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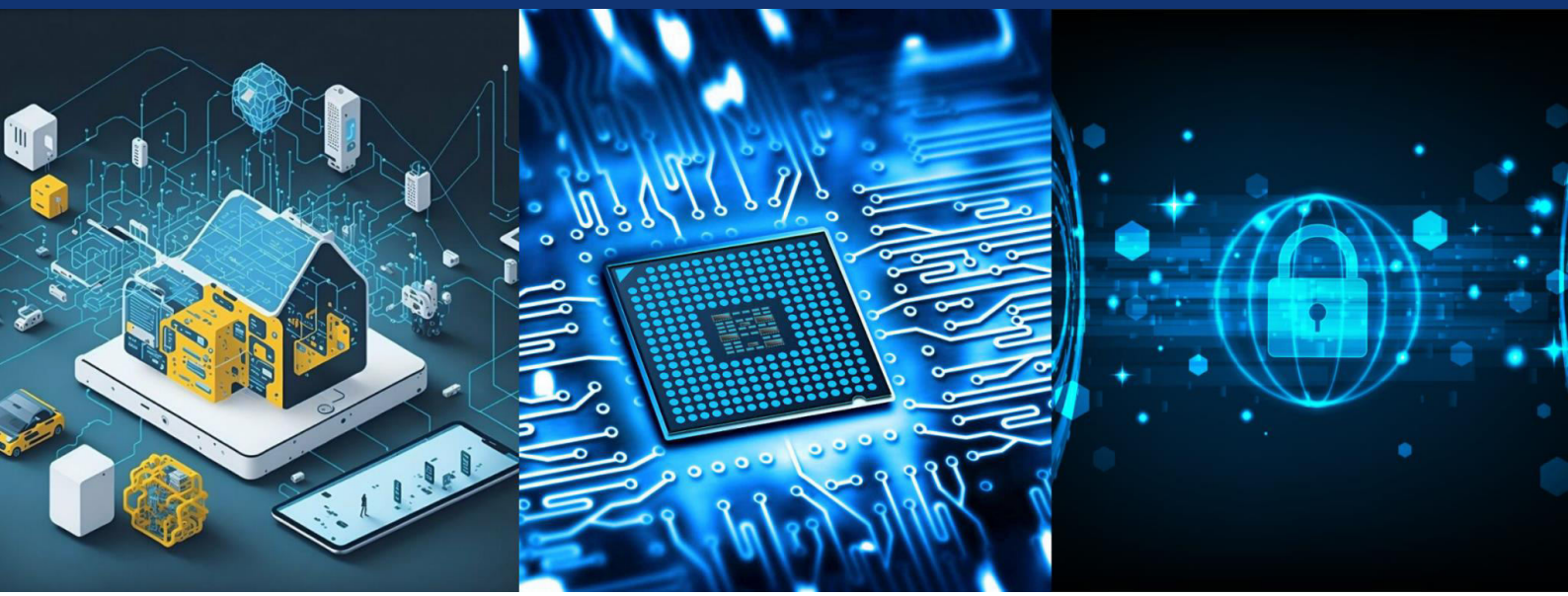

International Journal of Innovative Research in Computer and Communication Engineering

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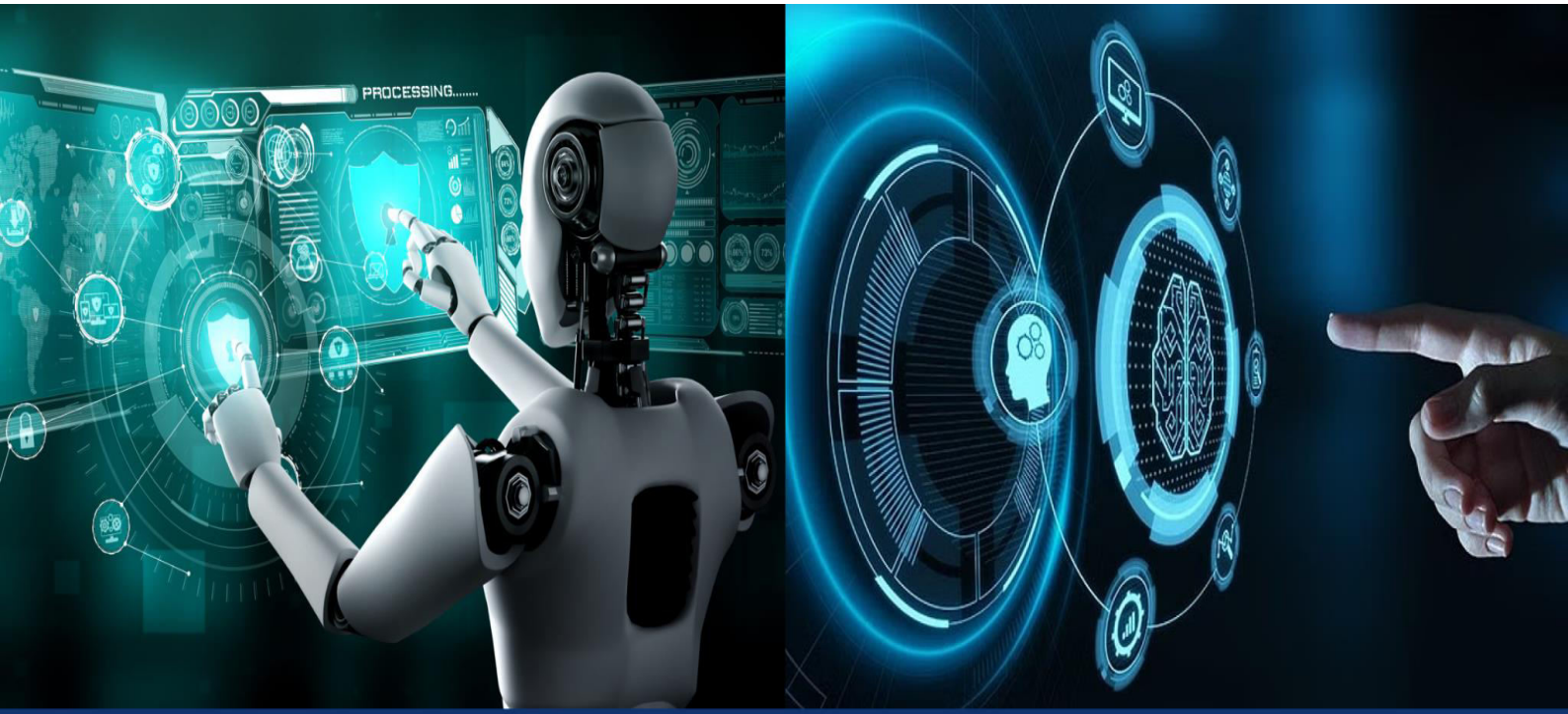

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Implementation Paper on AI-Based Plant Disease

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ABSTRACT: This project presents an intelligent AI-based system designed to detect and analyse plant diseases using images and user inputs. In the initial stage, the system relies on an advanced AI model to provide accurate disease identification and recommendations. These results are stored as learning data, allowing the system to gradually improve its own decision-making ability over time.

As more detections are performed, the system begins to learn from past experiences and reduces its dependence on external AI services. This approach helps in improving efficiency, reducing operational cost, and increasing system reliability. The proposed solution aims to support farmers by providing timely disease identification along with preventive and corrective measures. The system demonstrates how AI can be effectively used to build self-learning applications that improve continuously with real-world usage

I. INTRODUCTION

The agriculture industry contributes 18% in our economy, so to boost our economy, we need to support the farmers to improve the economy. For that, we have to solve the problems of the farmers, and one of the major controllable problems is plant disease.When the crop is get infected or get affected by the disease, the farmers follow the traditional knowledge and find the solution by gassing the problem, it can cause the damage to the crop, bad quality products, financial condition of the farmer.

To prevent this damage, farmers needs a system that detect disease and provide the guidance to them about the disease and solution. Therefore, we develop this AI system that help the farmers by providing the guidance to them on the time. This is our try towards improve the traditional knowledge by the help of AI and show the implementation of AI in the real world agriculture sector.

II. LITERATURE REVIEW

The literature survey is the important step in understanding the technology of the model or project in plant disease detection and the smart agriculture system, many researches and surveys have study how the modern technology like Artificial Intelligence, CNN, NLP, Image processing and the Machine learning can help the farmers to detect the crop disease efficiently and provide the solution. By understanding the previous studies and the correctly existing systems, it is possible to understand the current solution, advantages and their limitations.

The main purpose of the literature survey is to identify the main problem we face in the traditional agriculture treatments and solve them by the different technological approaches. It also helps in the research graphs, which helps to the improvement of model in the future.

1) computer vision

The computer vision is used for giving the input to the model and connect the environment to the model.

2) Image processing

Image processing is the main base of our model, where we convert the images in RGB vectors to process the image properly.

3) Machine leaning

We have use the machine learning for the classification of similar features of of provided data in model, help to organise and process the data.

4) Deep learning

Deep learning used to understand the hidden pattern and find the complex relationship between the data and increase performance of model.

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Method	Technology Used	Advantages	Limitations
Manual Inspection	Human expertise	Accurate diagnosis by experts	Time consuming and costly
Image Processing	Color and texture analysis	Simple implementation	Limited accuracy
Machine Learning	Classification algorithms	Faster detection	Requires manual feature extraction
Deep Learning	CNN models	High accuracy and automation	Needs large training datasets

III. SYSTEM ARCHITECTURE

The design overview of project explain the overall structure and working flow of the plant disease detection model. It describes hoe the different components of the model interact with the each other using the routers to detect plant disease from the image of infected region of plant. The model is also designed in the simple way, so that the image input, model prediction, and the solutions work together smoothly.

In our project, user provide the image of the infected crop using webcam and by uploading image, then the system process the image and send to the deep learning CNN model (ResNet18). Then the model analyse the image and checks the type of disease, and then provide the solution in output.

Layers:
1) User/ Farmer
2) Image Capture
3) Image Preprocessing
4) CNN model (ResNet18)
5) Detect Result

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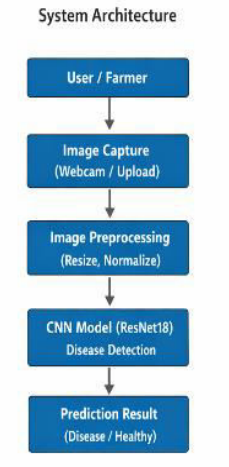

IV. METHODOLOGY

1) User interface (frontend)
Provides an easy way for the user to interact with the system. Users can upload plant disease images or capture them using the webcam and view the detection result
2) Image Input Module and Preprocessing Module
Capture the crop image by using webcam or image is by uploading feature,and captured images by cleaning and converting it into the RGB vector for the deep learning model.
4) CNN model (ResNet18)
The deep learning model responsible for analyzing the leaf image and identifying the plant disease.
5) Backend Processing module
Handles the communication between the frontend interface and the trained model. It processes the images data and returns detection results.
6) Detection output model
Display the final result indicating the name, cause, solution, and the natural solution of the disease.

V. IMPLIMENTATION

1) Frontend:
The frontend have to be user friendly and attractive, so the user means farmer can get the end to end access of the knowledge of the plant disease. Therefore, here we use the HTML, CSS for styling, and JavaScript for complex functionalities and connections.
2) Backend:
The backend of our project is designed by using Python programming language, and because Python is the most flexible programming language for AIML, get use world-wide.
i) AI model: In AI model, we have use the CNN ResNet18 model for finding hidden patterns and build complex relationship between the data.
ii) API: In the project, we use Gemini API key for the Q&A functionality for the farmers to make the platform interactive.
iii) Database: For the collection and store training and testing data, we use the local server of MySQL for the schema base data structure.
iv) Image Processing: For the image processing, I use the OpenCV library to convert the image into RGB format for better analysing.
Components
Project include the components like Frontend, Backend, AI model, Database, API, Image Processing.

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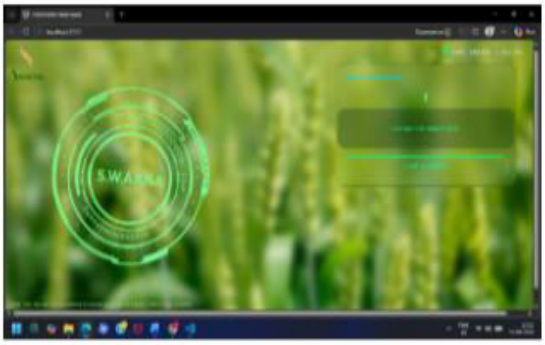
Component	Technology
Frontend	HTML, CSS, JavaScript
Backend	Python Flask
AI Model	CNN / TensorFlow
Database	MySQL local Database
API	Gemini API
Image Processing	OpenCV

VI. RESULTS

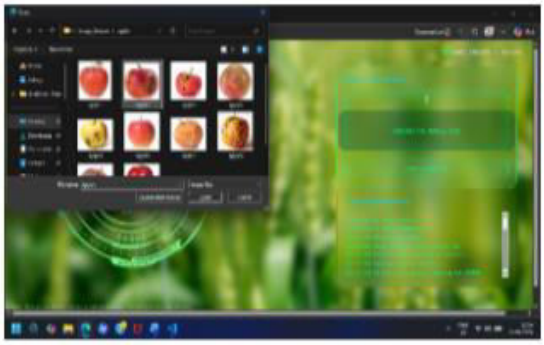
The result of the project shows that the deep learning models can be effective used for the agriculture applications such as plant disease detection. The system demonstrate how image processing and machine learning techniques can help farmers monitor crop disease and take the early preventive measure using the our model.

Working

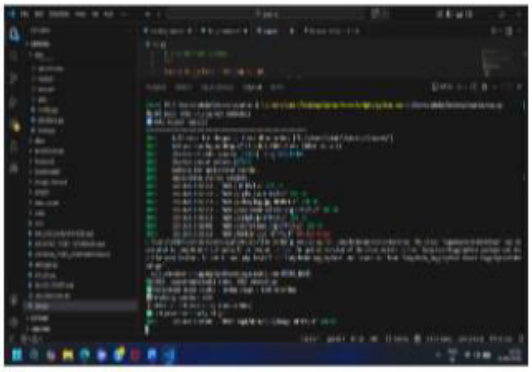
1) Frontend



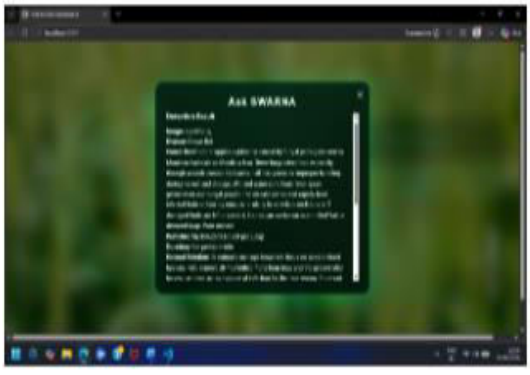
2) Uploading



3) Processing



4) Output Solution



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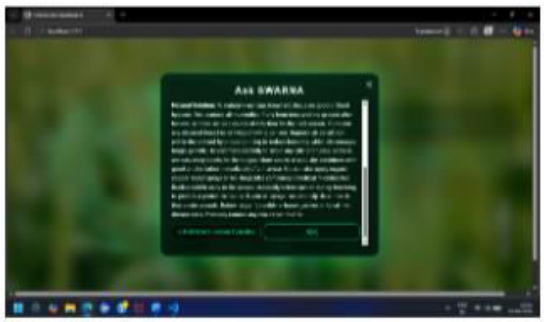
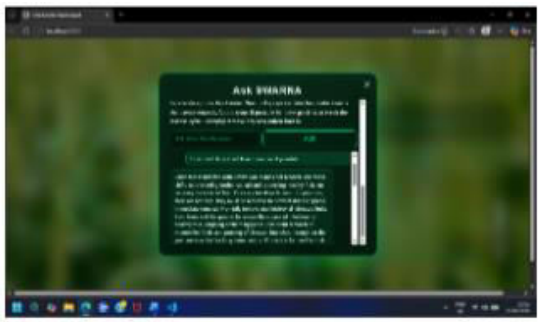
5) Asking Questions 6) Interactive Answer of Question





Crop Image 1	Disease Detected	82%
Crop Image 2	Disease Detected	83%

VII. CONCLUSION

This project successfully developed a plant disease system using image processing and deep learning techniques. The system can analyze plant disease image and identify the solution of the disease. It demonstrate the use of modern technology in the agriculture industry. Traditional methods of detecting plant disease can be time consuming and require expert knowledge. The developed system provides a faster and more convenient way to identify plant disease by simply analysing crop images. This makes the process more efficient and accessible.

VIII. FUTURE SCOPE

Develop the AI system that can analyses images of plants infected region to identify the disease, Provide the simple end to end user friendly interface, so that farmers can easily access the technology. Help the farmers to detect the crop disease on time to Prevent the damage of crops. Improve the traditional way of the framers with the new technology to get the better results. Help the farmers to take decision by support of the guide and improve the crop quality and financial conditions.

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