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LEAF DISEASE DETECTION USING MACHINE LEARNING

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Abstract - Agriculture is one of the important professions in many countries including India. As most part of the Indian financial system is dependent on agriculture production, the keen attention to the concern of food production is necessary. The taxonomy and identification of crop infection got much importance 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 in agriculture region. There is a need for a system which can automatically detect the diseases as it can bring revolution 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 color image of a diseased leaf and then we can proceed with applying CNN to predict leaf disease.

Keywords: - deep learning, transfer learning, classification, CNN, plant disease detection, precision agriculture

1.INTRODUCTION

Agriculture is the backbone of the Indian Economy"- said Mahatma Gandhi six decades ago. India ranks second in the agricultural output worldwide. Here in India, farmers cultivate a great diversity of crops. It contributes 18% of the overall GDP and accounts for employment of approximately 41.49% of the Indian population. Rapid growth in agriculture is essential not only for self-reliance but also to earn valuable foreign exchange.

Various factors such as climatic conditions, soil conditions, various disease, etc. affect the production of the crops. Hence the detection of plant diseases is an important aspect in increasing the yield of a crop. The existing method for plants disease detection is simply naked eye observation which requires more manual labor, scientifically equipped laboratories, expensive devices, etc. And improper disease detection may led to incorrect pesticide usage that can lead to development of long term resistance of the pathogens, reducing the ability of the crop to fight back. The plant disease detection can be done by observing different parts of the affected plant. The method we are adopting to detect plant diseases is image processing using Convolution neural network(CNN).

2. Body of Paper

Preprocessing and Training the model (CNN): The database is Preprocessed such as Image reshaping, resizing and conversion to an array form. Similar processing is also done on the test image. A database consisting of about 32000 different plant species is obtained, out of which any image can be used as a test image for the software. The train database is used to train the model (CNN) so that it can identify the test image and the disease it has. CNN has different layers that are Dense, Dropout, Activation, Flatten, Convolution2D, MaxPooling2D. After the model is trained successfully, the software can identify the disease if the plant species is contained in the database. After successful training and preprocessing, comparison of the test image and trained model takes place to predict the disease. Database collection: Initial step for any image processing based project is acquiring proper database which is valid. Most of the time the standard database is preferred but in certain circumstances we do not get proper database. So in such conditions we can collect the images and can form our own database. The database is accessed from crowdAI which is plant disease classification challenge. Data available here is not labeled. So the first task is to clean and label the database. There is a huge database so basically the images with better resolution and angle are selected. After selection of images, we should have deep knowledge about the different leaves and the disease they have. Huge research is done from plantvilllage organization repository. Different types of plant images are studied and corresponding. After detail study, labeling in done by segregating the images and with different diseases.

Disease of different plants database:
Apple black rot
Apple rust
Apple scab
Apple normal
Bell paper normal
Blueberry normal
Cherry normal
Cherry powder normal
Corn blight
Corn rust
Potato early blight
Potato late blight
Tomato bacterial spot
Tomato early blight
Tomato leaf mold
Tomato target spot
Tomato yellow curl virus
Grape black rot
Grape esca
Grape leaf blight
Citrus greening
Peach bacterial spot

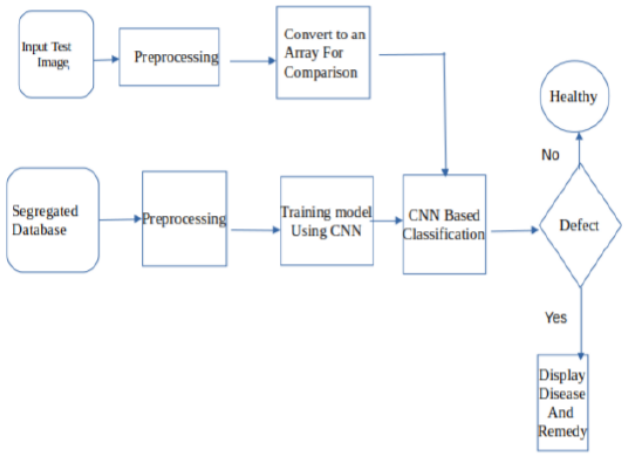

Fig -1: Flow Chart

3. CONCLUSIONS

An application of detecting the plant diseases and providing the necessary suggestions for the disease has been implemented. Hence the proposed objective was implemented on the plant. The diseases specific to plant were considered for testing of the algorithm. The experimental results indicate the proposed approach can recognize the diseases with a little computational effort. By this method, the plant diseases can be identified at the initial stage itself and the pest control tools can be used to solve pest problems while minimizing risks to people and the environment.

In order to improve disease identification rate at various stages, the training samples can be increased with the optimal features given as input condition for disease identification and fertilization management of the crops. As a part of Future Enhancement, the complete process described in this project can be automated so that the result can be delivered in a very short time. Further enhancements can include upgrading user interface and the accuracy to detect specific diseases along with product recommendations.

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