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CROP YIELD PREDICTION IN AGRICULTURE USING PRODUCTIVITY AND SEASON DATA

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ABSTRACT

Agriculture is one of the main factor that decides the growth of any country. In India itself around 65% of the population is based on agriculture. Because of different occasional circumstances the harvests get contaminated by different sort of diseases. These diseases initially influence the leaves of the plant and later contaminated the entire plant which thus influence the quality and amount of yield developed. As there are huge number of plants in the homestead, it turns out to be undeniably challenging for the natural eye to recognize and order the disease of each plant in the field. And it is vital to analyze each plant on the grounds that these diseases might spread. Thus in this paper we are presenting the artificial intelligence based automatic plant leaf disease detection and classification for quick and easy detection of disease and then characterizing it and performing expected solutions for fix that disease. This methodology of our own objectives towards expanding the efficiency of harvests in horticulture.In this approach we have follow several steps i.e. image collection, image preprocessing, segmentation and classification.

I.INTRODUCTION

Agriculture plays a very important role in the economic growth of any Country. It is the field which highly affect the GDP of the countries. Agriculture sector contributes around 16% of GDP of India. There are various factors that affects the quality and quantity of crops cultivated. Due to different weather and local conditions these plants are exposed to various diseases. And if these diseases remain undetected may cause some serious losses. In India itself around 15-25 percent of crops are lost due to diseases, pest, and weeds. Also, we can take reference of the incident of Georgia (USA) in 2007 in which there was loss of around 540 USD due to plant diseases. As the cultivational fields are quite large and have very large number of plants in that, hence it becomes very difficult for the human eye to properly detect and classify each and every plant. And doing so is very important as even single infected plant can spread the disease. Also, most of the farmers does not have proper knowledge of those diseases and actual cure for that disease. Hiring experts may cost them heavily and use of pesticides without knowledge will harm the land. Hence in order to solve this problem we have developed the Artificial Intelligence based solution. and speed are

the two main factors that will decide the success of the automatic plant leaf disease detection and classification model. The suggested model will help the farmers to correctly detect and classify the disease by scanning the leaf and alert the farmers about the disease before it starts spreading. The model is mainly divided into four steps or phases. In first one, we collect the dataset of different plant leaves infected as well as healthy. These all images will be color images. In second step, noise from the images is removed then we will create color transformation structure for the images. In third step we segment the images using clustering techniques available. This step is performed to easily extract the foreground that is leaf. Now the image set of leaves with black background is obtained. In final step, different machine learning and deep learning algorithms like logistic regression, KNN, SVM and CNN are trained and compared on the basis of accuracy and the algorithm that performs best in training as well as testing is taken in account.

II.LITERATURE SURVEY:

Paper by Saradhambal.G, Dhivya.R, Latha.S, R. Rajesh give solution to the plant disease with image classification. In theirapproach they collect 75 images of different diseased plant leaves such as Bacterial Blight and more. There were total of 5 classes that include 4 disease classes and one normal healthy leaf class. Removal of noise is done with some image preprocessing and then conversion into lab color model was done. They segmented the image with clustering and Otsu's method. After that some feature extraction is done on the basis of which class is determined. They have not discussed the accuracy that they have achieved as well as dataset was small [1].

Another paper named "Plant Leaf Disease Detection and Classification Based on CNN with LVQ Algorithm" clarifies that they have used CNN model for the leaf disease m classification. In their methodology they have used a dataset of 500 images divided into 400 training and remaining 100 testing. Total classes for classification were 5 including one healthy class as well. Images size used was quite well that is 512*512. Three matrixes for R, G, B channels were used as input to CNN model and the output was feed into neural network known as LVQ (Learning Vector Quantization). Average accuracy of around 88 percent was achieved. Their proposed model was only for tomato related diseases [2].

"Plant Disease Classification Using Image Segmentation and SVM Techniques" by K. Elangovan, S. Nalini uses the svm mfor the classification purpose. In their methodology image was converted into another color space. After that image was cropped and with image preprocessing techniques noise was removed and smoothening was done and converted into greyscale images. Segmentation was also performed and then features were extracted. They considered color, morphology and texture as features and they were used for classification. They also does not mention about the accuracy of their suggested model

A Brief Review on Plant Disease Detection using Image Processing India is the agriculture based country, since it contributes 7.68 percent of total global agricultural output. In India, agricultural sector contributes about seventeen percentage of total Indian gross domestic product (GDP). Effective growth and improved yield of plants are necessary for increment of farmer's profit and economy of India. For this purpose farmers need domain experts for manual monitoring of plants. But manual monitoring will not give satisfactory result all the time. Moreover, domain experts are not available at all regions and are expensive as farmers have to pay fees including travelling charges. Hence, it requires developing an efficient smart farming technique which will help for better yield and growth with less human efforts. In this paper, we provide a review on methods developed by various researchers for detection of diseases in plants, in the field of image processing. It includes research in disease detection of plants such as apple, grapes, pepper, pomegranate, tomato etc.

An approach for identification of infections in vegetables using image processing techniques Vegetables are the indispensable ingredient for any nutritious diet. While using them, due care should be taken, so as to ensure that they are free from any form of diseases and infections. Considering this in large scale, certain techniques in image processing are used with some standard procedure. These existing systems of approach, even though we can't say them as ideal, in present day scenario, these are all the popularly used setup. This paper presents a study on different methods of identification of diseases in vegetables by using various feature extraction techniques and also various classification methods are utilized. This comparative Analysis is an approach towards optimizing an ideal Algorithm with efficient methods of feature extraction and classification techniques in identifications of diseases in vegetables.

III.EXISTING SYSTEM

In developing countries, farming land can be much larger and farmers cannot observe each and every plant, every day. Farmers are unaware of non-native diseases. Consultation of experts for this might be time consuming & costly. Also unnecessary use of pesticides might be dangerous for natural resources such as water, soil, air, food chain etc. as well as it is expected that there need to be less contamination of food products with pesticides

Drawbacks

- Farmers cannot afford so much money for persons who visit the crop for disease prediction.
- Speed and accuracy of getting result is delayed.
- As the cultivational fields are quite large and have very large number of plants in that, hence it becomes very difficult for the human eye to properly detect and classify each and every plant.

IV.PROPOSED SYSTEM

The model that is proposed by us to detect and classify the infected plant leaves consists of 4 phases.

Those phases are

- Dataset Collection
- Image Preprocessing
- Segmentation
- Selection of Classifier

Advantages

- Farmer can predict the diseases so that can use the right cultivation and fertilizers method. So that they can improve the product quality and crop yield prediction.
- Based on our proposed system we achieved the best model for prediction of diseases in variety of crops.

V.MODULES DESCRIPTION:

Dataset Collection

Firstly, the images of leaves were collected from online sources such as GitHub, Kaggle and also some of the image's dataset consists of 20,000 images divided into 19 different classes. The dataset consists of both healthy and infected leaves which covers diseases like black rot, rust, bacterial spot, early blight, late blight, leaf scorch, target spot, mosaic mvirus of different crops like apple, potato, tomato, grape, strawberry, corn.

Image Preprocessing

In this progression pictures are resized to more modest pixel size all together accelerate the calculations. The obtained pictures contain some clamor. This commotion is eliminated utilizing some separating methods like Gaussian Blur. After that pictures are available in RGB format which isn't proper for additional work as RGB format can't separate picture power. Consequently it is switched over completely to another variety space that is HSV what separate tone from power. Likewise, RGB variety space is noisier than HSV.

Segmentation

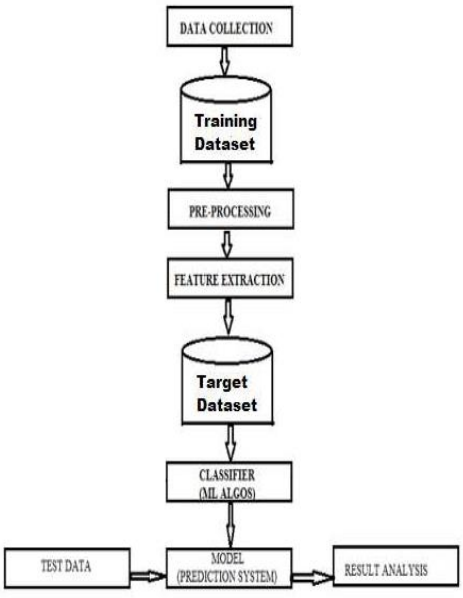
In this step, segmentation of images is done in order to separate the leaves from the background. Segmentation is performed using K-means clustering with 2 cluster centers, one for background and one for foreground. K-means clustering is unsupervised learning technique that is used to segregate the data points in the predefined number (k) of clusters or groups on the basis of their similarities.

After finding the two clusters, one with background and other one with leaf part, the clustered image is used to change the pixel value of the background of the leaf to black. By doing so the useless information from the image is eliminated which in turn increases accuracy.

Selection of Classifier

This is the classification problem as we have to classify the type of disease on the leaf of the plant. So, we have plenty of machine learning as well as deep learning algorithms that we can apply on this dataset. We have decided to start with low complex algorithms and increasing the complexity level in order to increase accuracy of the model. We have selected four classifiers namely – logistic regression, KNN, SVM and CNN.

Architecture:



CONCLUSION

In this paper, a very accurate artificial intelligence solution for detecting and classifying different plant leaf disease is presented which makes use of convolutional neural network for classification purpose. The presented model used the dataset that consists of more than 20,000 images with 41 total classes. The following nmmodel can be extended by using even more large dataset with more categories of diseases and the accuracy can also be improved by tuning the hyperparameters. The remedies for the classified disease can also be included in the model. The model then can be deployed on android and as well as iOSn platform to reach out the farmers who can make the actual use of the proposed system.

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