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Cotton Leaf Disease Detection Through Image Processing Technique

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ABSTRACT

Agriculture is an important industry in many countries. As farm production is a large part of India's financial system, it is extremely important to carefully examine the issues of food production. The scientific and economic importance of nomenclature and recognition of plant infections are increasing, There is a need for a method or system that can automatically diagnose diseases because it can revolutionize surveillance. You can ingest huge harvest fields and plant leaves. Diagnosis of cotton disease is important to prevent catastrophic outbreaks. Immediately after the detection of disease, the purpose of this study is to issue guidelines for the creation of applications to detect wattage blade disease. To use this, the user must first submit a photo of the cotton blade and then use image processing to obtain a digitized color image of the damaged sheet. Get a digitized color image of this sheet. This can be handled using a mobile set algorithm to expect the true cause of wattage blade disease.

Keywords: Cotton plant, Cotton leaf, Disease, Detection, MobileNet, Feature extraction, Image classification.

Introduction

1.1 PROBLEM STATEMENT

Cotton farms are an important sector, especially in many countries in India, and agriculture is a critical part of the economy. However, cotton systems are susceptible to a variety of diseases that can strongly affect yield and quality. Traditional methods for recognizing illness are time-consuming, expensive and require competent interventions. An automated system that closely diagnoses cotton disease is urgently needed to avoid widespread damage. The aim of this study is to consider gaps by developing deep learning-based applications that use mobile sets for efficient and accurate detection of cotton diseases through image processing techniques.

1.2 OBJECTIVE:

The main goal of this study is to design and develop applications that can automatically recognize and classify cotton plant leaf diseases. In particular, the application uses a mobile set algorithm to analyze digitized images of cotton leaves to identify and predict the presence of disease. Process these images to identify signs of illness by allowing users to submit photos of cotton leaves. We provide timely and accurate diagnosis to take appropriate precautions and improve plant management.

1.3 MOTIVATION:

The motivation behind this study is based on important needs to improve disease management in cotton ties, a key agricultural sector in many economies, including India. Traditional methods Disease detection has expensive and time to consider. This often leads to delayed responses and significant losses in yield. By using deep learning and image processing techniques, this study seeks to provide an efficient and inexpensive solution for early disease detection. The potential to improve crop yields, reduce economic losses, and support farmers' livelihoods leads to the development of this innovative approach to plant disease management.

1.4 SCOPE

This study involves the development and validation of deep learning-based applications for recognizing cotton disease. The range includes the collection and preprocessing of cotton blade images, implementation of mobile set algorithms for image classification, and evaluation of application accuracy and efficiency. The purpose of this application is to act as a practical tool for farmers and agricultural professionals and diagnose real-time diseases to promote rapid intervention. Future expansions include adapting the system to other plants and the integration of additional features for comprehensive management of agricultural diseases.

1.5 INTRODUCTION

According to Mahatma Gandhi, the father of our country, agriculture is the backbone of the Indian economy. India is the second largest agricultural producer in the world. Indian farmers are endless series of plants. It accounts for around 41.49% of India's employment and provides 18% of GDP. Fast growth in agriculture is important not only for self-saflin, but also for the acquisition of important foreign exchange. Detection of plant diseases becomes a critical component of the overall production of harvest. Current methods for recognizing plant diseases are merely naked eye observations that require additional manual work, scientifically equipped laboratories, and expensive devices. Inadequate diagnosis of disease can lead to false pesticide use, contribute to the development of long-term pathogen resistance and limit your ability to protect the harvest. Plant damage detection can be achieved by investigating the various components of the disease system. Image processing using MobileNet is an approach used to recognize plant diseases.

LITERATURE REVIEW

Cotton disease has had to result in huge losses in yield and productivity over the last few decades. Identifying cotton diseases in early-stage diagnosis is important. The goal of the proposed work illustrates a system that automatically diagnoses cotton disease using a simple image processing approach. Classification based on the selection of appropriate features such as texture, color, texture, etc. of images using the SVM classifier. The photo was taken from a cotton field with a digital camera. A variety of preprocessing techniques are implemented, including filtering, background removal, and improvement. Segmentation is based on color to get the segmented portion of the disease from a cotton blade. Segmented images are used for property extraction [1].

Cotton is one of the most important cash factories in India. Each year, cotton production is reduced due to disease attacks. Plant diseases are commonly caused by pests insects and pathogens, which reduce productivity to a large standard if not checked in time. In this article, cotton blade disease detection and control systems are presented along with monitoring soil quality. This work proposes a vector mechanism- A base regression system for the identification and classification of five cottons. blade diseases, namely H. bacterial rot, alternative, grey mold, celeosprah, and fusarium alit. After recognizing the disease, the name of the disease in that medication [2].

Most disease symptoms are reflected in cotton blades. In contrast to previous approaches, the novelty of the proposal lies in the processing of images recorded under uncontrolled conditions in the field using the normal or mobile phone cameras of untrained individuals. Such field images have an overcrowded background that makes leaf segmentation very difficult. The proposed work uses two cascade classifiers. With the help of local statistical features of the first classification cotyledon from the background. Next, the color and brightness of the HSV is trained with another classifier to recognize disease and find stages. The developed algorithm is any disease. But as a presentation, we discover grey mold [3].

The world moves with a technological revolution. Computers are the main objects in almost every field of life. This concern requires a biotechnology application needs to be highly It is necessary to solve complex problems. Cotton systems are an important sector of the agricultural sector. This special plant disease can also lead to losses. This article presents a methodology for identifying the severity of frequent and complex diseases, namely Colcud disease (COLCUD) [4].

Approximately 80-90% of diseases that occur in cotton leaves are stains on leaf leaves, celcospora leaves, bacteria noise, and red spots. Uses a variety of segmented images to extract features such as colors, shapes, textures and more from your photos. Finally, these extracted features are used as entrances to the classifier [5].

1. EXISTING METHOD

This model highlights existing methods designed usin g algorithms for machine learning. Here, this process i s performed on the CNN. This algorithm does not wor k accurately and does not provide the correct accurac y.

2. PROPOSED METHOD

The proposed system proposes deep learning technology that can automatically classify images using mobile sets. These techniques allow for easy identification and identification of diseases.

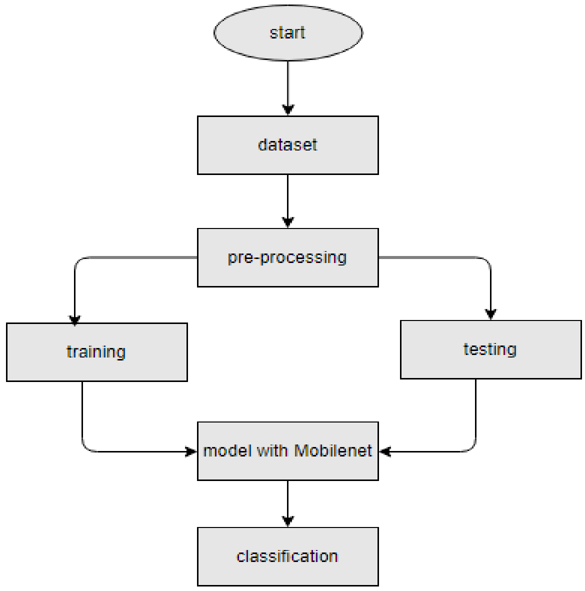
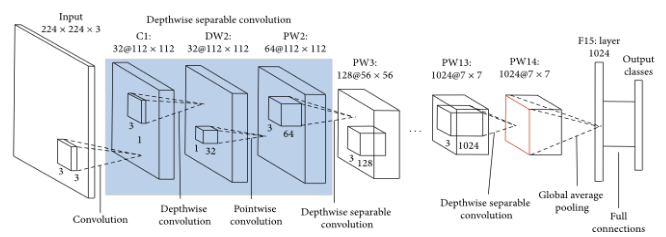


Fig.1 Block diagram of proposed method

3. ALGORITHMS:

3.1 MobileNet:

When the name is used, the mobile set model of the mobile application is interpreted. This leads to a small, deep neuronal network.



-1	0	+1
-2	0	+2
-1	0	+1

Gx

+1	+2	+1
0	0	0
-1	-2	-1

Gy

Sobel filter. GX for vertical edges, GY for detection of horizontal edges. You can separate the height and width of these filters. The GX filter can be transposed with [-1 0 1] as the matrix product of [1 2 1]. I found out that the filter was disguising itself. It shows that there are nine parameters, but it was 6. This was possible due to the separation of altitude and width dimensions. Next, use a 1*1 filter to cover the depth dimensions.

To create a channel, you need 3*3*3 parameters to perform a depth distribution and 1*3 parameters to perform a different collapse dimension. A total of 81 parameters are stored as a 33*3*3 filter is required from the normal collapse start channel. The sewer-related DK space folding is deep folded. Let's take the above diagram. There are five channels. After that, there is a 5 dk spatial convolution.**Depthwise convolution.**

SOFTWARE DEVELOPMENT LIFE CYCLE – SDLC:

In our project we use waterfall model as our software development cycle because of its step-by-step procedure while implementing.

Fig 3: Waterfall Model

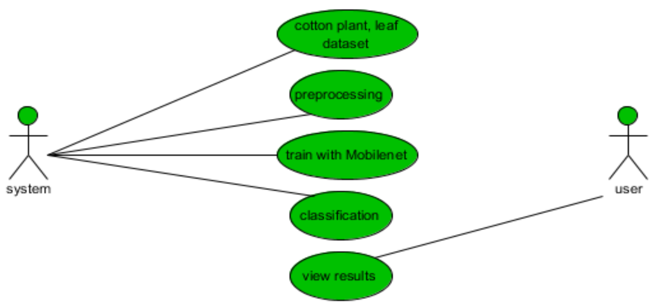
3.2 UML DIAGRAMS

UML stands for Unified Modeling Language. UML is a modeling language that is commonly standardized in the field of object-oriented software engineering. The standard was managed and created by an object management group.

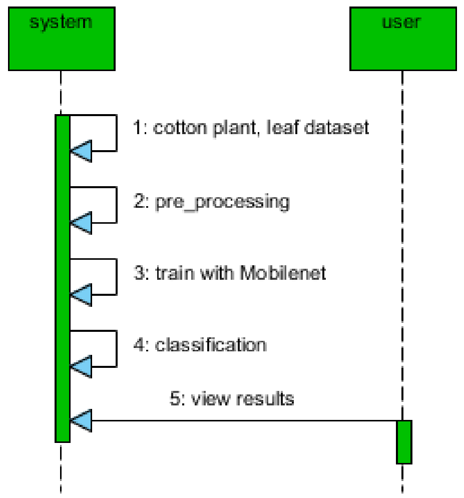
The purpose is to make UML a common language for creating models for object-oriented computer software. In its current format, UML consists of two main components: metamodel and notation. In the future, any form of methods or processes can also be added.

USE CASE DIAGRAM

The purpose is providing a graphical overview of the functions provided by the system in relation to the actor, their goals (as a use case), and all dependencies between these applications. The main purpose of the application diagram is to show which systems are run. You can view the roles of actors in the system.

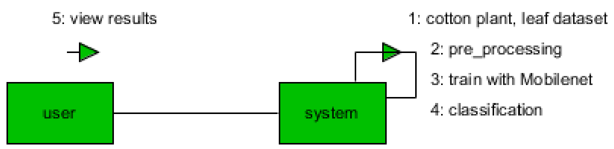


In software engineering, a uniform modeling language (UML) shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.



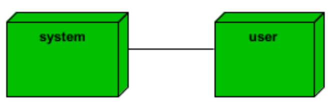
COLLABORATION DIAGRAM:

In collaboration, method call sequences are displayed through several numbering techniques, as shown below: Numbers show how methods are called one after another. To illustrate the collaboration diagram, we adopted the same order management system. Method calls are similar to calling a sequence diagram. However, the difference is that the sequence diagram does not describe the object organization, but the collaboration diagram shows the object organization.



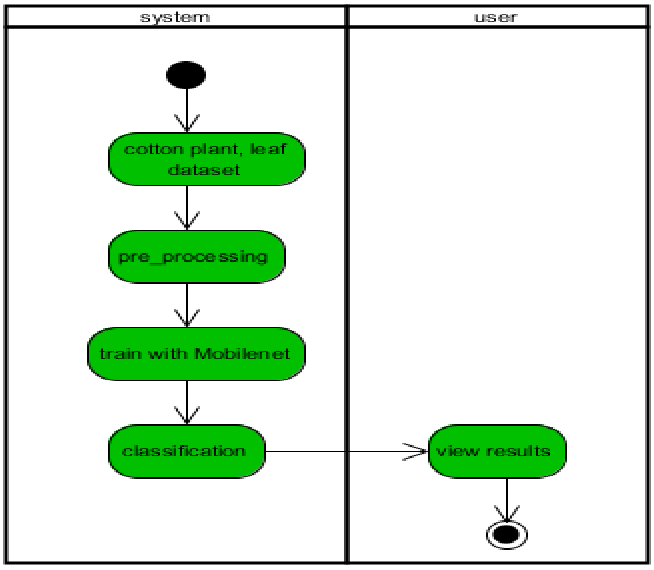
DEPLOYMENT DIAGRAM

It is related to the component diagram. Because the components are deployed using the deployment diagrams. A deployment diagram consists of nodes. Nodes are nothing but physical hardware's used to deploy the application.

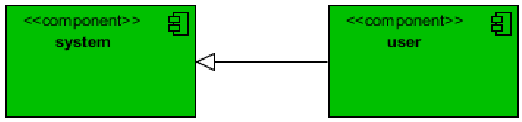


ACTIVITY DIAGRAM:

An activity diagram is a graphical representation of a step-by-step activity and action workflow that supports selection, iteration, and parallelism. A uniform modeling language allows you to use activity diagrams to describe the business and operational step-by-step workflows of components in a single system. The activity diagram illustrates a typical control flow.

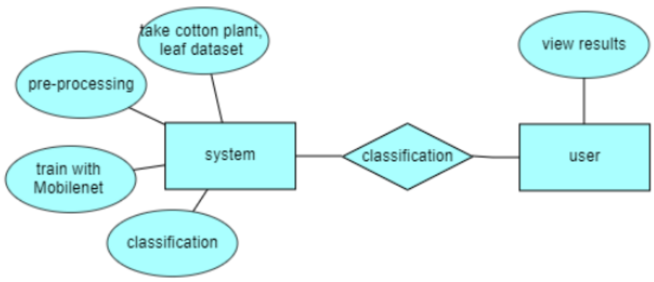


This covers each aspect of the required functionality of the system by planned development.



ER DIAGRAM:

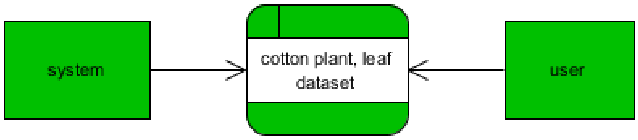
The Entity Relationship Model (ER Model) uses a diagram called the Entity Relationship Diagram (ER - Diagram) to explain the structure of a database. The ER model is a database design or blueprint that can be implemented later as a database. The main components of the E-R model are entity rates and relationships. The diagram shows the complete logical structure of the database. Let's take a look at a simple ER diagram to understand this concept.



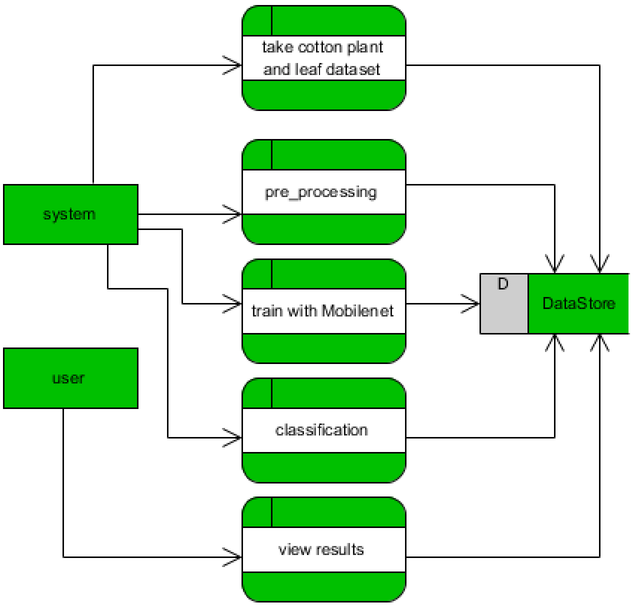
3.3 DFD DIAGRAM:

Data Flow Diagrams (DFDs) are traditional methods of visualizing information flow within a system. A good, clear DFD can graphically represent a significant amount of system requirements. It can be manual, automated, or a combination of both. It shows how information occurs, leaving the system behind a change in information and a place where information is stored. The purpose of DFD is to show the scope and limitations of the entire system. It can be used as a communications device between a system analyst and anyone who plays a role in the system that serves as a starting point for system redesign.

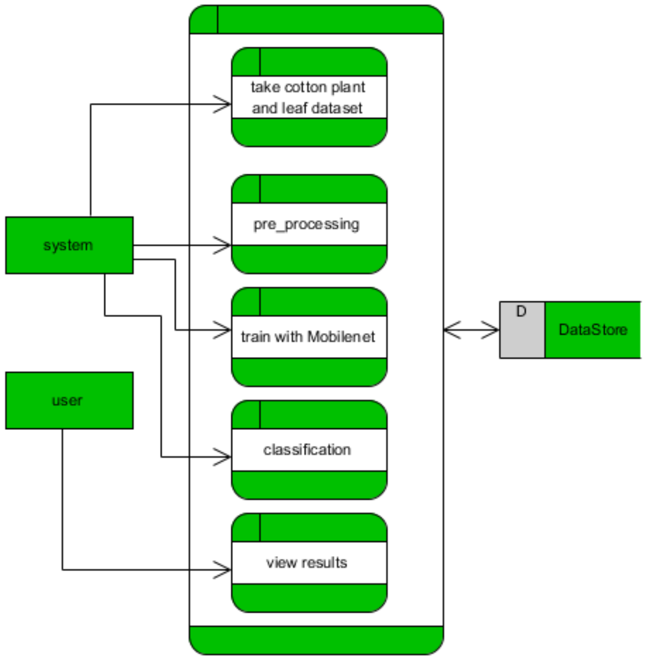
Context level diagram:



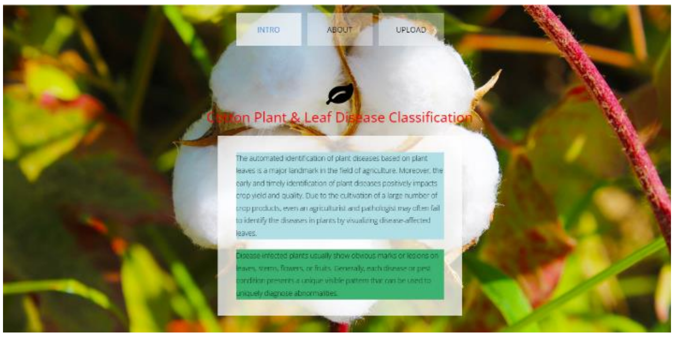
Level 1 diagram:



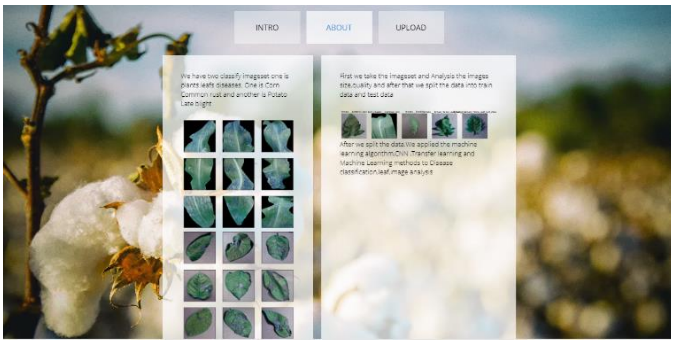
Level 2 diagram:



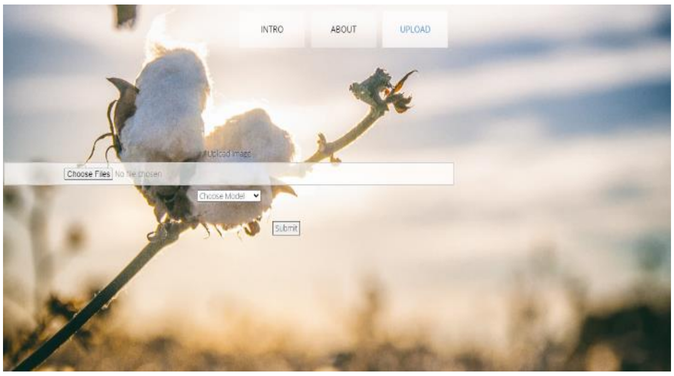
HOME:



ABOUT



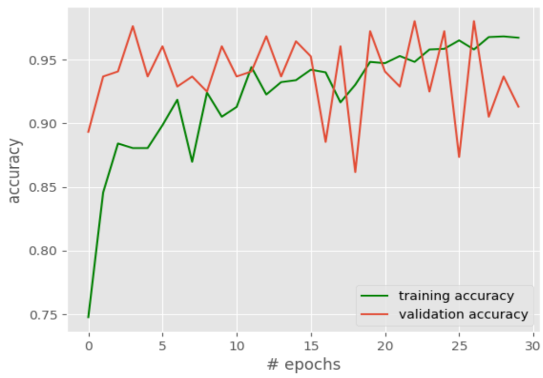
UPLOAD



OUTPUT

OUTPUT2

RESULT



Accurate Knowledge: Training accuracy (green line) steadily increases, reaching approximately 95% towards the end of the training process. This shows that the model effectively learns from training data and improves performance. However, there was significant variation, indicating that the model occasionally exceeded the training data. The accuracy of the verification does not improve consistently. This indicates that the model is problematic with validation rates, especially with a particular class or characteristic. Effective learning of the patterns underlying cotton plant and leaf classification could further improve its robustness through improved model adjustment and validation strategies.

CONCLUSION

This model shows strong potential for cotton plant and leaf detection, but slight adjustments in model architecture or training techniques might be necessary to enhance performance on unseen data. Further optimization could help in reducing fluctuations in the validation accuracy, making the model more stable and reliable in real-world applications.

FUTURE SCOPE

The future scope of this project includes expanding the dataset to cover a broader range of cotton plant diseases and incorporating images from diverse environmental conditions to enhance the model's robustness. Integration of this system with mobile applications can provide farmers with real-time disease detection capabilities in the field. Additionally, adapting the algorithm for other crops can widen its applicability, benefiting a larger segment of the agricultural industry.

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