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Leaf Disease Detection Using Machine Learning and Feature Exploration

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ABSTRACT

Agriculture is an important sector of the Indian economy and plays a major role in the country's socio-economic development. As most part of the Indian financial system is dependent on agriculture production, the close attention to the concern of food production is necessary. The taxonomy and identification of crop infection got important in technical as well as economic in the Agricultural Industry. While keeping track of diseases in plants with the help of specialists can be very costly and ineffective in agriculture region. There is a need for a system which can automatically detect the diseases as it can bring drastic change in monitoring large fields of crop and then plant leaves can be taken cure as soon as possible after detection of disease. The aim of the proposed system is to develop an application which recognizes leaf diseases. For availing this user need to upload the image and then with the help of image processing we can get a digitized colour image of a diseased leaf and then we can proceed with applying CNN to predict leaf disease.

Keywords: CNN, Socio-Economic, Agricultural Industry, Leaf Disease

I. INTRODUCTION

"**Agriculture is the backbone of the Indian Economy**"- are the words by Mahatma Gandhi told six decades ago. Agriculture in India employs more than 50% of the country's workforce and contributes around 15% to the country's Gross Domestic Product (GDP). India is one of the world's largest producers of agricultural commodities, including rice, wheat, cotton, sugarcane, tea, coffee, and spices. The country is also a significant producer of fruits, vegetables, and livestock. Agriculture is practiced across the country, with different regions specializing in various crops and livestock. Leaf disease detection is an important task in agriculture because it helps to identify and control plant diseases before they can cause significant damage to crops. Early detection of leaf diseases can prevent crop losses, reduce the need for pesticides, and improve the overall health and productivity of the crop. Any fault in disease detection may led to incorrect pesticide and fertilizer usage which leads to development of long term diseases and fighting abilities will be dead in it. The algorithm we are following to detect plant diseases is image processing Convolution neural network

(CNN) algorithms. CNNs have been highly successful in computer vision tasks, and have achieved state-of-the-art performance in various benchmark datasets. They are used in a wide range of applications, including facial recognition.

II. LITERATURE SURVEY

P. R. Rothe and R. V. Kshirsagar introduced a" [1] Leaf Disease Identification using Pattern Recognition Techniques" which Uses snake segmentation, here Hu's moments are used as distinctive attribute. Active contour model used to limit the vitality inside the infection spot, BPNN classifier tackles the numerous class problems. The average classification is found to be 85.52%.

Aakanksha Rastogi, Ritika Arora and Shanu Sharma," [2] Leaf Disease Detection and Grading using Computer Vision Technology &Fuzzy Logic". K-means clustering used to segment the defected area; GLCM is used for the extraction of texture features, Fuzzy logic is used for disease grading. They used artificial neural network (ANN) as a classifier which mainly helps to check the severity of the diseased leaf.

III. EXISTING SYSTEM

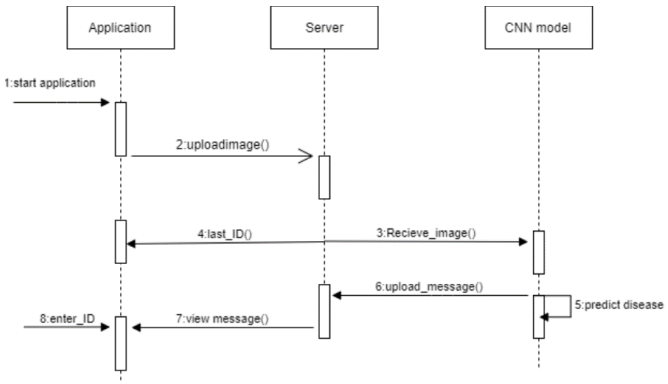
In existing system, Other techniques were used for image processing, those include template matching, edge detection, and feature extraction. These methods involved manually designing algorithms to detect specific patterns or features in the image, which were then used to classify the image. However, these methods had limitations in handling variations in lighting, orientation, and scale, and they required a lot of manual tuning to achieve good performance. CNNs overcame many of these limitations by automatically learning hierarchical representations of the input data, making them a powerful tool for image and video processing tasks.

IV. PROPOSED SYSTEM

The goal of this application is to develop a system which recognizes crop diseases. In this the user has to upload an image on the system, Image processing starts with the digitized colour image of the diseased leaf. Finally, by applying the CNN plant disease can be predicted. Purpose of Proposed System:

1. Developing a user-friendly web-based system for farmers.
2. Recognizing leaf diseases accurately from input images.
3. Providing corrective and preventive measures for the detected diseases.

Block diagram



V. IMPLEMENTATION

Step 1 : Define project objectives and gather the resources.

(1) What are the services that we are going to provide using this project? (2) What are the conditions and restrictions used in this project? (3) What are the client needs and demands? (4) How many number of support staff do we need after developing the system ?

Step 2: Design the Leafe Disease Detection System Architecture. Once the website objectives have been confirmed and communicated, there are multiple key factors that needed to be considered when designing the system architecture.

User Interface (UI) : Interface should be clear and easy to understand. Webpage must be eye catchy to attract

users. With Django framework in addition we can built it with ease.

Backend: Python and javascript is the coding language we use in backend which connects to the server which helps to send the results obtained from the algorithm to frontend.

Database: Database stores information about diseases and users and profiles including their search and feedback.

Step 3 : Implementation – Developing code After we have clear idea on the architecture of the leaf disease detection system, we will start developing the code. Here, we have 3 stages to develop the code:

Stage 1 : Frontend -HTML and ReactJS Stage 2 : Backend - Python and Django Stage 3 : Database - MySQL

Step 4 : Deployment and Testing After completing the development of code we need to deploy the project in the compatible system which satisfies all the hardware and software requirement specifications. After deploying successfully, we need to check that the software meets the requirements and expectations of the end-users. Code should undergo testing processes like alpha, beta testing, unit testing, integration testing and functional testing to identify mistakes in code developed.

Step 5 : Maintain

The final step is risk analysis i.e. after testing process every unsuccessful step has some risk which disturbs users accessibility. Our aim is maintain the website with support staff and to make servers available all the time and to analyze risks and update the code to avoid those risks. We need to fix some bugs and features in future as per user feedback. Website should be updated with new features in the future using renewing software models which increases project efficiency and productivity.

SOFTWARE TOOLS

Operating system: windows 10

Coding language: Python3

Python IDLE, Vscode.

Modules: Tensorflow, Keras, Django.

The software for the development has been selected based on several factors such as Support

- ➢ Cost Effectiveness
- ➢ Development Speed
- ➢ Stability
- ➢ Accuracy

FUNCTIONAL REQUIREMENTS

User shall upload the images.

The system shall allow the farmer/user to upload images.

The system shall predict the image and validate it.

The system shall provide the correct output i.e. diseased or not.

System shall allow user to see the suggested products i.e. pesticides.

NON-FUNCTIONAL REQUIREMENTS

Scalability: System should be able to handle a large number of users. The system is capable enough to work properly.

Speed: The application should be fast. It should not slow down with the increase of number of users. Search functionality should be fast to enable better end-user experience. The system should be quick enough to be able to respond to user actions with a short period of time.

Usability: User interface should be simple and clear to break to understand to any user. At every step of this project user seems to be familiar with the interfaces as they are easy to use.

Availability: The system should be available at every moment to the user. It should be ensured that there should be minimum or no downtime to ensure better user experience for students.

Reliability: The system should be reliable and yield correct results if a user performs any actions. Also, if the farmer uploads a image, the system should ensure

that the correct message is delivered to the correct destination without any loss of content.

Testability: The application is tested for validation, uploading images, message structures and works fine.

VI. ADVANTAGES

Early detection of diseases: One of the primary advantages of a leaf disease detection project is the ability to detect diseases early. Early detection allows for more effective treatment, reducing the potential for crop loss.

Reduced use of pesticides: Traditional methods of disease detection often rely on the use of pesticides, which can be harmful to both the environment and human health. By using a leaf disease detection project, farmers can reduce the use of pesticides and other chemicals, making their farming practices more sustainable.

Better accuracy: The use of technology can improve the accuracy of disease detection. This can reduce false positives and false negatives, allowing farmers to take appropriate action based on accurate information.

Reduced use of pesticides

Cost-effective

DISADVANTAGES

Dependence on technology: Farmers who rely heavily on technology for disease detection may become overly reliant on it, potentially neglecting other important aspects of crop management.

High initial costs

VII. APPLICATIONS

- Monitor tree health and detect diseases in forests to protect the ecosystem
- Monitor the health of plants in natural ecosystems for biodiversity and ecosystem health
- Farmers can use the technology to detect diseases in their crops early, allowing for more effective treatment and higher crop yields.
- Research

VIII. CONCLUSION

In conclusion, the leaf disease detection project is a highly innovative solution that offers a wide range of applications in agriculture, forestry, horticulture, environmental monitoring, and research. By detecting diseases early, the project can significantly minimize crop losses and maximize yields while promoting the growth of healthy plants. While there may be some limitations, the benefits of using the technology are substantial. With further investment and advancements in the technology, the leaf disease detection project can become an essential tool for sustainable plant management and environmental protection.

IX. FUTURE ASPECTS

Future aspects of leaf disease detection project include the integration of machine learning and artificial intelligence algorithms to improve efficiency and accuracy. The development of low-cost, portable, and user-friendly tools will expand the technology's reach to farmers in remote areas.

X. REFERENCES

[1]. Sharma, A., & Singh, V. (2019). Leaf disease detection using machine learning algorithms: a review. Journal of Emerging Technologies and Innovative Research, 6(8), 219-223.

[2]. Singh, R., Singh, G., & Kaur, R. (2021). A review on automated leaf disease detection using machine learning algorithms. Journal of Ambient

Intelligence and Humanized Computing, 12(1), 857-873.

[3]. Saeys, W., Inza, I., & Larrañaga, P. (2007). A review of feature selection techniques in bioinformatics. Bioinformatics, 23(19), 2507-2517.

[4]. Kavitha, P., & Balamurugan, M. (2019). Automated leaf disease detection and classification using image processing techniques: a review. Journal of Medical Systems, 43(8), 243.

[5]. Haider, S., Khan, A. M., & Qamar, A. (2021). Automated classification of plant leaf diseases using deep learning: a review. Computers and Electronics in Agriculture, 187, 106220.

[6]. Adhikari, S., & Dass, A. (2021). Disease detection in plants: a review of deep learning-based approaches. Journal of Crop Improvement, 35(2), 139-156.

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