



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

## AI Based Mobile App For Prediction Of Disease In Cotton Plants

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**Abstract:** The Cotton Plant Disease Prediction Mobile Application is designed as a practical solution to address the challenges faced by farmers in diagnosing and managing cotton plant diseases. The project combines mobile technology and machine learning to deliver a convenient, accurate, and cost-effective disease detection system. Users can capture or upload images of their cotton plants through the mobile application, which then processes these images using a pre-trained convolutional neural network (CNN) and TensorFlow Lite. This deep learning model identifies various diseases, such as leaf blight, bacterial spot, and fungal infections, with high accuracy. The application not only detects diseases but also offers a comprehensive guide to remedies and management strategies tailored to each diagnosis. By providing early detection and actionable solutions, the app minimizes crop damage, reduces dependency on agricultural experts, and saves time for farmers. The project also highlights scalability, with potential extensions to other crops and integration with real-time environmental data like weather and soil conditions. This initiative stands as an excellent example of technology-driven solutions for modern agriculture, fostering sustainable practices and empowering farmers with tools to combat crop diseases effectively and efficiently.

**Index Terms** - Convolutional neural network (CNN), Cotton Plants, TensorFlow Lite, Machine learning, Deep Learning.

### I. INTRODUCTION

Agriculture plays a significant role in feeding the world's population, and cotton is one of the most important crops globally, especially in countries like India, China, and the United States. Cotton farming, however, faces several challenges, particularly diseases that can severely affect crop yield and quality. Early detection of plant diseases is critical for effective management, but the tools and expertise required for diagnosis are often unavailable to small-scale farmers, especially in rural areas. The **Cotton Plant Disease Prediction Mobile Application** is an innovative solution designed to bridge this gap by enabling farmers to detect and identify diseases in cotton plants using their smartphones. The primary goal of this application is to help farmers monitor their crops in real-time and take preventive or corrective measures before diseases cause significant damage. By combining **image recognition technology** and **machine learning (ML) algorithms**, the application allows users to upload images of cotton plants and receive accurate diagnoses of potential diseases. The mobile application uses a sophisticated machine learning model that analyzes images of cotton plants uploaded by users. By processing these images, the application can accurately identify a range of cotton plant diseases such as bacterial blight, cotton leaf curl, and other common pathogens. Once the disease is identified, the app provides the user with a detailed report that includes the name of the disease, its symptoms, potential causes, and suggested treatment or prevention methods. This empowers farmers with the knowledge they need to take swift action and improve the health of their crops.

Beyond its technical capabilities, the Cotton Plant Disease Prediction Mobile Application serves as an essential tool in promoting sustainable farming practices. By enabling early diagnosis and reducing reliance on chemical treatments, the app contributes to environmentally friendly farming.

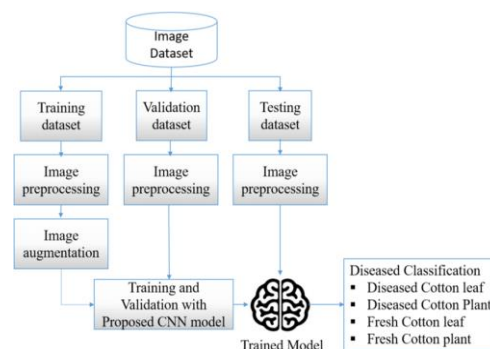


Fig. System Design

For this study secondary data has been collected. From the website of KSE the monthly stock prices for the sample firms are obtained from Jan 2010 to Dec 2014. And from the website of SBP the data for the macroeconomic variables are collected for the period of five years. The time series monthly data is collected on stock prices for sample firms and relative macroeconomic variables for the period of 5 years. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of KSE -100 Index is taken from yahoo finance.

## II. METHODOLOGY

### 1. Front-End Layer (Mobile App):

The front-end of the system is a **Flutter**-based mobile application that provides a user- friendly interface. It includes

**User Interface (UI):** Allows users to interact with the app by capturing or selecting images, displaying results, and showing disease-related information

**Image Capture:** The **camera** package allows users to capture images of cotton plants.

**Image Selection:** The **image picker** package enables users to select images from the device's gallery.

**Preprocessing:** Before sending the image to the model, it is preprocessed (e.g., resizing or enhancing) to ensure optimal quality for analysis.

### 2. Machine Learning Layer:

This layer handles the disease detection process using machine learning models, specifically **TensorFlow Lite**.

**Model Inference:** The TensorFlow Lite model is used for efficient disease detection on mobile devices. The model analyzes the image and returns a disease prediction with associated confidence levels.

**Model Updates:** Periodic updates to the machine learning model can be pushed to the app to improve accuracy and detect new diseases.

### 3. Device Layer (Hardware):

This layer consists of the physical components of the mobile device, ensuring smooth operation:

**Mobile Device:** The app works on Android smartphones, requiring at least 2GB RAM, an 8MP camera, and a multi-core processor.

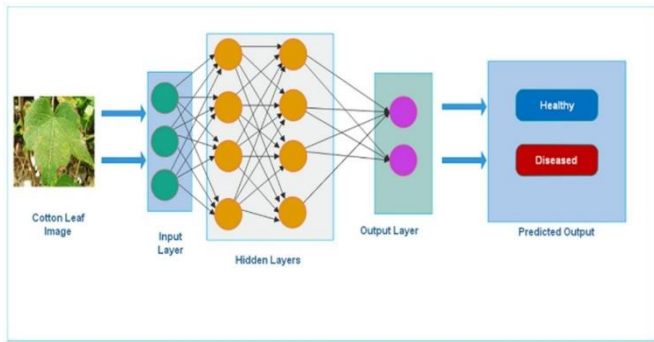
**Camera:** The camera captures high-resolution images of the cotton plant, which are then processed for disease analysis.

### 4. Data Flow:

**User Interaction:** The user captures or selects an image of the cotton plant. **Preprocessing:** The image is resized and enhanced for optimal model performance.

**Model Inference:** The preprocessed image is passed to the **TensorFlow Lite** model for disease detection.

**Result Generation:** The model returns the disease prediction and severity.



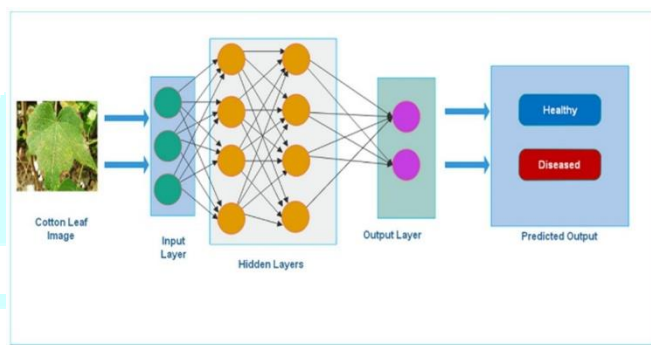
**Display Results:** The results are displayed to the user, including disease type, severity, and remedies.

#### 5. Security and Privacy:

**Data Security:** User data is encrypted and handled securely, especially if cloud storage is used.

### III. PROPOSED SYSTEM

The Cotton Plant Disease Prediction System is an advanced mobile application designed to assist farmers in identifying diseases in cotton plants using deep learning techniques.



By leveraging computer vision and CNN models, the system provides real-time disease classification, helping users take preventive measures to protect their crops. This mobile application offers a user-friendly interface where farmers can capture or upload images of their cotton plants. The system processes the image and utilizes a trained deep learning model to determine whether the plant is healthy or affected by a disease. The results are displayed instantly on the screen, eliminating the need for manual analysis.

#### 1. Image Input Module

- Allows users to **capture an image** using their smartphone camera or **upload an existing image**.
- Ensures a smooth user experience with a simple and intuitive UI.

#### 2. Disease Prediction Module

- Uses a **CNN-based deep learning model** trained on different types of cotton plant diseases.
- Processes the input image and classifies it as **healthy or diseased**.
- Provides **instant feedback** to the user within the mobile application.

#### 3. Result Display Module

- Once the model makes a prediction, the **results are displayed on the screen**.
- Users can view whether the plant is **healthy or affected** by a disease.
- Additional information (such as confidence score and disease category) may be included.

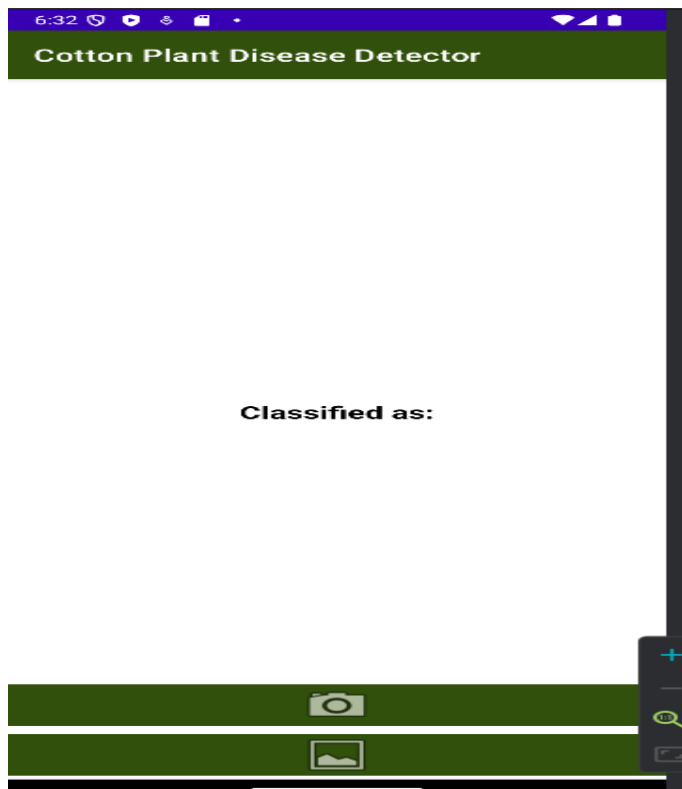
By breaking down the system into these three modules, the proposed architecture provides a structured approach to implementing the AI Based mobile App for prediction of disease in cotton plants. Each module focuses on a specific aspect of the system, making it easier to design, implement, and maintain the overall system.

The modular design also allows for flexibility and scalability, as modules can be independently created, modified, or replaced as needed.

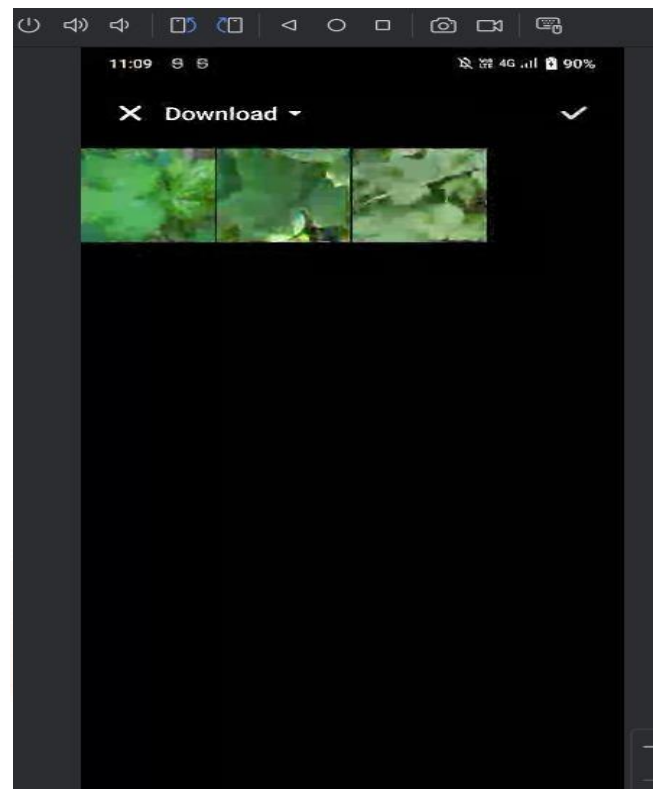
#### IV. CONCLUSION

The AI-Based Mobile App for Cotton Plant Disease Prediction uses deep learning to detect diseases in cotton plants. By leveraging a CNN model, the system analyzes cotton leaf images and classifies diseases accurately. Users can upload photos via the app, and real-time processing provides instant results for timely action. This solution eliminates manual observation, ensuring consistency and efficiency in disease detection. The lightweight and user-friendly design makes it accessible to farmers and researchers. AI integration enhances agricultural productivity by minimizing crop losses and supporting data-driven decisions. This project showcases AI's potential in modernizing farming with smart, scalable solutions.

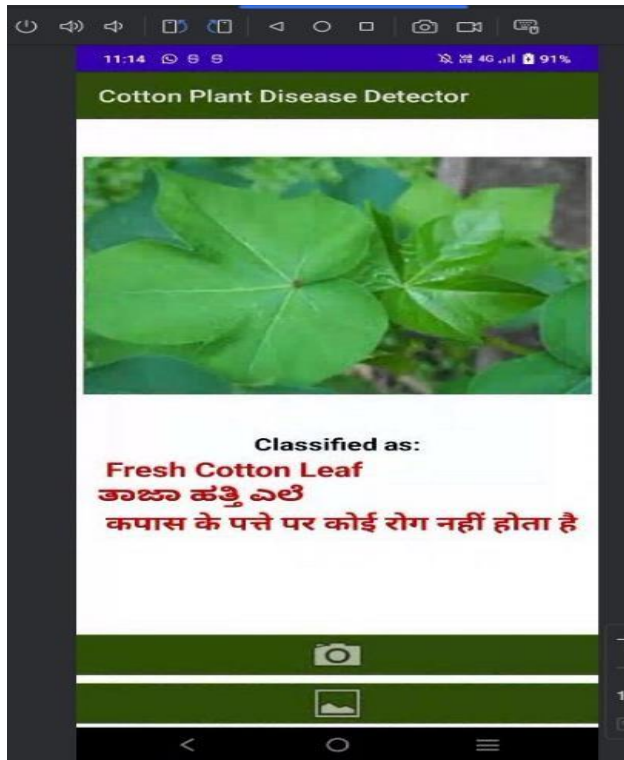
#### V. RESULTS



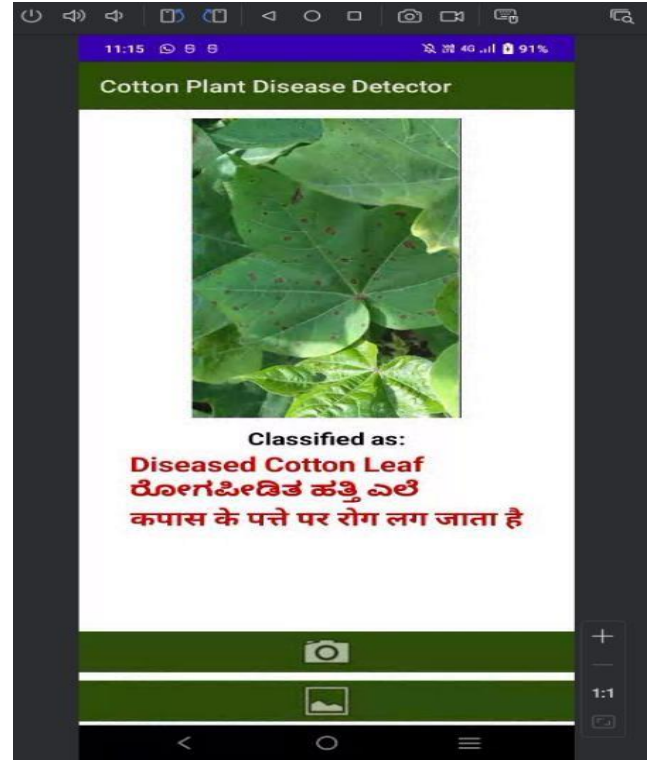
**Fig.1 : Home page**



**Fig.2 : Image selection**



**Fig.3 : Testing on Fresh Cotton Leaf**



**Fig.4 : Testing on Diseased Cotton Leaf**

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