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Detection of Plant Leaf Disease Using CNN Algorithm

Nageshwar Jaiswal[1], and Vivek Sarnaik[2]
[1]*Sinhagad Institute of Technology, Lonavla, India*
[2]*Sinhagad Institute of Technology, Lonavla, India*

Abstract
The key to reducing losses in agricultural product output and quantity is early detection of plant diseases. The investigation of visually observable patterns on the plant is required for the research of plant diseases. Plant health monitoring and disease detection are crucial for long-term agriculture. Manually monitoring plant diseases is quite tough. It necessitates a great deal of effort, as well as knowledge of plant diseases and long processing times. As a result, image processing is utilized to detect plant illnesses. Image acquisition, image pre-processing, image segmentation, feature extraction, and disease identification are all processes in the disease detection process. Image acquisition, picture pre-processing, image segmentation, feature extraction, and classification are all processes in the disease detection process. The approaches for detecting plant illnesses using photographs of their leaves were addressed in this research. In addition, certain segmentation and feature extraction algorithms for plant disease diagnosis were discussed in this study. Image capture, segmentation, and feature extraction are some of the terms used in this paper.
Keywords: *Image processing, disease detection, smart detection.*

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I. INTRODUCTION

India is a cultivated country, with agriculture employing over 70% of the people. Farmers have a wide range of options when it comes to choosing appropriate crops and insecticides for their plants. Plant disease causes a considerable decrease in the quality and quantity of agricultural goods. Plant disease research is concerned with the examination of visually discernible patterns on plants. The monitoring of plant health and disease is critical to the effective cultivation of crops on the farm. In the beginning, plant disease monitoring and analysis were done manually by an expert in the field. This necessitates a great deal of effort as well as a long processing time. Plant disease detection can be done using image processing techniques. Symptoms of disease can be noticed on the leaves, stems, and fruits in the majority of cases. The illness symptoms are shown on the plant leaf, which is used to detect the sickness. This study provides an overview of image processing techniques for detecting plant diseases.

A. MOTIVATION

Nowadays, files are uploaded by only one user and unshared multi- owner setting. It cannot be directly applied in the shared multi-owner setting. to overcome this issue we propose Sharing Data By Multi Owners Settings Using Access Policy And Keyword Search On Cloud that share files with multiple owners, here we also use time server that automatically deletes the files on cloud whenever time limit crossed and users can get file rank wise.

B. PROBLEM DEFINITON

Farmers actually does not understand due to which disease plant get affected to provide him correct information we build robot which identify the correct disease and suitable pesticide for that disease.

II. LITERATURE SURVEY

A. NEW OPTIMIZED SPECTRAL INDICES FOR IDENTIFYING AND MONITORING WINTER WHEAT DISEASES

Author Name Wenjiang Huang, Qingsong Guan, Juhua Luo, Jingcheng Zhang, Jinling Zhao.
Description: The vegetation indices from hyper spectral data have been shown for indirect monitoring of plant diseases. But they cannot distinguish different diseases on crop. Wenjiang Huang et al developed the new spectral indices for identifying the winter wheat disease. They consider three different pests (Powdery mildew, yellow rust and aphids) in winter wheat for their study. The most and the least relevant wavelengths for different diseases were extracted using RELIEF-F algorithm. The classification accuracies of these new indices for healthy and infected leaves with powdery mildew, yellow rust and aphids were 86.5%, 85.2%, 91.6%.

B.. FEASIBILITY STUDY ON PLANT CHILI DISEASE DETECTIION USING IMAGE PROCESSING TECHNIQUES

Author Name: Zulkifli Bin Husin, Abdul Hallis Bin Abdul Aziz, Ali Yeon Bin Md Shakaff Rohani Binti S Mohamed Farook

Description: They captured the chilli plant leaf image and processed to determine the health status of the chilli plant. Their technique is ensuring that the chemicals should apply to the diseased chilli plant only. They used the MATLAB for the feature extraction and image recognition. In this paper pre-processing is done using the Fourier filtering, edge detection and morphological operations. Computer vision extends the image processing paradigm for object classification. Here digital camera is used for the image capturing and LABVIEW software tool to build the GUI.

C. IMAGE PROCESSING FOR SMART FRAMING DETECTION OF DISEASE AND FRUIT GRADING

Author Name: Jiguo Li, Wei Yao, Jinguang Han

Description:They have used artificial neural network for detection of disease. They have created two separate databases, one for the training of already stored disease images and other for the implementation of the query images. Back propagation is used for the weight adjustment of training databases. They consider three feature vectors, namely, color, textures and morphology. They have found that the morphological feature gives better result than the other two features.

D. PLANT LEAF DISEASE DETECTION AND CLASSSIFICATION BASED ONN CNN AND LVQ ALOGRITHM

Author Name: Melike Sardogan, Adem Tuncer, Yunus Ozen.

Description: The early detection of diseases is important in agriculture for an efficient crop yield. The bacterial spot, late blight, septoria leaf spot and yellow curved leaf diseases affect the crop quality of tomatoes. Automatic methods for classification of plant diseases also help taking action after detecting the symptoms of leaf diseases. This paper presents a Convolutional Neural Network (CNN) model and Learning Vector Quantization (LVQ) algorithm based method for tomato leaf disease detection and classification. The dataset contains 500 images of tomato leaves with four symptoms of diseases. We have modeled a CNN for automatic feature extraction and classification. Color information is actively used for plant leaf disease researches. In our model, the filters are applied to three channels based on RGB components. The LVQ has been fed with the output feature vector of convolution part for Training the network. The experimental results validate that the proposed method effectively recognizes four different types of tomato leaf diseases.

E. IoT BASED CROP DISEASE DETECTION AND PESTING FOR GREENHOUSE

Author Name: Sanket Solanke, Paurnima Mehare, Shweta Shinde.

Description: Agriculture is the biggest sector in India but still farming and Information Technology seems far away from each other. Farmers waste a lot of time waiting for disease detection on the crop. And unless these diseases spread to a large area, they cannot be noticed. In the meantime lot of crop gets wasted and expenditure of fertilization and pesting also increases. Thus, to overcome issues of an existing system we put forward an approach established on Internet Of Things (IoT) platform. In the proposed approach, a smart device is placed in between plants lane in a way that it will cover the whole farm in a zig-zag manner.

III. SOFTWARE REUQIREMENTS SPECIFIACTION

The software requirement specification of our project will have the entire necessary requirement which will be a baseline of our project. The software requirement specification will incorporate functional and nonfunctional requirements, system architecture, data flow diagrams, UML diagrams, experimental setup requirements and performance metrics.

Purpose and Scope of Document:

A software requirements specification (SRS) is a document that is created when a detailed description of all aspects of the software to be built must be specified before the project is to commence. It is important to note that a formal SRS is not always written. In fact, there are many instances in which effort expended on a SRS might be better spent in other software engineering activities.

Overview of responsibilities of Developer

1. To have understanding of the problem statement.
2. To know what are the hardware and software requirements of proposed system.
3. To have understanding of proposed system.
4. To do planning various activities with the help of planner.
5. Designing, programming, testing etc.

Purpose
The main purpose of this project is to preserve the confidentiality in secret share file.

Objective
1. We formulate the problem of secure data transmission in sensor networks, and identify the challenges specific to this context.
2. To provide security against malicious cloud hackers
3. To reduce complexity of existing system
4. We design efficient techniques for data decoding and verification at the base station.
5. We perform a detailed security analysis and performance evaluation of the proposed technique

IV. FUNCTIONAL REQUIREMENTS

System Specifications
1. Hardware: Intel core
2. Speed: 2.80 GHz
3. RAM: 1GB
4. Hard Disk: 20 GB
5. Key Board: Standard Windows Keyboard
6. Mouse: Two or Three Button Mouse
7. Monitor: 15 VGA color

Software Specifications
1. Operating System: Windows 7 and above
2. Technology: Java, Python, HTML
3. Database: My SQL

V. EXTERNAL INTERFACE REQUIREMENTS

A. USER INTERFACE

The requirements section of hardware includes minimum of 180 GB hard disk and 4 GB RAM with 2 GHz or higher speed. The primary requirements include a memory of 4GB for the Android Application development and MySQL.

B. HARDWARE INTERFACES

As this is an online application for product management we are not enabling or installing any hardware components for user interface. It's not an embedded system.
• Processor - Pentium IV 2.4 GHZ
• Speed - 1.5 Ghz and Above
• RAM - 4 GB (min)
• Hard Disk - 220 GB
• Key Board - Standard Windows Keyboard
• Mouse - Two or Three Button Mouse

C. SOFTWARE INTERFACES

This is the software configuration in which the project was shaped. The programming language used, tools used, etc. are described here.
• Operating System : Windows
• Database : MySQL

VI. NON-FUNCTIONAL REQUIREMENTS

Performance Requirements:
• The performance of the functions and every module must be well.
• The overall performance of the software will enable the users to work efficiently.
• Performance of encryption of data should be fast.
• Performance of the providing virtual environment should be fast.

Safety Requirement:
The application is designed in modules where errors can be detected and fixed easily. This makes it easier to install and update new functionality if required.

Security Requirement:
All data will be encrypted using strong encryption algorithm and according to location encryption is done.

Software Quality Attributes:
Our software has many quality attribute that are given below:-
• Adaptability: This software is adaptable by all users.
• Availability: This software is freely available to all users. The availability of the software is easy for everyone.
• Maintainability: After the deployment of the project if any error occurs then it can be easily maintained by the software developer.
• Reliability: The performance of the software is better which will increase the reliability of the Software.
• User Friendliness: Since, the software is a GUI application; the output generated is much user friendly in its behavior.
• Integrity: Integrity refers to the extent to which access to software or data by unauthorized persons can be controlled.
• Security: Users are authenticated using many security phases so reliable security is provided.
• Testability: The software will be tested considering all the aspects.

VII. SYSTEM REQUIREMENTS

Database Requirements:
MySQL : MySQL is an open-source relational database management system (RDBMS). Its name is a combination of "My", the name of co-founder Michael Widenius's daughter, and "SQL", the abbreviation for Structured Query Language.

MySQL is free and open-source software under the terms of the GNU General Public License, and is also available under a variety of proprietary licenses. MySQL was owned and sponsored by the Swedish company MySQL AB, which was bought by Sun Microsystems (now Oracle Corporation). In 2010, when Oracle acquired Sun, Widenius forked the open-source MySQL project to create MariaDB.
MySQL is a component of the LAMP web application software stack (and others), which is an acronym for Linux, Apache, MySQL, Perl/PHP/Python. MySQL is used by many database-driven web applications, including Drupal, Joomla, phpBB, and WordPress. MySQL is also used by many popular websites, including Facebook, Flickr, MediaWiki, Twitter, and YouTube.

Software Requirements

Operating system	:	Windows 7 and above.
Coding Language	:	Java 1.8, Python, PHP
IDE	:	Pycharm

Hardware Requirements

System	:	Intel I3 Processor and above.
Hard Disk	:	200 GB.
Monitor	:	15 VGA Color.
Ram	:	4 GB.

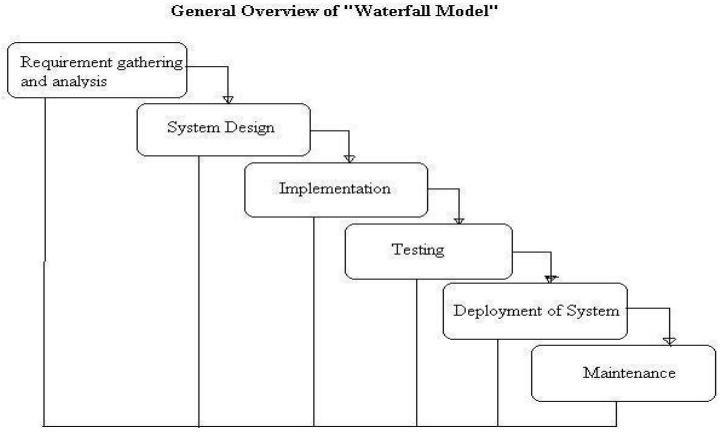

Figure 1: Analysis models: SDLC model to be applied

VIII. SYSTEM IMPLEMENTATION PLAN

1. Requirement gathering and analysis:
In this step of waterfall we identify what are various requirements are need for our project such are software and hardware required, database, and interfaces.

2. System Design:
In this system design phase we design the system which is easily understood for end user i.e. user friendly. We design some UML diagrams and data flow diagram to understand the system flow and system module and sequence of execution.

3. Implementation:
In implementation phase of our project we have implemented various module required of successfully getting expected outcome at the different module levels.
With inputs from system design, the system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality which is referred to as Unit Testing.

4. Testing:
The different test cases are performed to test whether the project module are giving expected outcome in assumed time. All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.

5. Deployment of System:
Once the functional and nonfunctional testing is done, the product is deployed in the customer environment or released into the market.

6. Maintenance:
There are some issues which come up in the client environment. To fix those issues patches are released. Also to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment. All these phases are cascaded to each other in which progress is seen as flowing steadily downwards like a waterfall through the phases. The next phase is started only after the defined set of goals are achieved for previous phase and it is signed off, so the name "Waterfall Model". In this model phases do not overlap.

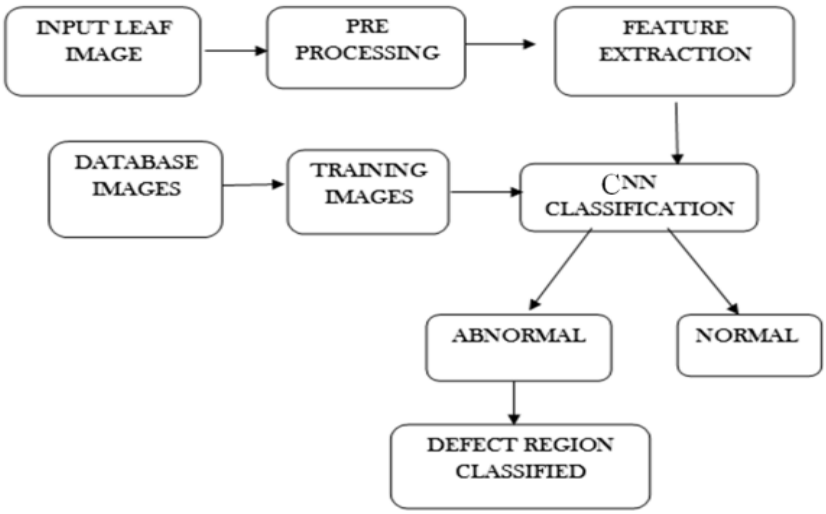

Figure 2: System Architecture

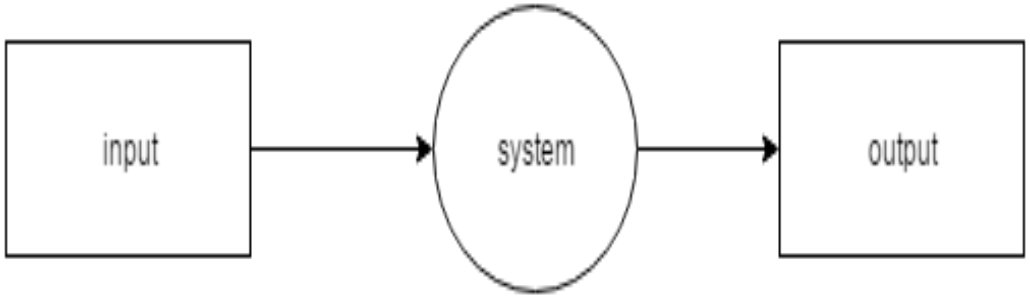

Figure 3 (i): In Data flow diagram, DFD Level 0 DFD Level 1

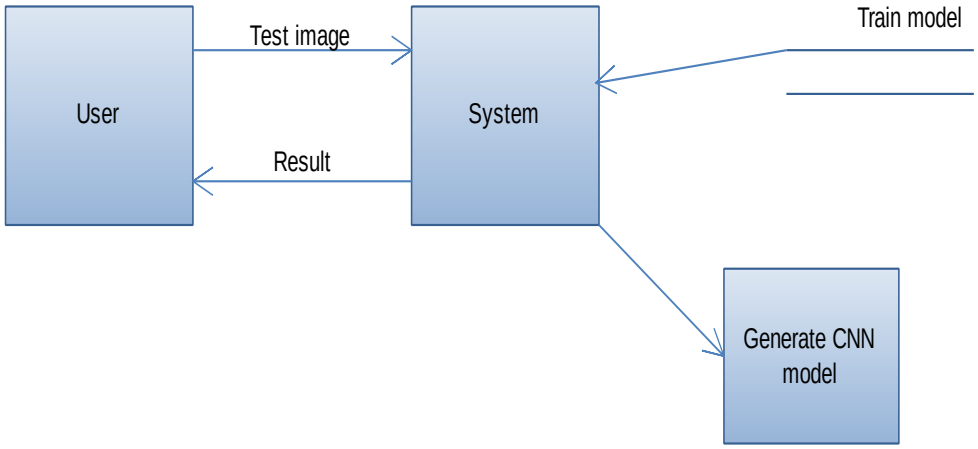

Figure 3.(ii): DFD Level 1

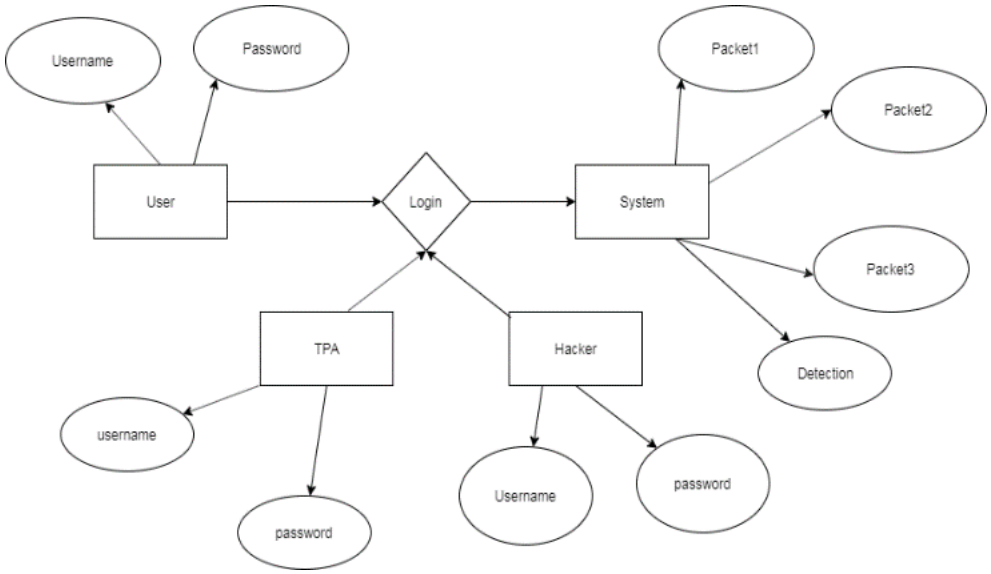

Figure 4: Entity Relationships Diagrams

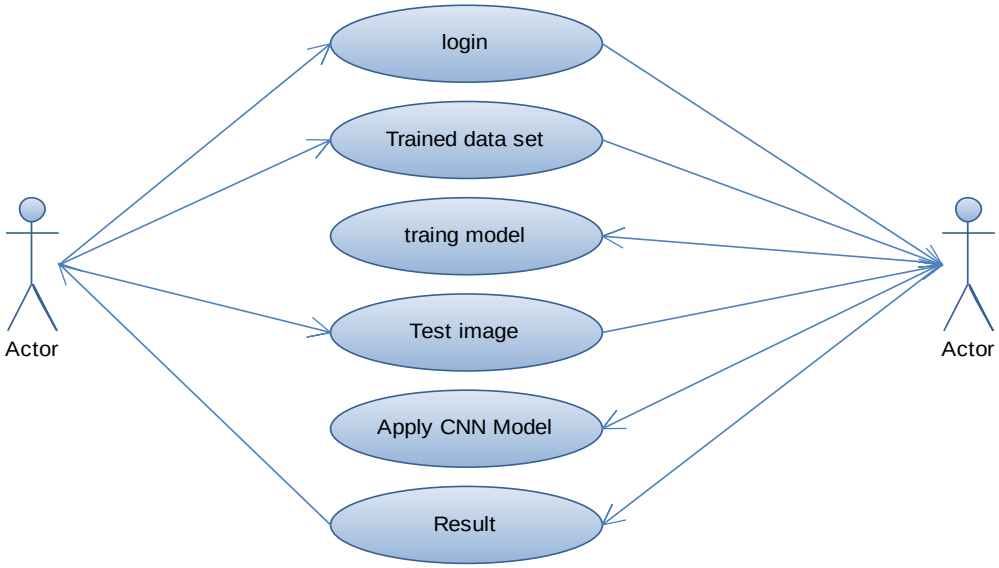

Figure 5: Usecase Diagram

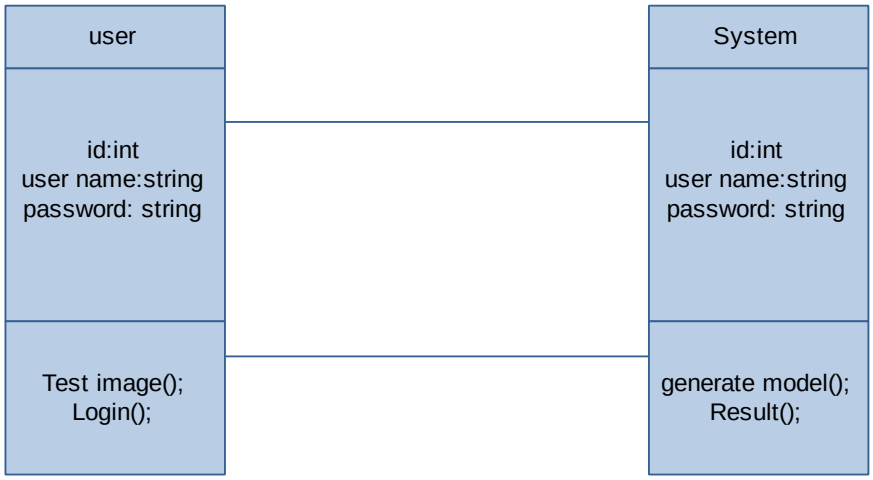

Figure 6: Class Diagram

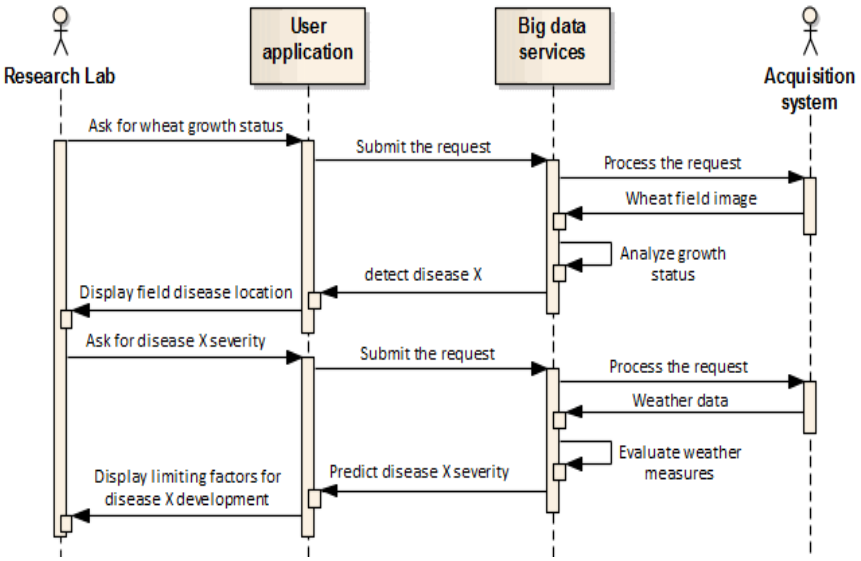

Figure 7: Sequence Diagram

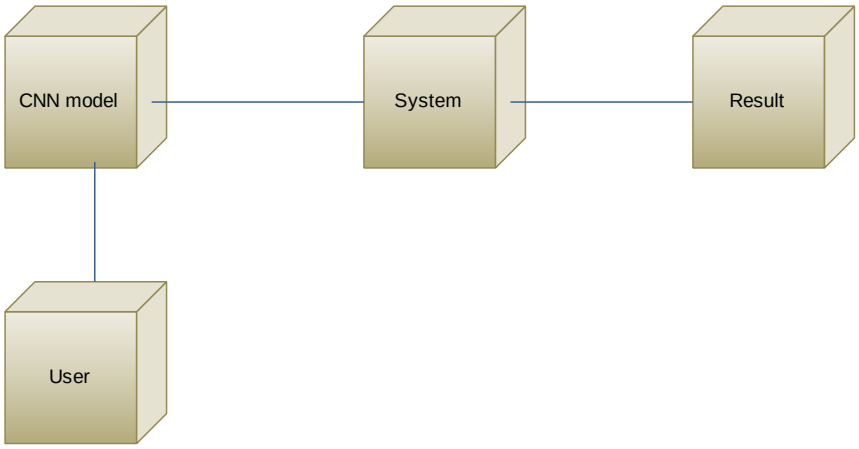

Figure 8: Deployment Diagram

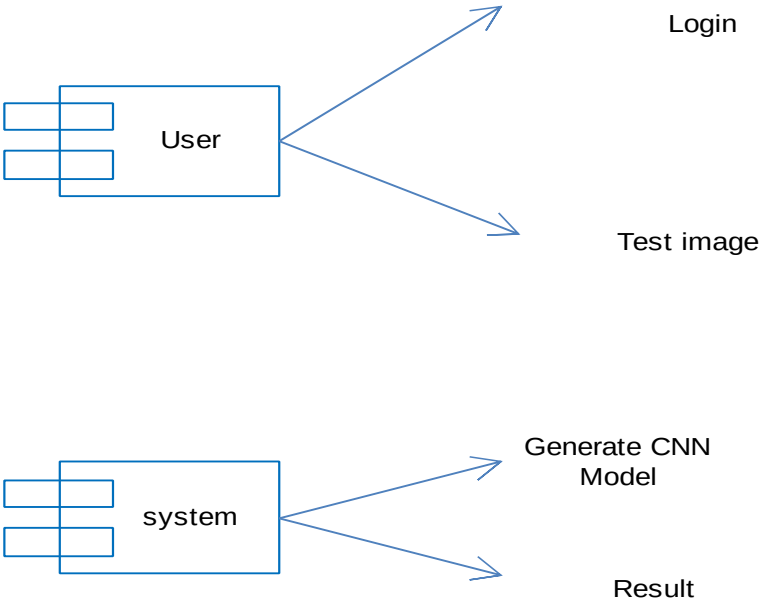

Figure 9: Component Diagram

IX. OTHER SPECIFICATIONS

Advantages:-
• Highly secured.
• Easy to handle.

Limitations:-
• User must have all required software to run the application.
• User must have the knowledge of Web based application.
• User must have cellular data.

Applications:-
•Agriculture Sector related applications.
• Crop detection.
•It helps the farmer.

X. CONCLUSION AND FUTURE WORK

The accurately detection and classification of the plant disease is very important for the successful cultivation of crop and this can be done using image processing. This paper discussed various techniques to segment the disease part of the plant.

What is P?
• P is set of all decision problems which can be solved in polynomial time by a deterministic.
• Since it can be solved in polynomial time, it can be verified in polynomial time.
• Therefore P is a subset of NP.

P: Whenever a user types in her password in any organization's assigning box, the hacker intercepts the password. The threat of such hackers is pervasive. Username is useful to find the particular user and the password for the authorization of the user. Once a password file is stolen, by using the password cracking technique it is easy to capture most of the plaintext passwords.

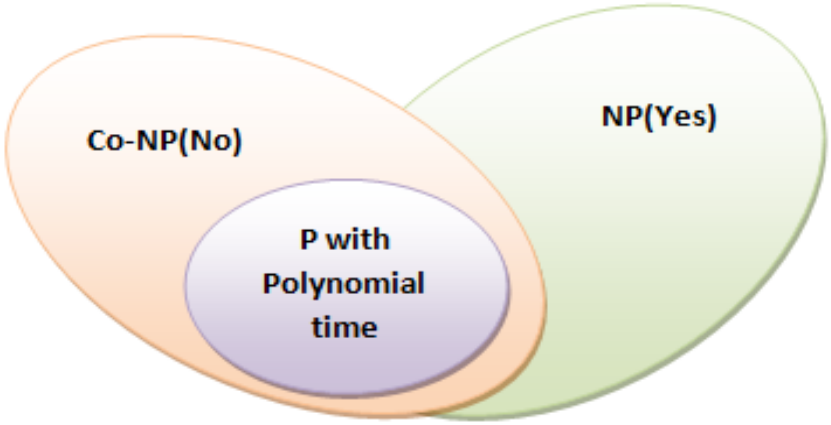

Figure 9.1: Polynomial Time

What is NP?
"NP" means "we can solve it in polynomial time if we can break the normal rules of step-by-step computing".

What is NP Hard?
A problem is NP-hard if an algorithm for solving it can be translated into one for solving any NP-problem (nondeterministic polynomial time) problem. NP-hard therefore means "at least as hard as any NP-problem," although it might, in fact, be harder.

NP Hard:
In this study, we focus on the security issue and deal with fake passwords or accounts as a simple and cost effective solution to detect compromise of passwords. Honeypot is one of the methods to identify occurrence of a password database breach. In this approach, the administrator purposely creates deceit user accounts to lure adversaries and detects a password disclosure, if any one of the honeypot passwords get used.

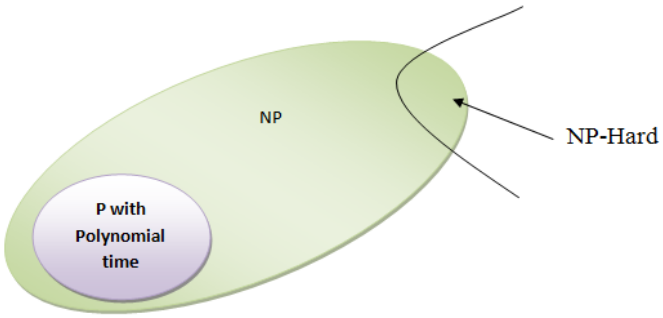

Figure 9.2: NP-Hard Problem

What is NP-Complete?

• Since this amazing "N" computer can also do anything a normal computer can, we know that "P" problems are also in "NP".

• So, the easy problems are in "P" (and "NP"), but the really hard ones are *only* in "NP", and they are called "NP-complete".

• It is like saying there are things that People can do ("P"), there are things that Super People can do ("SP"), and there are things *only* Super People can do ("SP-complete").

NP Complete:

We have study carefully the security of the honeyword system and introduce a number of defect that need to be fitted with before successful realization of the scheme. In this respect, we have pointed out that the strong point of the honeyword system directly depends on the generation algorithm. Finally, we have presented a new approach to make the generation algorithm as close as to human nature by generating honeywords with randomly picking passwords that belong to other users in the system. We present a standard approach to securing personal and business data in the system.

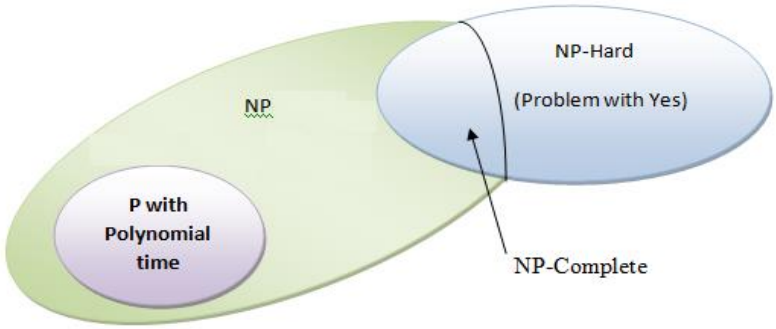

Figure 9.3: NP-Complete Problem

ACKNOWLEDGEMENT:

With immense pleasure, we present the project report as part of the curriculum of the B.E. Computer Engineering. We wish to thank and express deep sense of gratitude to our guide (Prof.S.V AUTKAR) for their consistent guidance, inspiration and sympathetic attitude throughout the project work. Without their help, this project could not have even been imagined.

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