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Crop Doctor (Plant Disease Detection Using Machine Learning)

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ABSTRACT: The backbone of the Indian economy is agriculture and it is vital for food security. Hence it is significant to recognize the plant diseases that affect humans directly or indirectly by health and also economically. The early detection ofdiseases is important in agriculture for an efficient crop yield. The bacterialspot, late blight, Septoria leaf spot, and yellow curved leaf diseases affect the crop quality. Crop Doctor is a collection of images of leavesthat are diseased and the physical parameters like soil and temperature. It is a fast, automatic and accurate approach to identifying plant diseases. The farmer has to upload an image of the leaf and if it matches the existing image, the farmer will get the message with the apt solution, so that it will not spread throughout the field.

The proposed system presents a Convolutional Neural Network (CNN) model and Learning Vector Quantization(LVQ)algorithm-based method for plant leaf disease detection and classification. The dataset contains500 images ofplant leaves with four symptoms ofdiseases whichhave been modelled a CNN for automatic feature extraction and classification. Colour information is actively used for plant leaf disease research. In the proposed system, the filters are applied to three channels based onRGB components. The LVQ has been fed with the output feature vector of the convolution part for training the network. The experimental results validate that the proposed method effectively recognizes four different types of plant leaf diseases. After detecting the disease, the proposedsystem also suggestsmedicine for the diseased plant.

KEYWORDS: Machine Learning, Convolutional Neural Network, Learning Vector Quantization, RGB components,
Artificial Intelligence

I.INTRODUCTION

Plant diseases affect thegrowthandcrop yieldof theplants andmakesocial, ecologicaland economic impacts onagriculture. Recent studies on leaf diseases show how they harm plants. Plant leaf diseases also cause significant economic losses to farmers. Earlydetectionof the diseases deservesspecialattention. Plant diseases arestudiedinthe literature, mostlyfocusing on the biological aspects. They make predictions according to the visible surface of plants and leaves. Detection of diseases as soonastheyappear isa vitalstep for effectivediseasemanagement. Thedetectionis traditionallycarriedoutbyhumanexperts.

Human experts identify diseases visually but they faced some difficulties that may harm their efforts. In this context, detecting andclassifying diseases inanexact andtimely manner is of great importance. Advances inartificial intelligenceresearch now make it possible to make automatic plant disease detection from raw images. Machine learning can be thought of as a learning method on neural networks. One of the advantages of deep learning is that it can extract features from images automatically. The neural network learns how to extract features while training. CNN is a multi-layer feed-forward neural network and is a popular deep learning model.

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II.MOTIVATION

It is essential for humans to eat food to survive. Humans get vegetables, fruits, etc. from plants. Plants also get diseases like humans. If plants get diseased, it directly or indirectly affects humans. Hence, it is necessary to take precautions so that plants don't get diseased.

III.LITERATURE SURVEY

Many researchers had done research on various plants and their diseases also they had given some techniques to identify that disease. To get an understanding of this research area, we carry out a study on various types of plants with diseases. This survey will help to propose a novel idea for the identification of diseases. Plant diseases have turned into a dilemma as they can cause a significant reduction in both the quality and quantity of agricultural products. Plant pests and diseases affect food crops, causing significant losses to farmers and threatening food security.

Since the beginning of agriculture, generations of farmers have been evolving practices for combating the various plagues suffered by our crops. Following the discovery of the causes of plant diseases in the early nineteenth century, a growing understanding of the interactions of pathogen and host has enabled us to develop a wide array of measures for the control of specific plant diseases. Many researchers are carried out in the detection of those diseases.

GittalyDhingra describes the application of agriculture using computer vision technology to recognize and classify diseases of plant leaves. The paper deals with the correlation between disease symptoms and their impact on product yield. It also deals with increasing the number of training data and testing to accomplish better accuracy. Researcher proves that climate change can alter stage and pathogen development rate.

IV. EXISTING SYSTEM

The existing method for plant disease detection is simply naked eye observation by experts through which identification and detection of plant diseases are done. For doing so, a large team of experts as well as continuous monitoring of plants is required, which costs very high when we do with large farms. At the same time, in some countries, farmers do not have proper facilities or even the idea that they can contact experts. Due to this consulting experts even cost high as well as time-consuming too. In such conditions, the suggested technique proves to be beneficial in monitoring large fields of crops. Automatic detection of the diseases by just seeing the symptoms onthe plant leaves makes it easier as well.

V. PROPOSED SYSTEM

Theproposedsystemisaweb-basedsolution"IDENTIFICATIONOFPLANTDISEASEUSINGCNN" which accepts the diseased plant images and processes them using CNNs image recognition and classification. The dataset contains 500 images of plant leaves with four symptoms of diseases. Colour information isactivelyusedforplantleafdiseaseresearches.

Intheproposedsystem, the RGBimageis usedas input toCNN where the filters are applied tothree channels based on RGB components. The proposed system also plans todesign it simple and easily understandable for user-friendliness. The existing system can only specify the plant disease type.The proposed system provides the result in a couple of seconds and also specifiesthe medicine for the diseased plant.

ADVANTAGES:

1. Easydetection ofdiseases.
2. Accurateresults.

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3. Cheaperthanexistingsystem'smethod.
4. Lesstimeconsuming.

LIBRARIES USED:

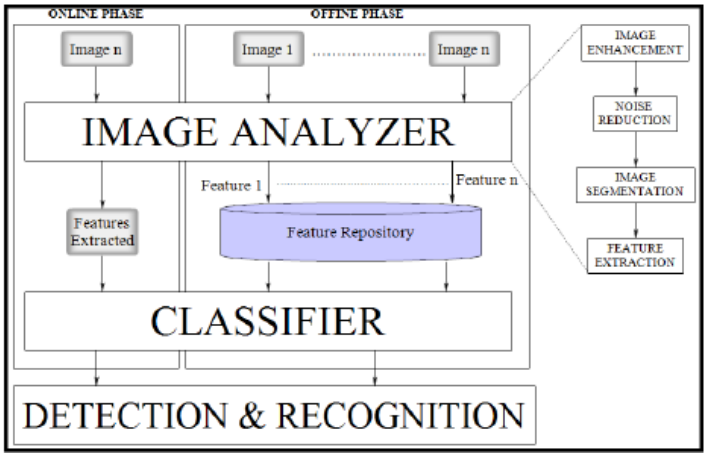
NumPy

NumPy stands for Numerical Python. NumPy is a Python library used for working with arrays. It also has functions for working in the domain of linear algebra, Fourier transform, and matrices. NumPy was created in 2005 by Travis Oliphant. It is an open-source project and you can use it freely.

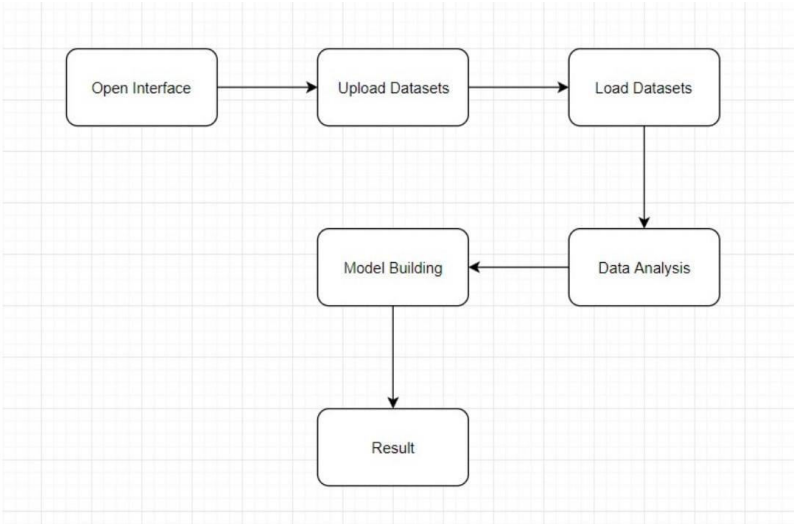
TensorFlow

It is a popular java-script library for Machine Learning. It trains and deploys machine learning models in the browser. It adds machine learning functions to any web application.

SYSTEM ARCHITECTURE



FLOW CHART:



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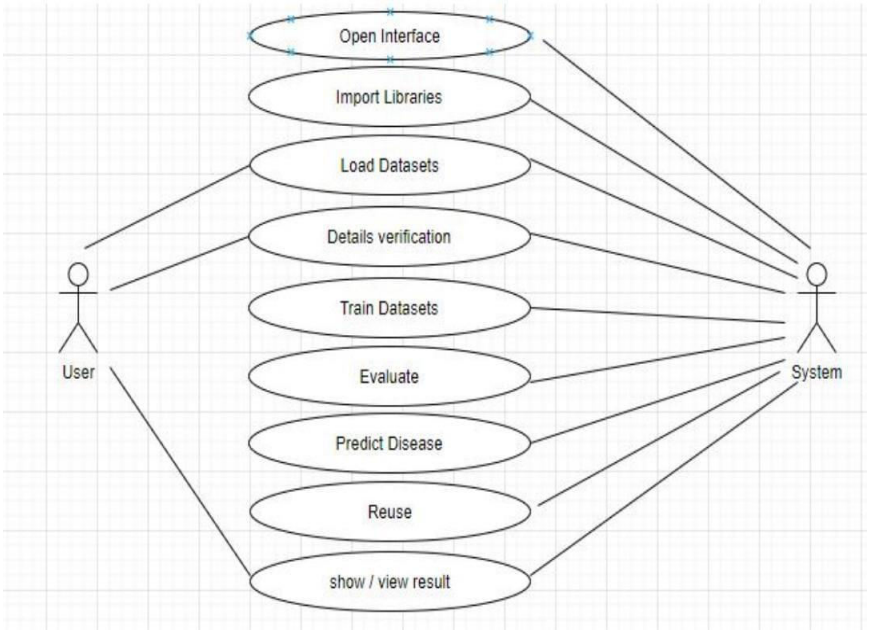
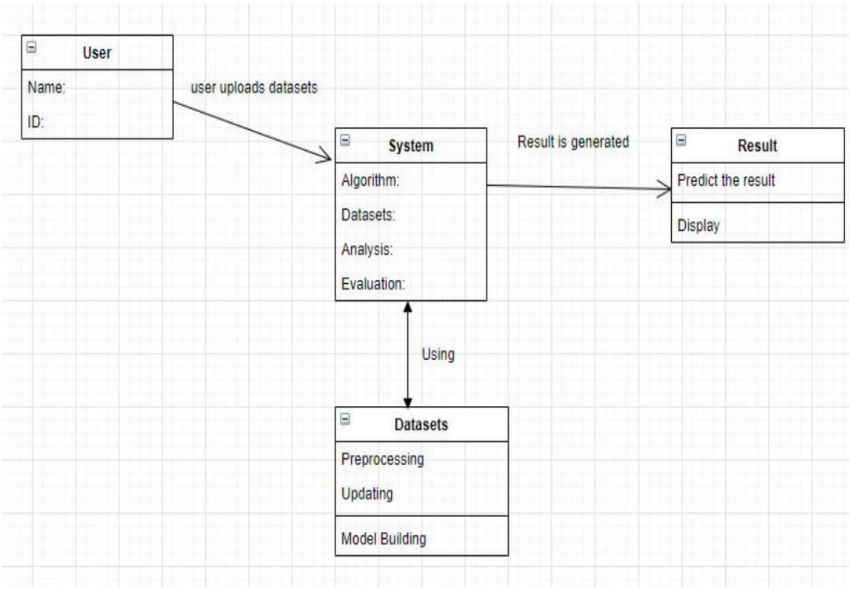
USECASE DIAGRAM:



CLASS DIAGRAM:



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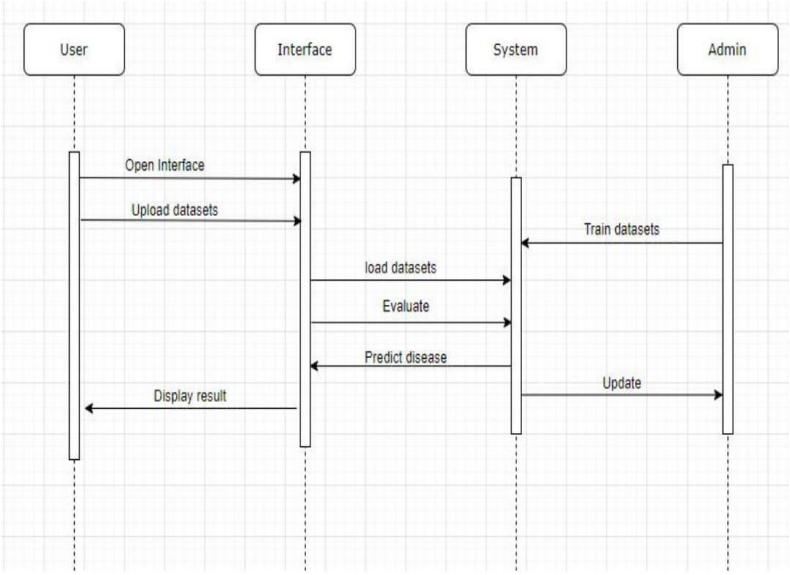
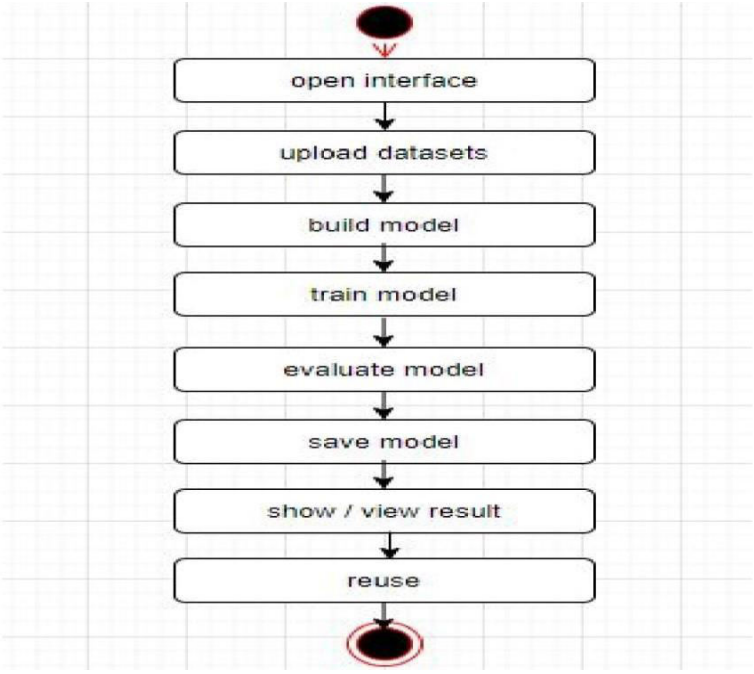
SEQUENCE DIAGRAM:



ACTIVITY DIAGRAM:



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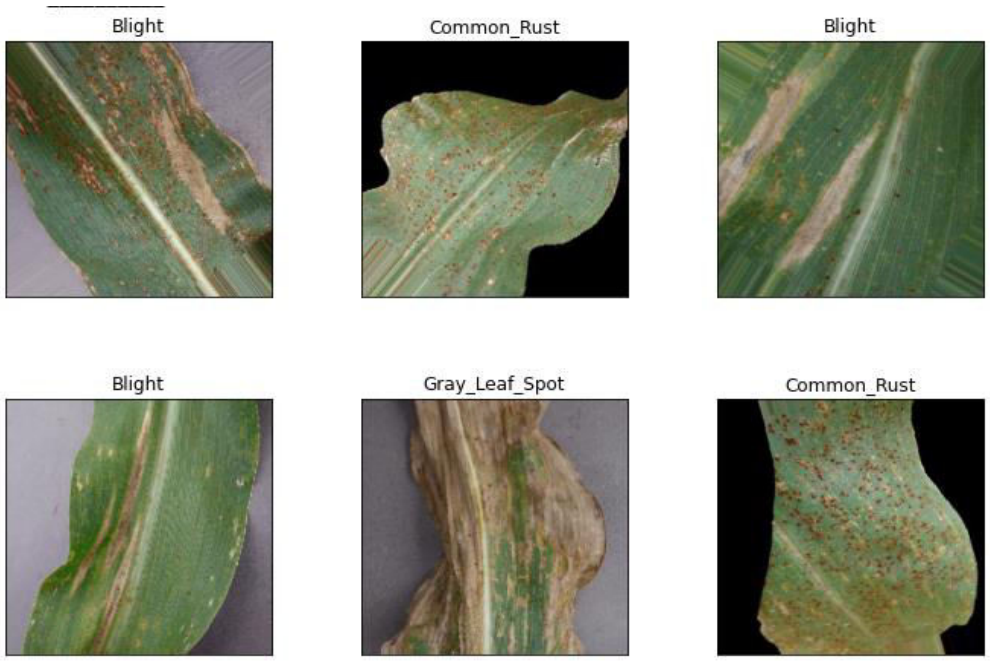
VI.RESULTS



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VII.CONCLUSION

Data miningtechnologies has beenincorporatedintheagricultureindustry.This project implements an innovative idea toidentifytheaffectedcrops andprovideremedy measures totheagricultural industry. By the use of CNN algorithm, the infected region of the leaf is segmented and analyzed. The images are fed to our application for the identification of diseases. It provides a good choice for agriculture community particularly inremote villages. It acts as anefficient system in terms of reducing clustering time and the area of the infected region. Feature extraction technique helps to extract the infected leaf and also to classify the plant diseases. The embedded voice navigation system helps to guide us throughout the process.

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