool kit which provides the simulation and modeling to cloud environment. Cloud simulation's basis purpose is to provide modeling to cloud components. It also evaluate the performance of an applications. Cloud simulation is tool by which developer can test the performance of their components. This tool has controllable environment. Cloud simulation is running model .It does not run on actual software.

CloudSim is library for simulation of cloud scenario. It provide classes which defines the data center, applications, virtual machines and various parts of scheduling the system. By using cloud simulation it is easy to evaluate the performance of cloud components. CloudSim is written in java. It can be used as a building block for a simulated cloud environment and can add new policies for scheduling, load balancing and new scenarios. It is flexible enough to be used as a library that allows you to add a desired scenario by writing a Java program. The CloudSim layer provides support for modelling and simulation of cloud environments including dedicated management interfaces for memory, storage, bandwidth and VMs. It also provisions hosts to VMs, application execution management and dynamic system state monitoring. A cloud service provider can implement customized strategies at this layer to study the efficiency of different policies in VM provisioning. The user code layer exposes basic entities such as the number of machines, their specifications as well as applications, VMs, number of users, application types and scheduling policies. The layered architecture is defined in figure 1.8.

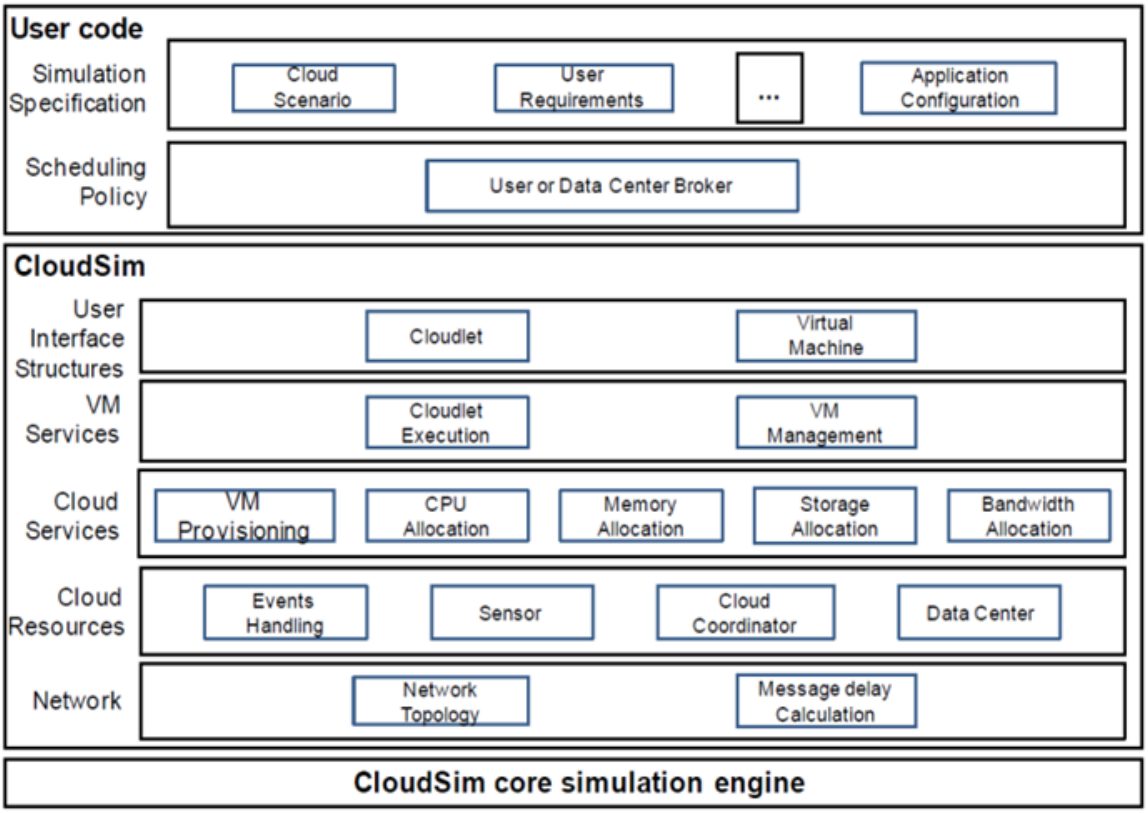

Figure 1.8 Architecture of CloudSim

There are following basic components of CloudSim:

- **Regions**

  It models geographical regions in which cloud service providers allocate resources to their customers. In cloud analysis, there are six regions that correspond to six continents in the world.

- **Data centers**

  It models the infrastructure services provided by various cloud service providers. It encapsulates a set of computing hosts or servers that are either heterogeneous or homogeneous in nature, based on their hardware configurations.

- **User Base**

  It models a group of users considered as a single unit in the simulation, and its main responsibility is to generate traffic for the simulation.

- **Cloudlet**

  It specifies the set of user requests. It contains the application ID, name of the user base that is the originator to which the responses have to be routed back, as well as the size of the request execution commands, and input and output files. It models the cloud-based application services. CloudSim categorizes the complexity of an application in terms of its computational requirements. Each application service has a pre-assigned instruction length and data transfer overhead that it needs to carry out during its life cycle.

- **Service Broker**

  The service broker decides which data Centre should be selected to provide the services to the requests from the user base.

- **VMM Allocation Policy**

  It models provisioning policies on how to allocate VMs to hosts.

- **VM Scheduler**

  It models the time or space shared, scheduling a policy to allocate processor cores to VMs.

1.9.1 Basic Features of Cloud Simulation

- It support for modeling and simulation of large scale of cloud computing environments including data centers and single physical node.
- It is flexible for defining the configurations.
- It support simulation of network connections among simulated system elements.
- It is self-contained platform for modeling cloud, service broker and allocation policies.

CHAPTER 2

REVIEW OF LITERATURE SURVEY

Sukhpal Singh, Inderveerchana (2013) *et,al.*.in Based Autonomic System for DeliveringAgriculture As service presents that with the continuous development in network technology and information technology, different areas of world have been undergoing enormous change. The information technology will not only change in communication way from one location to another but also change the economic and social development and improve the efficiency of production. Agriculture as service presents a QOS service aware cloud based autonomic system to deliver the agriculture related information as a service. In this paper they have used the latest cloud technologies. Cloud technology manages various types of agriculture related data based on different domains. Cloud based autonomic system overcome the problem in proposed system .This autonomic system improves the performance of system, more utilization of resources in better way, improve execution time, cost along with quality of service parameter. To present agriculture as service cloud reacquires self-management system. This self-management system improves the customer satisfaction .Cloud based autonomic system use the cuckoo optimization algorithm for efficient resources allocation for effective utilization of resources. System gathers information from various users through preconfigured devices. KMN classification mechanism is used to classify the agriculture data. Classify data is interpreted through fuzzy logic by which user can easily diagnose the agriculture status automatically. In this principal component analysis is used to find the distinct attributes to reduce the correlation among attributes and K- NN (k-neighbor) classification mechanism used to classify agriculture data. [9]

K. C. and A. Singh(2010) *et,al.*In Application of Cloud Computing to agricultureFields presents that agriculture methods and values introduce information technology into agriculture practices and also connect agriculture into single industry in order to improve the self-sufficiency and develop markets for agriculture technology. This paper presents how to use Information technology contributes in agriculture

technology for better production. They use the PDCA cycle (plan-do-check-act). This PDCA cycle improve the communication way in different –different levels and also improve the information sharing method. PDCA cycle also improves the information sharing in company meetings. It represents the better way to share the routine work reports between experienced workers and unexperienced workers about harmful insects and growing situations. To support the agriculture operations the IT mechanism uses the various level of process. It uses input, storage, display virtualization, analysis and instruction to present the components of agriculture technology. It presents how to collect the agriculture related data and after data collection how to analysis the data. The IT mechanism support to present the agriculture data storage in better way so it can be used in future needs. IT mechanism helps in management of agriculture data. The deployment model of cloud is used in better way to maintain the operations in agriculture system. [10]

Major Singh Goraya1, Harjinder Kaur (2000) *et,al*in this paper present work that cloud computing is way to integrate high computing infrastructure to provide computing services to community of users. Due to increasing world population, agriculture products demand is also increases. Agriculture products include selling and marketing of products. Cloud computing is great technology which has impacted the agriculture activities. With the use of cloud computing in agriculture technology, it provides large scale information storage. The activities in agriculture such as weather information, market information, crop information, farmer's experiences of agriculture processes, information regarding pesticides can be easily stored in cloud. The agriculture systems can improve with the help of IT tools which provides online language translation mechanism. It makes easy to take decision related to crop production according to demand and supply of crops in markets. The farmers can get online expert advice from stored data in cloud. It makes easy to take decision. With the use of cloud technology in agriculture it also provides land information with description related to soil analysis results and production history. The knowledge about disease and reaction of disease on crops can be easily get by farm management system. [11]

Enumi Choi (1998) *et,al.*.In agriculture Application Research on Cloud Computing presents that to embed agriculture with advance services like GPS sensors to

communicate with each other services the IT provides services in the form of cloud to agriculture. Cloud has five universal values and this provides MAD cloud computing architecture. This architecture provides data analyzer which is used by farmer, agriculture expert to analyze the various kinds of data in agriculture activity. It makes easy to know which data is useful in agriculture process. Data processing services are also provide like data sharing among different-different stages, data computing, reporting about daily work and production report. It also provides data storage services in cloud. The various services which are provided by cloud can be used in agriculture activities to analyze the data and to store data at various levels. The infrastructure as services is utilized as data storage and platform as services is utilized as data sharing, data computing and data conversion. It provides the framework to data which is used in agriculture technology. [12]

Santosh Kumar and R. H. Goudar (2012) *et,al* In Review Using Cloud Computing of Technology in Agriculture Development presents that this review is concerned with how ICT (information and communication technology) will be helpful in agriculture sector for economic development of the country. The various features of cloud computing like on-demand self-provisioning of resources, utilization of internet technologies, pool of resources, green technology, fast development, virtualization which can be implemented in agriculture activity to manage the processes. The information technology will not only change in communication way from one location to another but also change the economic and social development and improve the efficiency of production. Agriculture as service presents a QOS service aware cloud based autonomic system to deliver the agriculture related information as a service. In this paper they have used the latest cloud technologies. Cloud technology manages various types of agriculture related data based on different domains. Cloud based autonomic system overcome the problem in proposed system. This autonomic system improves the performance of system, more utilization of resources in better way, improve execution time, cost along with quality of service parameter. To present agriculture as service cloud reacquires Cloud based autonomic system use the cuckoo optimization algorithm for efficient resources allocation for effective utilization of resources. System gathers information from various users through preconfigured devices. KMN classification mechanism is used to classify

the agriculture data. Classify data is interpreted through fuzzy logic by which user can easily diagnose the agriculture status automatically. The problem in technical issues can be resolved easily because they are handled by team of professionals. [13]

Yifan Bo, Haiyan Wang (2011) *et,al.*.In Smart Agriculture Based on Internet Things and Cloud Computing presents Cloud computing and internet of things are new two parameter which can be implemented in agriculture. To improve the utilization of virtualized resources and memory using internet the cloud provides the way. The radio frequency identification, sensor network technology can be achieved by using internet of things in agriculture. Using cloud computing virtualization technology and internet of things in agriculture which provides high quality information to meet production needs and promote fast development of agricultural informational. The combination of both cloud computing and IOT makes smart agriculture development. It provides service oriented architecture which manages the service interface, service registration, service searching, services visiting. The monitoring related to quality of water, accurate fertilization, humidity, light can be achieved by using both cloud and IOT technologies in agriculture. Using features of IOT like radio frequency, automatic control, sensing techniques which help to make the smart agriculture technology. [14]

Praveen B, Viswesh M (2013).in Agriculture Updates via SMS- A Cloud Computing Approach presents this research contributes cloud computing named as Data-as-a-service which provides SMS services of agriculture updates. The information technology will not only change in communication way from one location to another but also change the economic and social development and improve the efficiency of production. Agriculture as service presents a QOS service aware cloud based autonomic system to deliver the agriculture related information as a service. In this paper they have used the latest cloud technologies. Cloud technology manages various types of agriculture related data based on different domains. For farmers and agencies it makes easy interface to use. To collect and distribute the plan strategy into different areas there is analysis of all activities. [15]

Rakesh Patel, Mili. Patel, (2010) *et,al.*in Study of Strategy and Operation agriculture in cloud computing presents to store the information for cultivation environment control

the cloud computing provides mechanism which is named as integrated management. This integrated management manages the plant factory and related services. This management fulfils the many needs of demand side like retailers, consumers, processors and distributers. To control the cultivation equipment and growing environment this management provides many services. Using cloud computing virtualization technology and internet of things in agriculture which provides high quality information to meet production needs and promote fast development of agricultural informational. The combination of both cloud computing and IOT makes smart agriculture development. It provides service oriented architecture which manages the service interface, service registration, service searching, services visiting. [16]

Liang Yan, ChunmingRong, (2000) in Key Technology Study of Agriculture Information Cloud Computing presents the cloud computing provides important service named as AISC. This service stands for Agriculture Information cloud-service. The main purpose of this service is to import the different datasets in different sources. This datasets are constructed be different organizations. The AISC combines these dataset into large datasets logically. By using this technology the service efficiency is improved. In this research they completed the CUNCUN Tong project which is for rural information infrastructure. The agriculture information cloud-services resolve the many problems. The activities in agriculture such as weather information, market information, crop information, farmer's experiences of agriculture processes, information regarding pesticides can be easily stored in cloud. The agriculture systems can improve with the help of IT tools which provides online language translation mechanism. It makes easy to take decision related to crop production according to demand and supply of crops in markets. The farmers can get online expert advice from stored data in cloud. It makes easy to take decision. With the use of cloud technology in agriculture it also provides land information with description related to soil analysis results and production history. [17]

MahyarAmini, Nazali Sadat (1999).in Agriculture Development in IRAN: Using Cloud Computing presents in this research paper the author has discussed about the status of IRAN in agriculture sector. IRAN's agriculture production still has decentralized operation and low level of information. [3]This results in an low productivity and speed

of modernization is slow. The concept of implementing the cloud is not yet matured in IRAN. It suggests the cloud application system framework that should be implemented in IRAN. [18]

Sawathi. R, Manasa.V CIT (1998) *et,al.* In Application of Cloud Computing For Agriculture Development presents in this paper authors has discussed about the major challenges in agriculture production. The major challenges are poor knowledge about the information technology, deficient production information, poor information and communication infrastructure. It also presents problems that occur in rural areas of this problem. These problems can be resolved by implementing cloud technology in agriculture because cloud computing is game of changing phase of IT and also delivered information needs as services. By implementing cloud the farmers can take the advantage of cloud features like on demand service.

Lianjie Zhou, Nengcheng Chen, Chenjie Xing (2011).An Efficient Remote Sensing Observation- Sharing Method Based on Cloud Computing For Soil Moisture Mapping in Precision Agriculture presents in this paper the authors has discussed about inversion of remote sensing images crucial for soil moisture mapping in precision agriculture. The information technology will not only change in communication way from one location to another but also change the economic and social development and improve the efficiency of production. Agriculture as service presents a QOS service aware cloud based autonomic system to deliver the agriculture related information as a service. In this paper they have used the latest cloud technologies. Cloud technology manages various types of agriculture related data based on different domains. Cloud based autonomic system overcome the problem in proposed system. This autonomic system improves the performance of system, more utilization of resources in better way, improve execution time, cost along with quality of service parameter. To present agriculture as service cloud reacquires Cloud based autonomic system use the cuckoo optimization algorithm for efficient resources allocation for effective utilization of resources. To enhance remote sensing observation storage, processing and serve capability, it represents the study of remote sensing based on cloud computing technology. [19]

Baskar Prasad, Enumi Choi (1998) Using GPS Sensor in Agriculture Application Based on Cloud computing presents in this paper author has discussed about to embed agriculture with advance service like GPS to communicate with each other services the IT provides in the form of cloud to agriculture. This paper represents five universal values and also provides MAD cloud computing architecture. This architecture provides data analyzer which is used by farmer, agriculture expert to analyze the various kinds of data in agriculture activity. Using cloud computing virtualization technology and internet of things in agriculture which provides high quality information to meet production needs and promote fast development of agricultural informational. The combination of both cloud computing and IOT makes smart agriculture development. It provides service oriented architecture which manages the service interface, service registration, service searching, services visiting. [20]

Shitala Prasad1, Sateesh K. Peddoju2 (1998in Agro Mobile: A Cloud-Based Framework for Agriculturists on Mobile Platform presents in this paper researcher has introduced new approach in field of Mobile cloud computing to explore the agriculture department. They presents new way to use mobile cloud computing by farmer's which is known as agro-mobile. They have analyzed the crop images. .This autonomic system improves the performance of system, more utilization of resources in better way, improve execution time, cost along with quality of service parameter. To present agriculture as service cloud reacquires self-management system. This self-management system improves the customer satisfaction. [21]

Sachin .D Khirade, A.B Patil (2011) Plant Disease Detection Using Cloud Computing andImage Processing presents in this paper there is study of visually observable patterns seen on plants. The study on plant diseases acquires high amount of work, some expertize team and also acquires large processing time to detect the diseases. In this paper the concepts of image processing are used to detect the plant diseases. It involves the various steps like image acquisition, image pre-processing, image segmentation, feature extraction and classification. By using these methods there is image of diseased plant. This paper also presents some segmentation and feature extraction algorithm which are used in plant disease detection. The proposed system used various

steps for detection of plant disease. They have used image acquisition which captures the image of plant leaf and image is in form of RGB (red, green, blue) color form. Then image pre-processing is used to remove the noise like cropping of image. The image segmentation is done using algorithms like k-mean clustering, boundary and spot detection algorithms. They have used artificial neural network for the classification. [22]

Tomohiro Hayata(2011)*et.al*, In this paper, author discuss that Numerous organizations discussed about to embed agriculture with advance service like GPS to communicate with each other services the IT provides in the form of cloud to agriculture. This paper represents five universal values and also provides MAD cloud computing architecture. This architecture provides data analyzer which is used by farmer, agriculture expert to analyze the various kinds of data in agriculture activity. Using cloud computing virtualization technology and internet of things in agriculture which provides high quality information to meet production needs and promote fast development of agricultural informational. The combination of both cloud computing and IOT makes smart agriculture development. To control the cultivation equipment and growing environment this management provides many services. Using cloud computing virtualization technology and internet of things in agriculture which provides high quality information to meet production needs and promote fast development of agricultural informational. The combination of both cloud computing and IOT makes smart agriculture development. [23]

Deepak J. Dange (2015),as agile development methodologies have gained great interest in Detection presents Such in-situ applications are required to be vigorous in the presence of messiness, provide fast and exact analysis and can operate at scale. We propose a processing pipeline that detects key wheat diseases in jumbled field imagery. To start with, we depict and evaluate a high dimensional texture descriptor joined with a randomized forest approach for automated primary leaf acknowledgment Second, we demonstrate that a consolidated nearest neighbor classifier and voting system connected to segmented leaf regions can robustly determine the presence and type of disease. Encourage plant leave disease detection is utilized by grayscale conversion and histogram balance. In agriculture research of automatic leaf disease detection is important research

topic. It might applicable in monitoring extensive fields of crops, and in this manner automatically identify symptoms of disease by the leaves of plant. [24]

Hanchuan Peng(2005)et.al this paper proposes a review on the best way to select good features as indicated by the maximal factual dependency criterion based on shared information. To support the agriculture operations the IT mechanism uses the various level of process. It uses input, storage, display virtualization, analysis and instruction to present the components of agriculture technology. It presents how to collect the agriculture related data and after data collection how to analysis the data. The IT mechanism support to present the agriculture data storage in better way so it can be used in future needs. IT mechanism helps in management of agriculture data. The results confirm that mRMR leads to promising improvement on feature selection and classification accuracy. [25]

David Gibson (2015*) et.al* this paper presents An application is proposed that shows a proof of concept system for automated in-the-field checking of disease in wheat crops. Such in-situ applications are required to be vigorous in the presence of messiness, provide fast and exact analysis and can operate at scale. We propose a processing pipeline that detects key wheat diseases in jumbled field imagery. To start with, we depict and evaluate a high dimensional texture descriptor joined with a randomized forest approach for automated primary leaf acknowledgment Second, we demonstrate that a consolidated nearest neighbor classifier and voting system connected to segmented leaf regions can robustly determine the presence and type of disease. The system has been tried on a real-world database of images of wheat leaves captured in-the-field utilizing a standard smart phone. [26]

Piyush Chaudhary (2012) *et.al*this paper presentsIn this exploration, an algorithm for disease spot segmentation utilizing image processing methods in plant leaf is implemented. integrate high computing infrastructure to provide computing services to community of users. Due to increasing world population, agriculture products demand is also increases. Agriculture products include selling and marketing of products. Cloud computing is great technology which has impacted the agriculture activities. With the use of cloud computing in agriculture technology, it provides large scale information storage.

The activities in agriculture such as weather information, market information, crop information, farmer's experiences of agriculture processes, information regarding pesticides can be easily stored in cloud. The agriculture systems can improve with the help of IT tools which provides online language translation mechanism. [27]

Jayamala K. Patil(2011) *et.al* this paper portrays the study of plant diseases which are visible by the naked eye and effortlessly perceptible. Insects assume significant part to harm nay crop or plant. The pesticides and insecticides are not generally supportive for the growth of the crop, now and again it contains toxins which may hurts a few birds too. The various features of cloud computing like on-demand self-provisioning of resources, utilization of internet technologies, pool of resources, green technology, fast development, virtualization which can be implemented in agriculture activity to manage the processes. The information technology will not only change in communication way from one location to another but also change the economic and social development and improve the efficiency of production. This will improve throughput and detects diseases automatically. To control the cultivation equipment and growing environment this management provides many services. Using cloud computing virtualization technology and internet of things in agriculture which provides high quality information to meet production needs and promote fast development of agricultural informational. The combination of both cloud computing and IOT makes smart agriculture development. It provides service oriented architecture which manages the service interface, service registration, service searching, services visiting. [28]

Ms. Kiran R. Gavhale (2014),in An Overview of the Research on Plant Leaves Diseased detection using Image Processing Techniques presents Diseases in plants cause major production and economic losses and additionally diminishment in both quality and quantity of agricultural products. Presently a day's plant diseases detection has received expanding attention in monitoring huge field of crops. Farmers experience awesome difficulties in switching starting with one disease control policy then onto the next. It provides service oriented architecture which manages the service interface, service registration, service searching, services visiting. This approach manages design and development of software tools for selected machines, their testing and standardization in rural areas. For farmers and agencies it makes easy interface to use. To collect and

distribute the plan strategy into different areas there is analysis of all activities. . To support the agriculture operations the IT mechanism uses the various level of process. It uses input, storage, display virtualization, analysis and instruction to present the components of agriculture technology.. The audit recommends that this disease detection technique demonstrates a decent potential with an ability to distinguish plant leaf diseases and a few limitations. Thusly, there is extent of improvement in the existing research. [29]

MeremElallaoui(2015*)* *et.al*, author has discussed about to embed agriculture with advance service like GPS to communicate with each other services the IT provides in the form of cloud to agriculture. This paper represents five universal values and also provides MAD cloud computing architecture This models defined by the approach include one for requirements specification and another for inter-requirement traceability and utilized he mentioned traceability in the application design model. The approach aims to generate an application model conforming to a DSL from the requirements specification. Domain expert or developer can interpret a similar sentence in two distinctive ways, which makes the transformation of user stories into UML diagrams a difficult task to accomplish. This task can also be time devouring, which requires expertise and effort. The resulting XMI file then transformed into a sequence diagram utilizing UML2 tool SDK plugin for Eclipse. [30]

Marveen B, Viswesh M (2010) in Agriculture Updates - A Cloud Computing Approach presents this research contributes cloud computing named as Data-as-a-service which provides SMS services of agriculture updates. The adoption of modern agriculture activities and use of technology related issue are resolved in this research. It resolves the overregulation of agriculture which has increased costs, price, and risks. This approach manages design and development of software tools for selected machines, their testing and standardization in rural areas. For farmers and agencies it makes easy interface to use. To collect and distribute the plan strategy into different areas there is analysis of all activities. . To support the agriculture operations the IT mechanism uses the various level of process. It uses input, storage, display virtualization, analysis and instruction to present the components of agriculture technology. It presents how to collect the agriculture

related data and after data collection how to analysis the data. The IT mechanism support to present the agriculture data storage in better way so it can be used in future needs. IT mechanism helps in management of agriculture data.

Sudhir Rao Rupanagudi, *et.al* the paper concentrates in methodologies researcher has introduced new approach in field of Mobile cloud computing to explore the agriculture department. They presents new way to use mobile cloud computing by farmer's which is known as agro-mobile. They have analyzed the crop images. .This autonomic system improves the performance of system, more utilization of resources in better way, improve execution time, cost along with quality of service parameter. To present agriculture as service cloud reacquires self-management system. This self-management system improves the customer satisfaction.

SmitaNaikwadi, NiketAmoda(2013) this paper presents proposed an experiment which indicates classification and detection of plant diseases. Insecticides are not generally proved proficient because insecticides might be poisonous to some sort of birds. It additionally harms n common animal food chains. The following two steps are included progressively after the segmentation phase. In the initial step they identify the for the most part green colored pixels. At that point utilizing Otsu's method, pixels are masked having green color. At that point those for the most part green pixels are masked. From that point forward, the red green and yellow color based pixel clusters are removed which are infected .The experimental results demonstrate that proposed strategy is the best for plant detection. The proposed method is a robust procedure for the detection of plant leaves diseases.

Mahinder Singh Goraya1, Harnet Kaur (2000) *et,al* in this paper present work that cloud computing is way to integrate high computing infrastructure to provide computing services to community of users. Due to increasing world population, agriculture products demand is also increases. Agriculture products include selling and marketing of products. Cloud computing is great technology which has impacted the agriculture activities. With the use of cloud computing in agriculture technology, it provides large scale information storage. The activities in agriculture such as weather information, market information, crop information, farmer's experiences of agriculture processes, information regarding

pesticides can be easily stored in cloud. The agriculture systems can improve with the help of IT tools which provides online language translation mechanism. It makes easy to take decision related to crop production according to demand and supply of crops in markets. The farmers can get online expert advice from stored data in cloud. It makes easy to take decision. With the use of cloud technology in agriculture it also provides land information with description related to soil analysis results and production history. The knowledge about disease and reaction of disease on crops can be easily get by farm management system.

Avid Gibson (2013*) et.al* this paper presents An application is proposed that shows a proof of concept system for automated in-the-field checking of disease in wheat crops. Such in-situ applications are required to be vigorous in the presence of messiness, provide fast and exact analysis and can operate at scale. We propose a processing pipeline that detects key wheat diseases in jumbled field imagery. To start with, we depict and evaluate a high dimensional texture descriptor joined with a randomized forest approach for automated primary leaf acknowledgment Second, we demonstrate that a consolidated nearest neighbor classifier and voting system connected to segmented leaf regions can robustly determine the presence and type of disease. The system has been tried on a real-world database of images of wheat leaves captured in-the-field utilizing a standard smart phone.

CHAPTER 3

PRESENT WORK

3.1 Problem Formulation

In India national source of income comes from the agriculture sectors. But still there are some rural areas which results in less productivity and speed of modernization agriculture is slow. These traditional procedures are followed by farmers which results in a gap between supply and demand chains of agriculture products. In current situation there is huge loss in agriculture departments due to pest infestation in crops. This is a negative impact to farmers benefit as well as national income of the country. There are many approaches are which are used to classify these kinds of pests. In these approaches data is extracted from pattern recognition. This kind of pattern is known as training set. The existing technique is Principal Component Analysis which is used to classify the diseased and non- diseased portion. The existing approach still have low accuracy and execution time is high. To overcome is problem a method is proposed in which there is extreme detection of images to detect the disease in efficient way. The support vector mechanism method is proposed to enhance the accuracy and reduce the execution time of the work.

3.2Objectives of the study

- Collection of images of different crops in order to analyze disease by which those crops are affected.
- Extreme detection of image for segregation of diseases in crops.
- To propose the method based on SVM classifier for analyzing and improving the result in term of accuracy and execution time.

3.3 Research Methodology

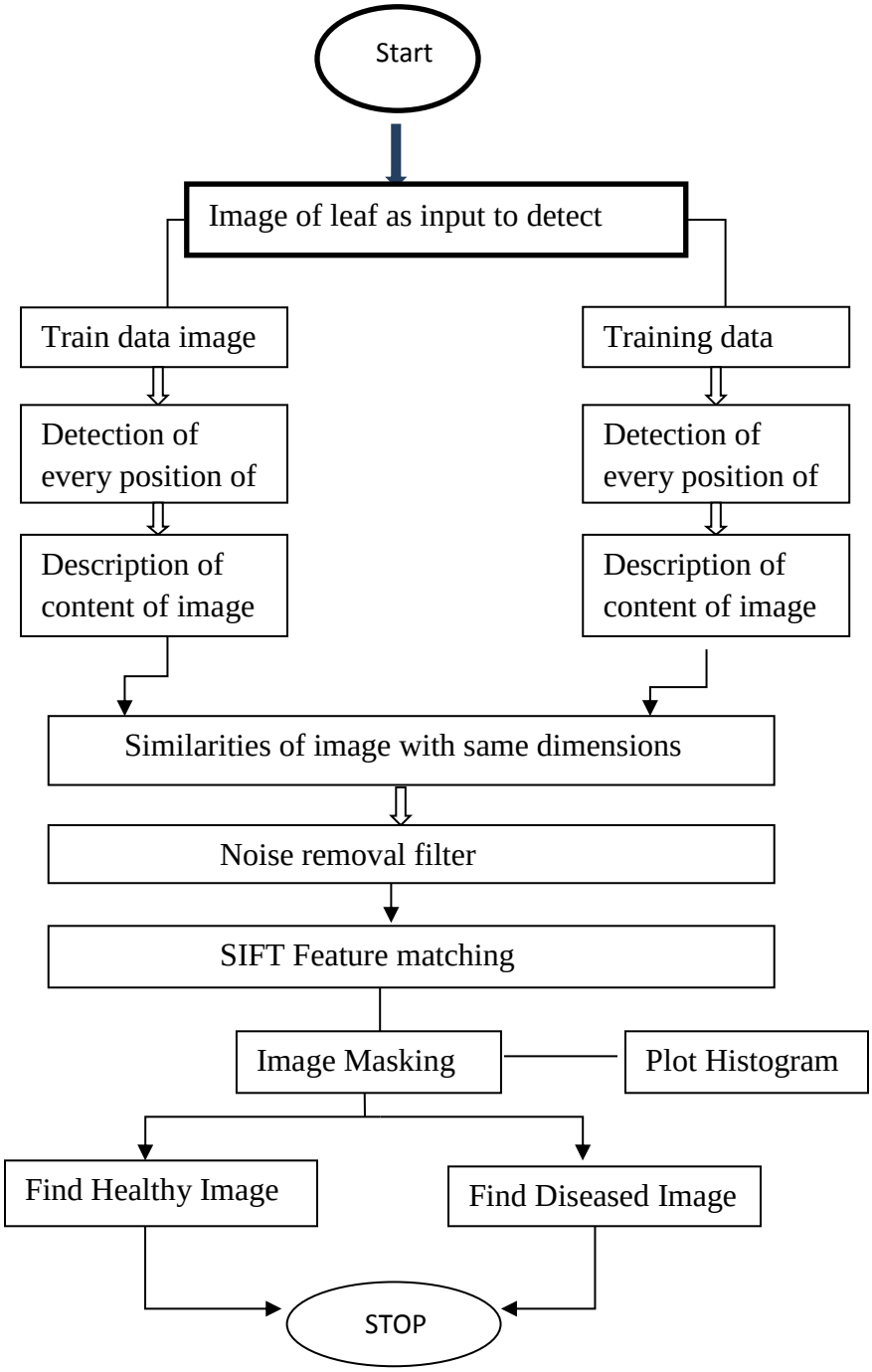

Figure 3.1 Flowchart of proposed work

In this research work the technique is being proposed to detect disease from plant using cloud computing architecture. In the existing work K-mean and PCA is used for classification and detection. Due to high complexity of algorithm the execution time is quite high. In this work PCA algorithm is replaced with SVM (Support Vector Machines) classifier which has low complexity and high accuracy than PCA.

There are following steps:

1. **Images as Input:** In this step different –different images are captured of crops which are used as input to detect the diseases.

2. **Extreme Detection:** For extreme detection image is converted into pyramid shape. Each and every position of image is detected. After detection each and every positon of image is compared with training image and then find the particular position of object.

3. **Description of Image:** In this step there is description of content of image. It describes various properties of image.

4. **Division of image into Uniform Region:** It is process of dividing the image into uniform regions. This process is known as split and merges segmentation. The splitting of image is done according to its properties. It makes group of connected pixels which have similar properties.

5. **Noise Removal:** It is non-liner and noise reducing filter for the images. It gives more clear image to detect the diseased portion. It is done by using bilateral filter.

6. **Feature Matching of image:** It is process of matching the features of image. This process is done by scale invariant feature detection. According to descriptors of image matching is done. The key points which are gives in the image gives the final output result.

7. **Image Masking:** Masking is process of setting the pixel values in an image to zero or some other background value. A mask image is an image where some of the pixel intensity values are zero, and others are non-zero. The pixel intensity

value is zero in the mask image then the pixel intensity of the resulting masked image will be set to the background value.

8. **Develop Histogram:** In this step the RGB image is converted to grayscale image to develop the histogram. The histogram is used to analyze the performance. It also describes the area of fraction.

9. **Classification of Diseased Portion:** The detection of disease is done by using support vector mechanism .Support Vector Mechanism is orthogonal matrix decomposition method. In this each object of image is plotted as point in N dimensions where N is number of features in the image. It involves the utilization of color, texture, and shape and then classification is performed by finding the hyper plane which differentiate the two classes. It gives the healthy and non-heathy part in the image.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Experimental Results

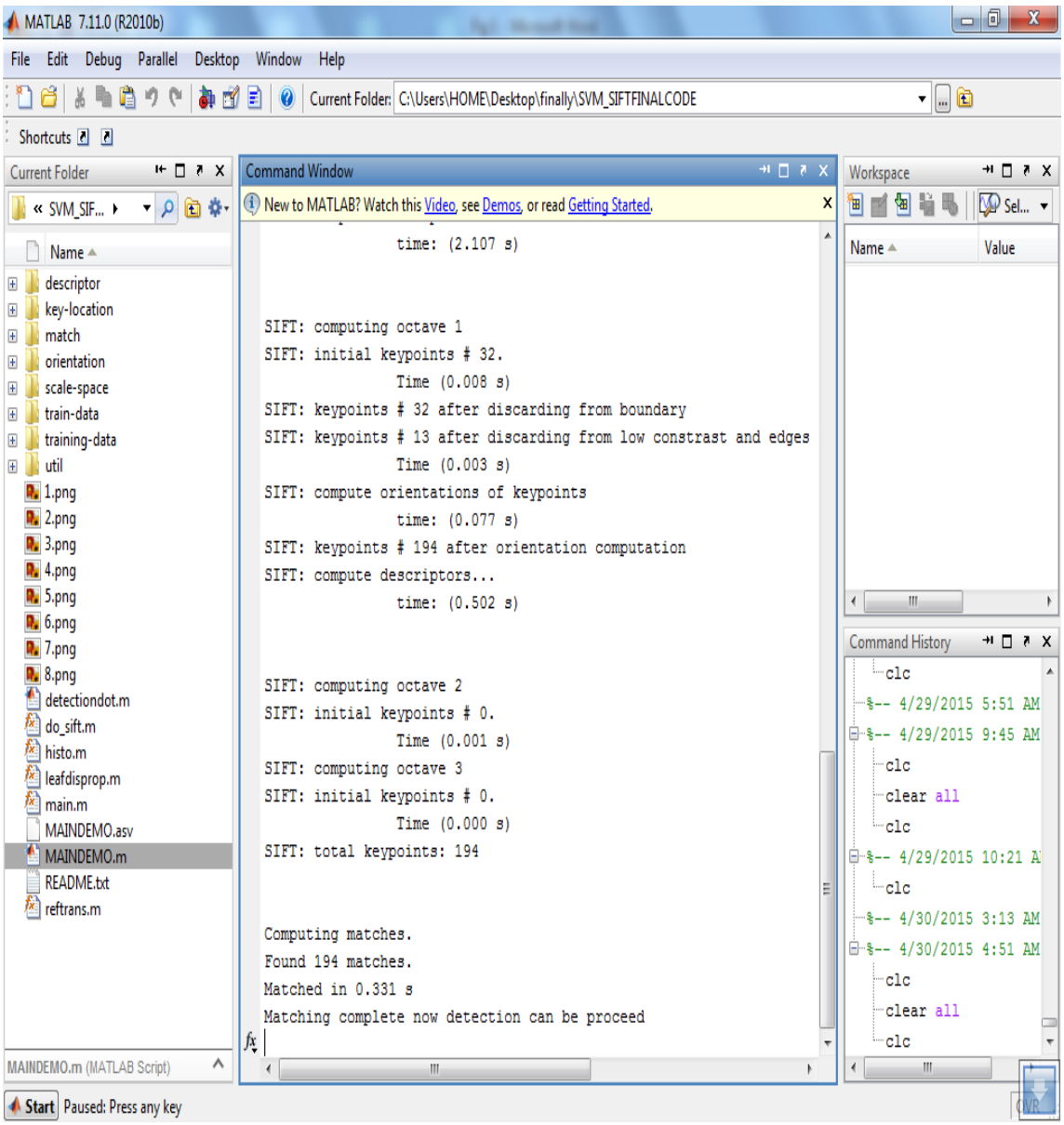

Figure 4.1 Training and train dataset

As shown in figure 4.1 there are two folders one is train set and another is training set. In this SIFT is applied to extract the features of image.

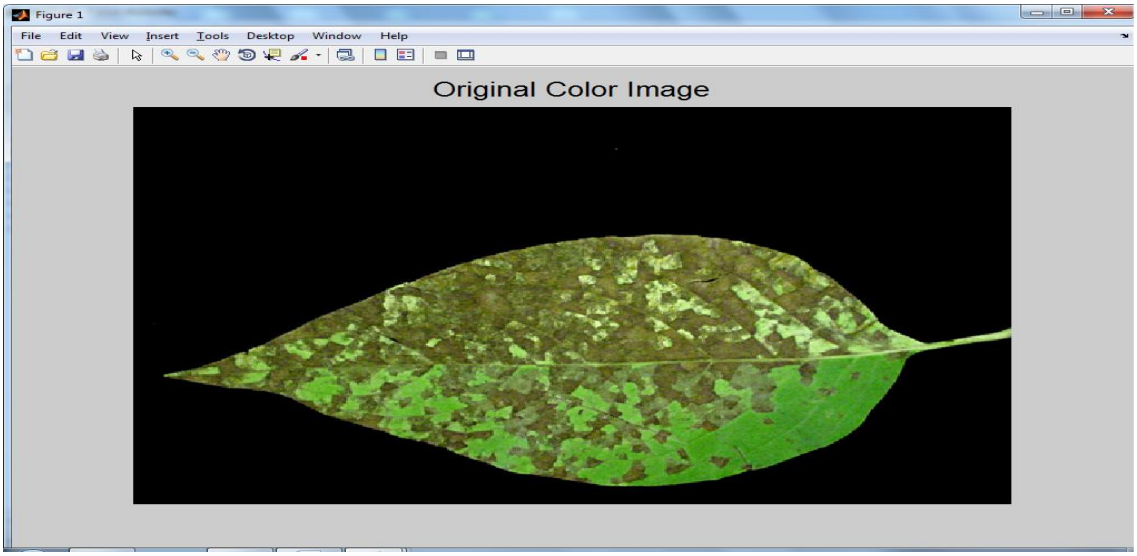

Figure 4.2Infected plant Leaf

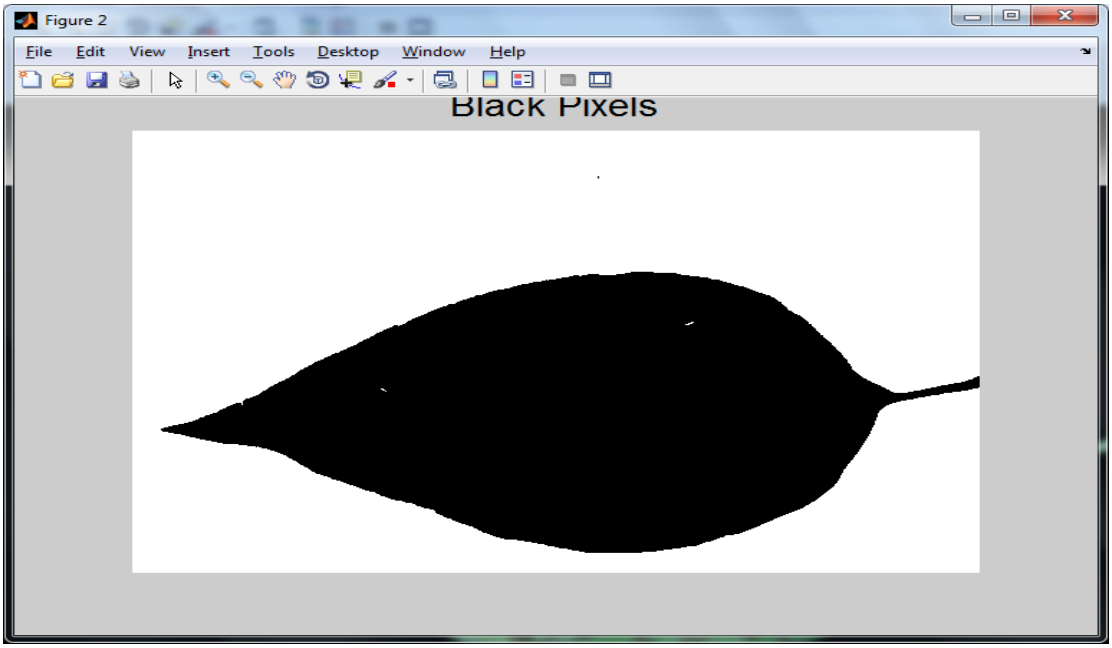

Figure 4.3Detection of Black Pixels

As shown in figure 4.2 there is infected leaf on which SIFT will be applied to extract its features and SVM will be applied to classify its diseased and non -diseased portion. Another figure 4.3 there is detection of that portion which does not belongs to image. In some leafs there is some holes which are not part of the image. So there is detection is these kind of portions in image for better results.

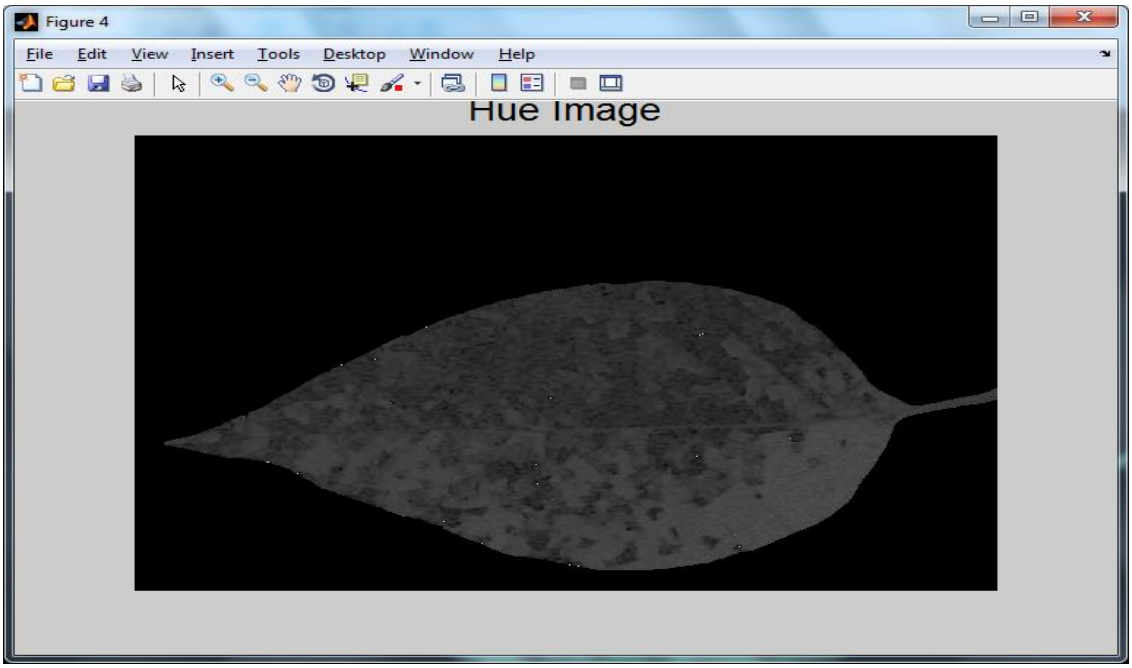

Figure 4.4 Infected plant Leaf

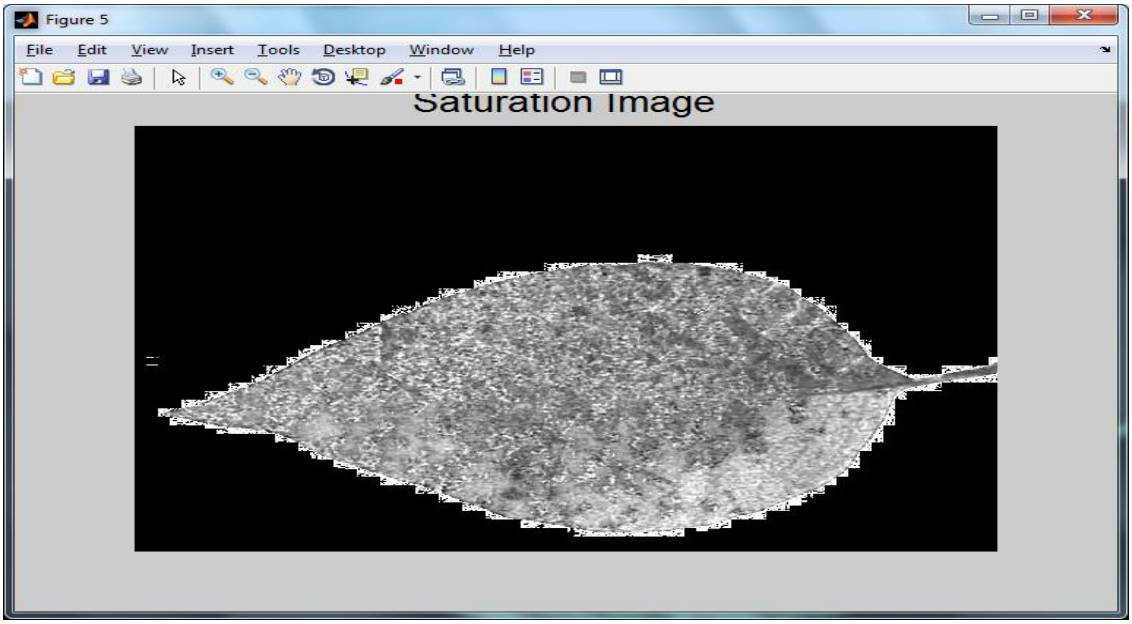

Figure 4.5 Saturation image

As shown in figure 4.5 there is saturation image which defines the intensity of color Another figure 4.4 there is hue image which is indication of color. It is the value actually tells color of the image.

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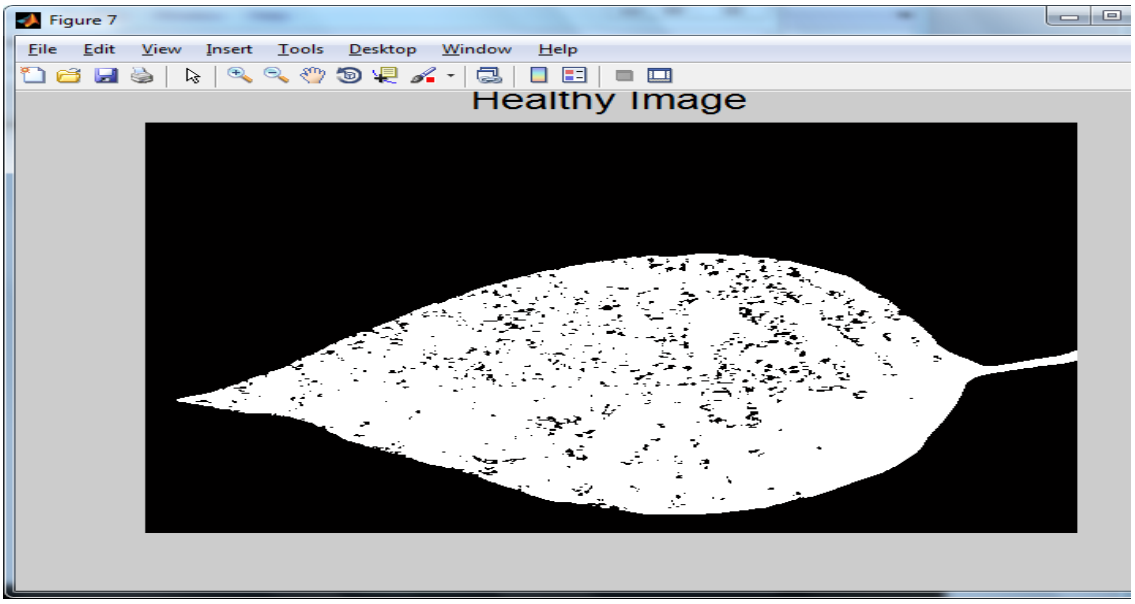

Figure 4.6 Healthy Portion in image

As shown in figure 4.6 there is healthy portion in image. The uninfected part is separated.

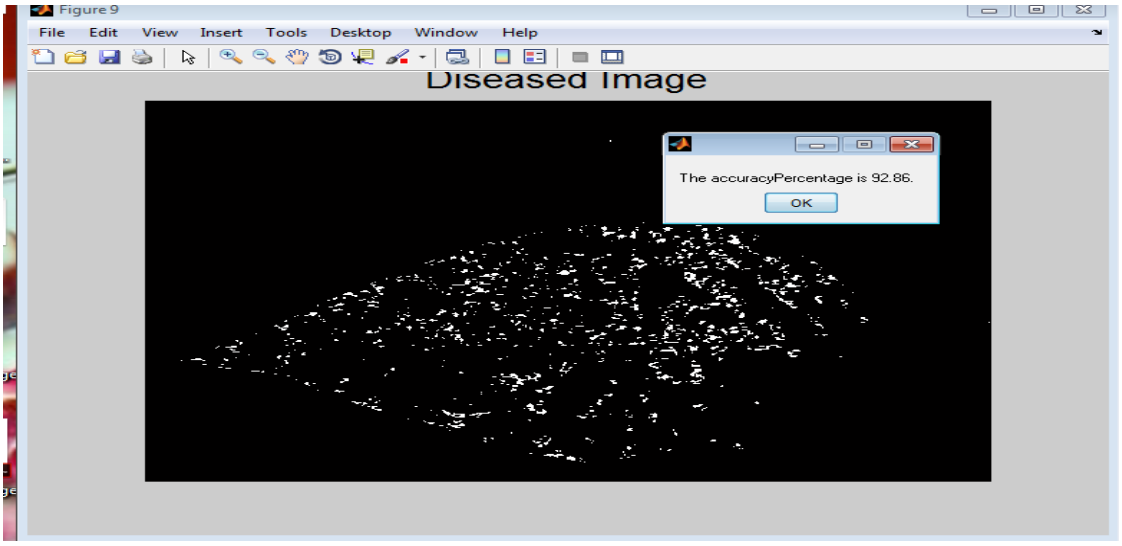

Figure 4.7Diseased Portion in image

As shown in figure 4.7 there is diseased portion in image and also enhanced the accuracy of the algorithm which is 92.86%.

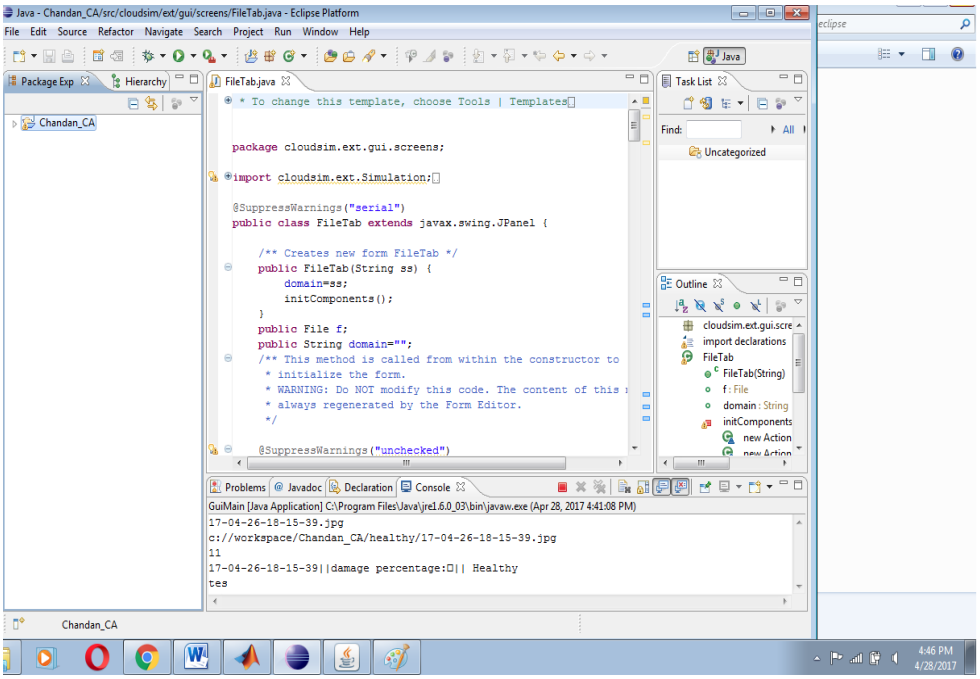

Figure 4.8Eclipse Platform

In figure 4.8 there is eclipse platform in which is used to integrate the results of images with cloud simulator.

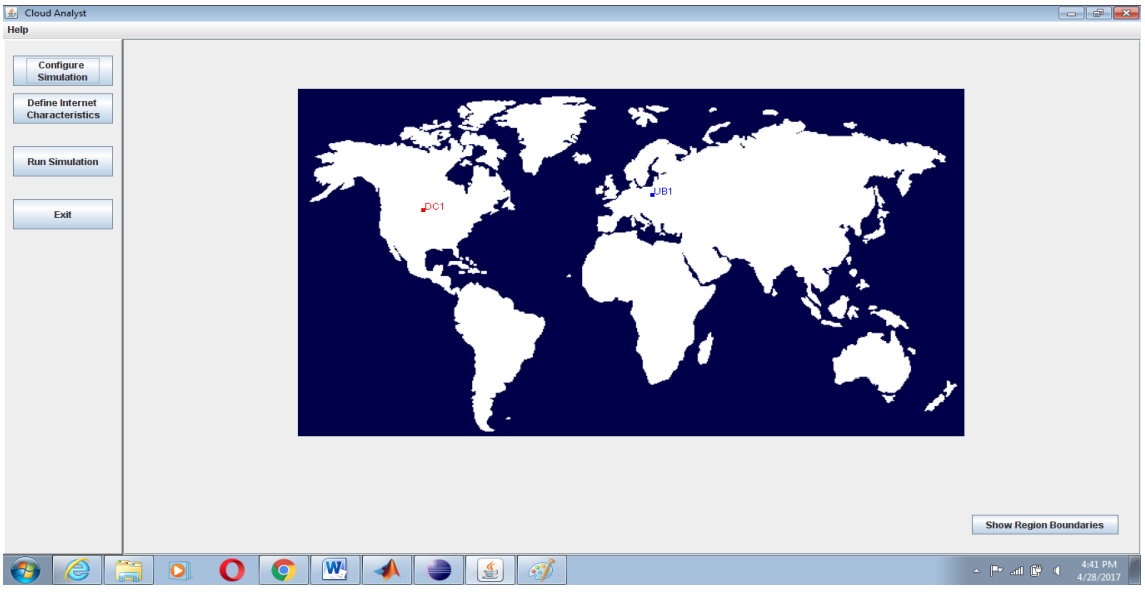

Figure 4.9Cloud Simulation interface

In figure 4.9 there is cloud simulation interface. It evaluates the performance of the cloud environment.

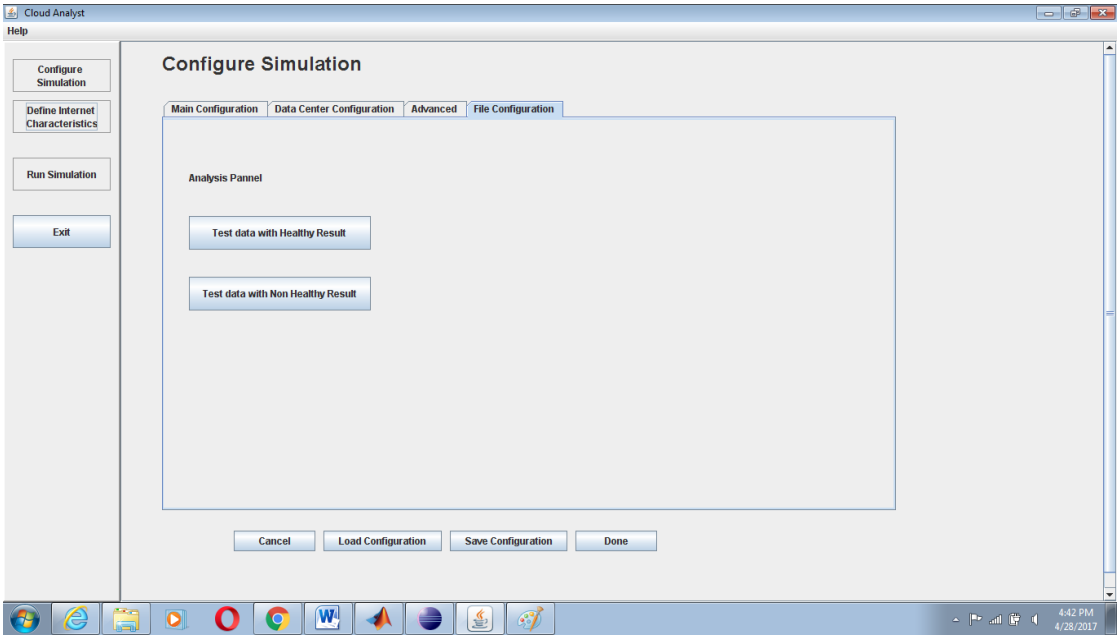

Figure 4.10Cloud Configuration Simulation

In figure 4.10 there is cloud configuration interface. It will give the results of images with timestamp on cloud interface.

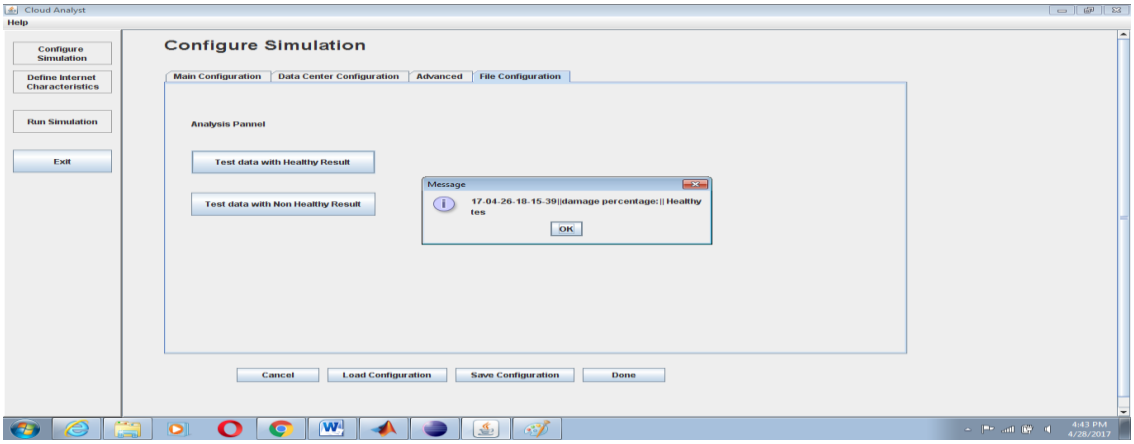

Figure 4.11Cloud Simulation Timestamp

In figure 4.11 it shows the results of diseased and healthy images with timestamp. It also gives the area of fraction of diseased portion. If the diseased portion is above 20% then it will show image as diseased image.

4.2 Comparison with Existing Technique

In the existing system the following steps are followed:-

- Various images are captured as input to detect the disease.
- Black pixels are added to detect the holes in image.
- Detection of each and every positon of image to extract the features.
- PCA classifier is applied.

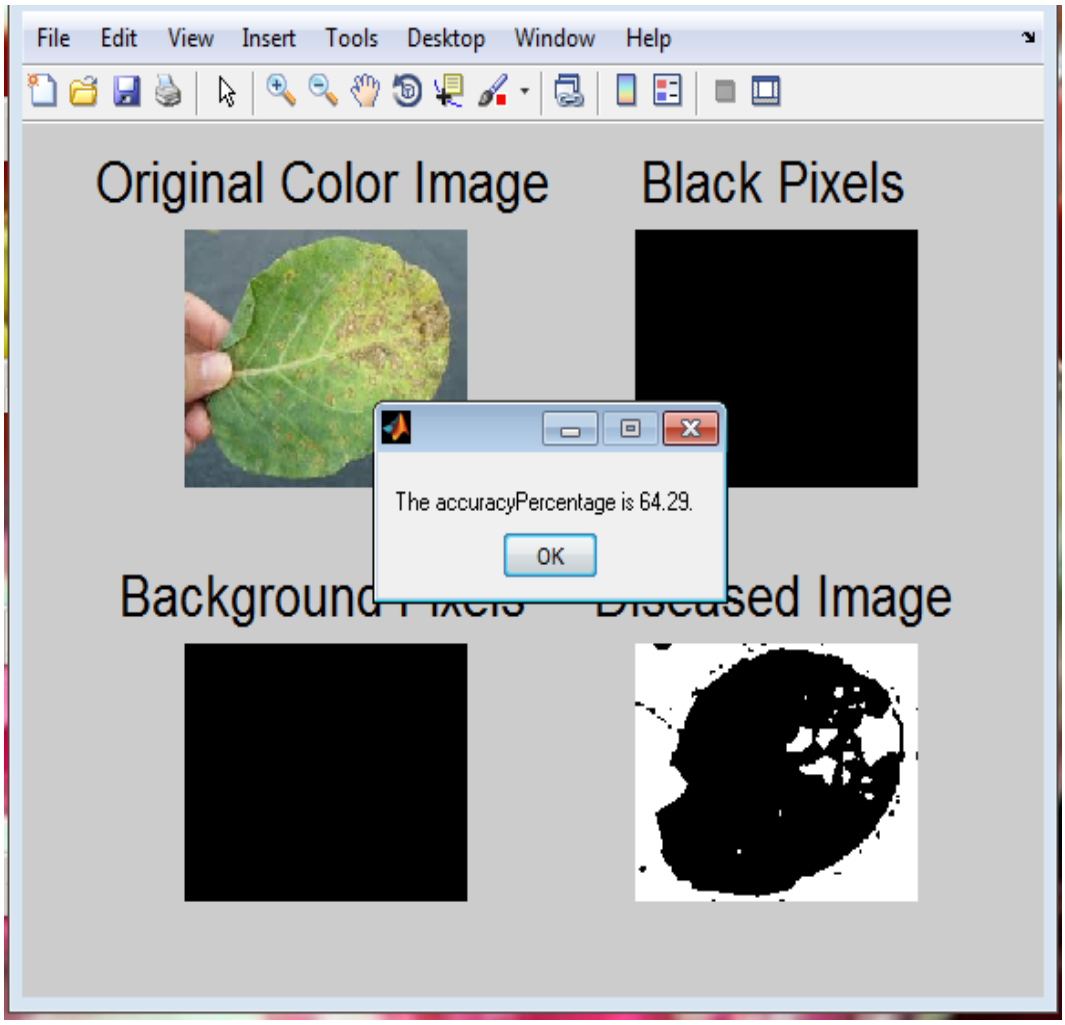

Figure 4.12 Existing work Results

This figure 4.12 shows the results of existing work and its accuracy is 62.29%.

In this proposed work, the existing system will be improved using the SVM classifier.

- Various images are captured as input to detect the disease.
- Extreme detection of image
- Division of image into uniform region

- Black pixels are added to detect holes in image
- Feature extraction is done using SIFT .
- SVM classifier is applied to classify diseased and non -diseased part

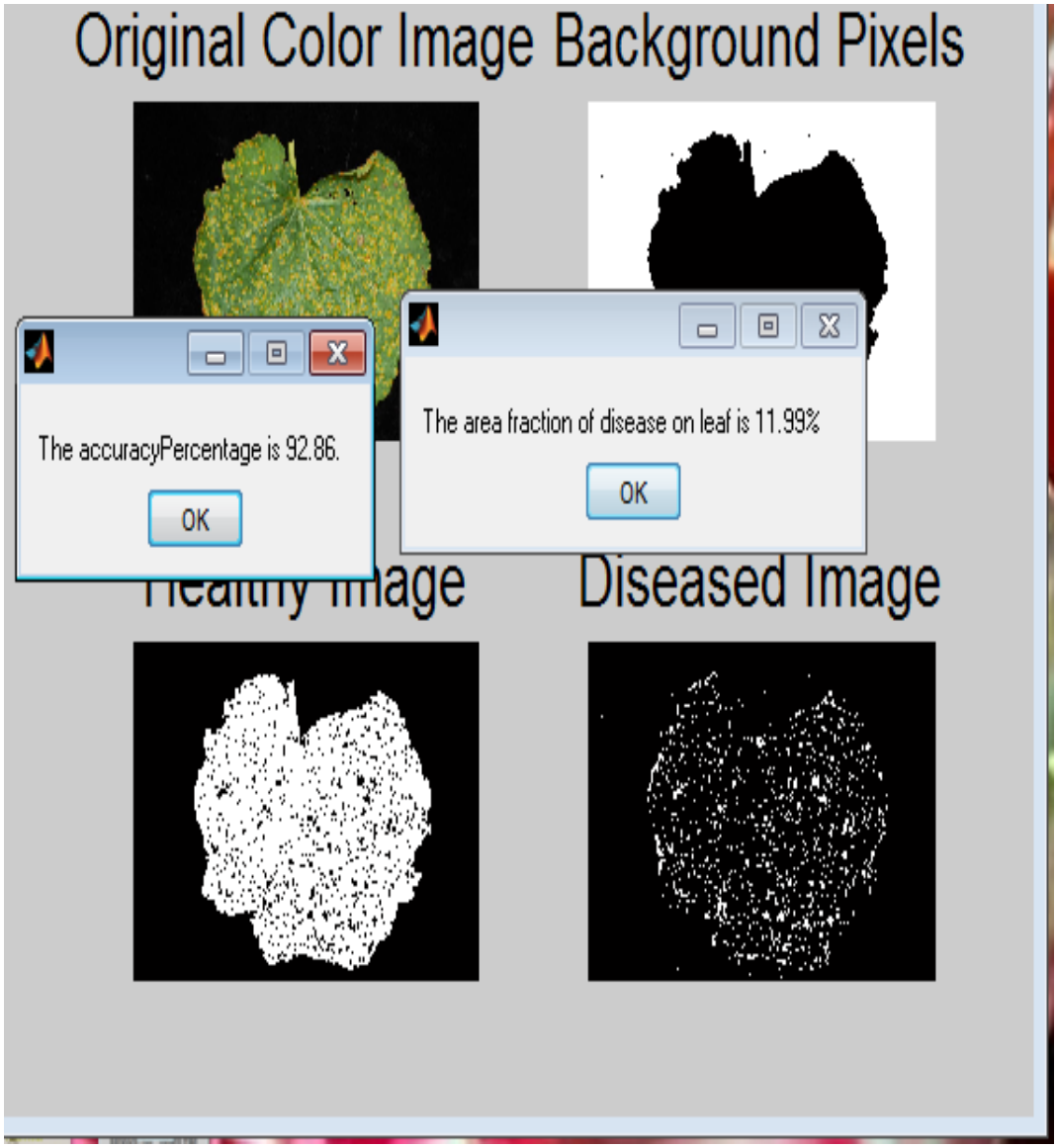

Figure 4.13 Proposed work Results

As shown in figure 4.13 it is implementation results of proposed work. It improves the accuracy of existing work and it also gives the area of fraction on leaf. This proposed work reduces the execution time of algorithm.

CHAPTER 5

CONCLUSION AND FUTURE WORK

5.1 Conclusion

To achieve the efficient information management, flexible knowledge and information sharing local and global communication there is need to develop the system which serves the information of agriculture. In agriculture there are various kinds of insects and pests which are harmful to crops. So there is need to detect these kinds of insects to improve the overall productivity. The detection of disease is done here through the BP networks. This involves the utilization of color, texture, and shape. The combination of these features was utilized. On the basis of the reduction of dimensions of data which is gathered by PCA, the image recognition is performed with the help of BP network. For reducing the dimensions of featured data found within the extracted images, the PCA was utilized. In the initial stage, the plant disease is recognized through this method and it is further controlled. The optimal recognition results were enhanced and when the dimensions of feature data was reduced using PCA, the results were gathered. However, the accuracy is low in this method. By proposing some new techniques, better results might be achieved for reducing the dimensions of the featured data.

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5.2 Future Scope

Although cloud computing can be seen as new phenomenon which is set to the way we use internet. There are many new technologies emerging at rapid rate, each with technology advancement and with the potential of making human's lives easier. Cloud computing technology facilitates large storage and management to agriculture information at low cost. By implementing cloud computing technology in agriculture it will makes easy to take decision related to crops and lands for farmers. It will increase the accuracy of work and decrease the execution time and disease detection rate. The overall productivity of crops will increase and users will be more satisfied.

Implementing cloud computing technology in agriculture will bring new growth in economic development of country as well as to farmers. By detecting disease in crops it will improve the overall production of agriculture sectors.

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