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Coriander Leaves Disease Detection Classification Using CNN

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ABSTRACT*:* Coriander is an annual herb and, in line with the climatic conditions, is cultivated as a summer time season or wintry weather annual crop. At flowering, the globous plant can attain heights among 0.20 and 1.40 m. There exist very one of a kind makes use of coriander and those are primarily based totally on one-of-a-kind components of the plant. The conventional makes use of the plant, which might be primarily based totally at the number one product, i.e., the end result and the inexperienced herb, are two-fold: medicinal and culinary. The coriander end result is believed to resource digestion. By the usage of gadget studying method, we are able to perceive the disorder this is affected to the leaf, stem, root and end result. Images captured the usage of cellular digital digicam could be processed the usage of photograph processing method. The capabilities are extracted from the disorder affected component and it is able to be categorized using system analysing technique inclusive of Convolutional Neural Network (CNN) and Mobile Net. A utility that could expect the disorder affected to the plant and feasible precautions to keep away from the disorder could be developed. This technique will enhance the accuracy of disorder detection, and additionally efficaciously enhance the version reputation performance with 92.7 %.

KEYWORDS: Machine Learning, CNN, Mobile Net, Image processing

I. INTRODUCTION

India is eminent for Agriculture that means most of the people are engaged in the agriculture industry. The agriculture industry acts as a significant role in the economic sectors. Most of the plants are infected by variant fungal and bacterial diseases. Due to the exponential inclination of population, the climatic conditions also cause plant disease. The major challenges of sustainable development are to reduce the usage of pesticides, cost to save the environment and to increase the quality.

Precise, accurate and early diagnosis may reduce the usage of pesticides. Data mining is termed as extracting the relevant information from a large pool of resources. Health monitoring and disease detection on plants is very critical for sustainable agriculture. The advent of data mining technologies has been adopted in the prediction of plant diseases.All parts of the coriander plant are edible, but the fresh leaves and the dried seeds are most commonly used. Leaves and seeds are used fresh or dried as a herb in cooking. There are factors that affect the plants and are classified into two categories:

(1) Diseases: The biotic factors that are either caused by the fungi, bacteria or algae.

(2) Disorder: The abiotic factors caused by the temperature, rainfall, nutrient deficiency, moisture.

II. RELATED WORK

This paper [1] deals with the diseases that affect the leafs of soybean. With the concept of K-means clustering a semi-automatic system was developed to classify healthy and disease affected leaves. The disease affected leaves are then classified into different disease categories. In this system the three models based on SVM classifier is trained with the combination of colour and texture features. The dataset used are selected from PlantVillage and provides a better accuracy. The system also detects the intensity of disease that affected the plant.

This paper [2] proposes a system to identify diseases of plants using deep learning methods. CNN model whichidentifies the plant diseases using leaf images are developed. The system was trained with the help of an open

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database.Different models are trained and got a best accuracy 99.53%. The high accuracy of the system is very useful for identifying the diseases and this will help the farmers to buy required pesticides and fertilizers. Also, more improvements can be done to the system in the future.

This paper [3] proposes a system using image processing to identify the diseases affecting the tea leaves. The main aim of the system is to identify two diseases, brown blight disease and algal leaf disease. SVM technique is used to identify the disease. When an image is uploaded in the system it will identify the features of the image with the help of SVM database and identifies the disease. The system also provides accuracy above 90% and high speed. The system helps to reduce the diseases in tea plants and increase the production.

This paper [4] proposes a deep convolutional neural network for plant species recognition. Previous systems depend on colour, texture, shape, etc for plant leaf identification. This system is different from the last one. The high-level features of leaf can be extracted by DCNN. The experiments conducted with the system shows the accuracy of the system. The system is trained with dataset and shows the efficiency of the system in identifying leaf.

In this paper [5] the main aim is to build the system which is fast, reliable, effective and error free. Hence using this system affected perform and yield. First the images are acquired from the digital high-resolution camera or from the samples that is stored in the database. Then affected and unaffected images are stored and captures. Then they are applied for pre-processing to enhance the contrast of an image. Images are segmented using K means clustering. Features are extracted before using K means and SVM algorithm for coaching and classification.Finally, diseases are identified and classified.

In this paper [6] propose a novel rice blast recognition method based on CNN. A positive samples of 2906 and negativesamples are established. So that training can be done. Testing of the CNN model can also be done. The evaluationresult show that the high-level features which are extracted by CNN are more discriminate and effective. Quarantineevaluation results indicate the CNN with software and CNN with SVM machine have similar performances with higheraccuracy, larger area under curve and better receiver operating characteristic curves than both LBPH plus an SVM as the classifier and Haar-WT plus an SVM as the classifier.

This paper [7] deals with the identification of disease in grapes. Diseases will be affected to leaf, stem and fruit becauseof bacteria, fungi, virus etc. This system deals with leaf diseases. The disease affected region is detected with the helpof K-means clustering. The colour and texture of the disease affected part is extracted for further purpose. Then thedisease is identified with the help of classification method. This system can identify the disease with accuracy 88.89%.As grapes are more cultivated in India it will be more helpful to farmers to deal with diseases that affect grapes.

This paper [8]propose a system to identify the leaf disease of ground nut. The main leaf disease that affects the groundnut is cercospora. This disease is affected to the ground nut in the beginning stage of leaf. Firstly, RGB image is made. Then RGB image is then transformed into HSV image. Then plane separation is conducted. After this colour features are performed. At the end back propagation algorithm is used to identify the leaf disease that affected the ground nut. So, the system will help to apply precautions early as possible.

This paper [9] uses GLCM and KNN for plant disease identification. For getting digital data from image, image processing is used. Feature extraction, segmentation and classifications are the processes done in this system. Feature extraction is done with the help of GLCM algorithm. Segmentation of Input picture is done by K-means clustering algorithm. First the SVM classifier divides the input pictures into two. Later SVM is replaced by KNN for bette rperformance. Then the accuracy of the system is increased and also the input data can be divided into many classes.

This paper [10] mainly focuses on the disease affecting the cotton plant and identifies the stage of disease. Images of theleafs are taken without any condition. That is, image can be taken by any person and with mobile phone. So the background of image makes the segmentation process difficult. Then two classifiers are used. First one will sosegmentation process and the second one is trained to identify the disease with the help of hue and luminance of HSV colour space. The developed system can be generalised and used for detection of any disease.

III. PROPOSED ALGORITHM

In the proposed work, we have concentrated on identification of Leaf Spot disease and Leaf Miner from the photographic signs and classify them using image processing techniques. The proposed framework has been implemented in three steps. First, image segmentation is performed using K means clustering to identify the infected area. In the next step leaf features are extracted from segmented regions using feature extraction techniques such as GLCM. These features are then used for classification into infected or non-infected leaf type. As third step these features given to the classifier to classify the disease in the cotton crop. We used CNN classifier to obtain efficient results.

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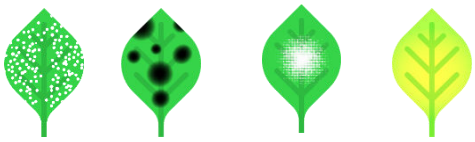

Figure1: Symptoms for Disease with colour transformation

Symptoms for Disease will contain following Colour transformation,Masking and removing of green pixels, Segmentation partitions an input image into its small constituent parts or objects.These segments are used for texture analysis by color co-occurrence matrix.Finally, if texture parameters are compared to texture parameters of normal leaf.

Training Process: Train_datagen. Flow_from_directory is the function that is used to prepare data from the train_dataset directory. Target_size specifies the target size of the image. Test_datagen. flow_from_directory is used to prepare test data for the model and all is similar as above.fit_generator is used to fit the data into the model made above, other factors used are steps_per_epochs tell us about the number of times the model will execute for the training data.

Validation process: validation_data is used to feed the validation/test data into the model.validation_steps denote the number of validation/test samples.

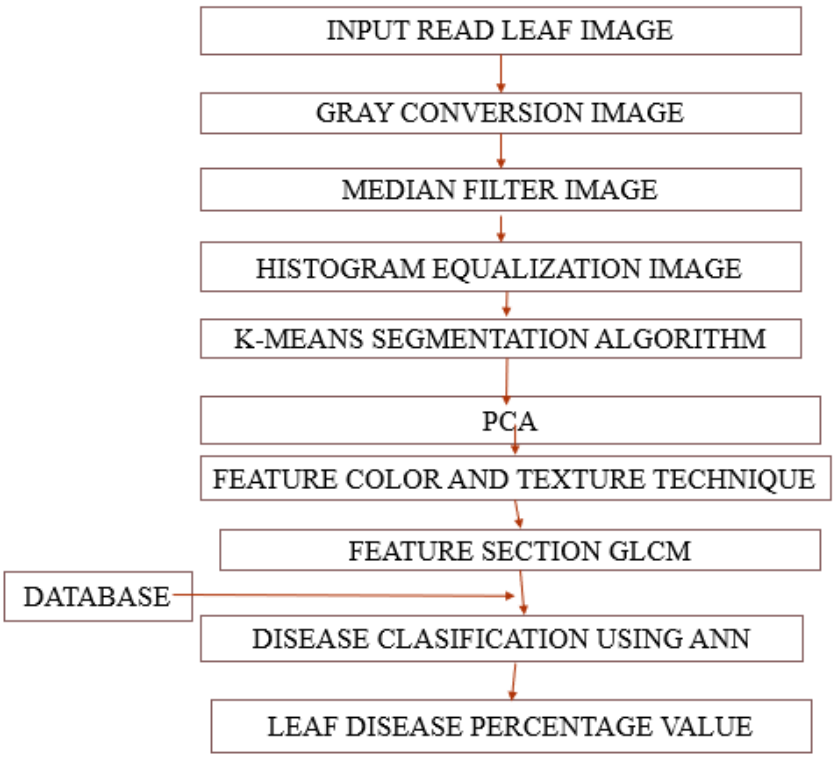

Figure2: Flowchart for leaf disease detection

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Category	Bacterial leaf spot	Symptoms	Comments	Management
Bacterium	Disease is transmitted through infected seed and can be spread by splashing irrigation water and rain	Bacterial leaf spot is difficult to control; plant pathogen-free seed; avoid overhead irrigation; do not work with plants when they are wet	Disease is transmitted through infected seed and can be spread by splashing irrigation water and rain	Bacterial leaf spot is difficult to control; plant pathogen-free seed; avoid overhead irrigation; do not work with plants when they are wet
Soft rot	Small water-soaked lesions near base of petioles which become soft, sunken and brown	Small water-soaked lesions near base of petioles which become soft, sunken and brown	Bacteria thrive in oxygen depleted plant tissue; disease emergence requires long periods of water saturated soil; bacteria enter plants through wounds	Control relies on the avoidance of conditions conducive to bacterial infection: plant coriander in well-draining soils; allow plants to dry before irrigating again; avoid wounding plants during harvest to prevent pst harvest development of disease; disinfect all equipment regularly
Viral	Carrot motley dwarf (CMD) Carrot redleaf virus (CRLV)	Yellow and red leaves; stunted plant growth	Disease transmitted by aphids; both viruses must be present to cause carrot motley dwarf	Avoid planting coriander in close proximity to overwintered carrot fields
Insects	Cavariella aegopodii	Small soft bodied insects on underside of leaves and/or stems of plant; usually green or yellow in color; if aphid infestation is heavy it may cause leaves to yellow and/or distorted, necrotic spots on leaves and/or stunted shoots; aphids secrete a sticky, sugary substance called honeydew which encourages the growth of sooty mold on the plants	Distinguishing features include the presence of cornicles (tubular structures) which project backwards from the body of the aphid; will generally not move very quickly when disturbed; willow-carrot aphid will also attack parnip, carrot and celery	If aphid population is limited to just a few leaves or shoots then the infestation can be pruned out to provide control; check transplants for aphids before planting; use tolerant varieties if available; reflective mulches such as silver colored plastic can deter aphids from feeding on plants; sturdy plants can be sprayed with a strong jet of water to knock aphids from leaves; insecticides are generally only required to treat aphids if the infestation is very high - plants generally tolerate low and medium level infestation; insecticidal soaps or oils such as neem or canola oil are usually the best method of control; always check the labels of the products for specific usage guidelines prior to use

Table1: Symptoms, Comments and Management of Coriander leaves

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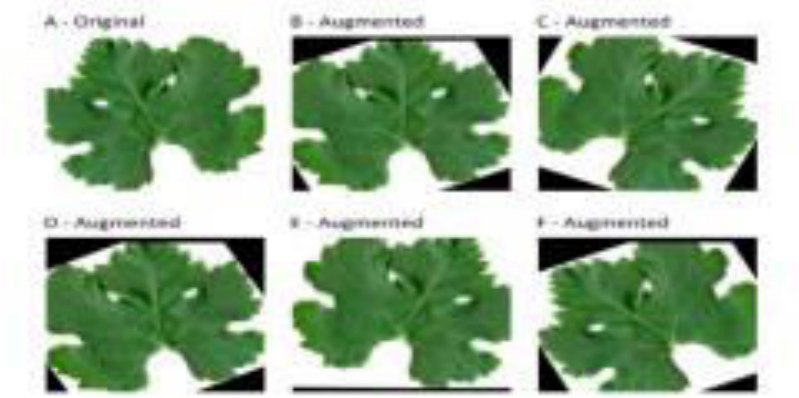

Figure 3: Equal distribution of datasets using Image Augmentation

This equal distribution makes it possible to use all of the data instead of selecting random data during the training process. It is expected that this situation increases the accuracy of the training and positively affects the classification results. Image augmentation techniques are shown in Figure.

The results of proposed model focus mainly on:

- Primary task is to classify the given images. Then, the secondary task is to identify the given leaf is a non-diseased leaf, and third is to identify and classify that the leaf is a diseased leaf or not.
- Measuring the accuracy for both the training process and the testing process of the proposed model.

The accuracy of the proposed method was computed to be 92.7%. Images taken in real condition majorly suffers from various problem

- Variation in Temperature
- Light density on leaf
- Presence of multiple objects
- Overlapping of other leaves

IV. CONCLUSION

Thispaper will be helpful to farmers who are facing plant disease problems in their crops. An application for identifying the plant diseases and predicting the necessary precautions for the disease will be implemented. The proposed system will be applicable for different plants. The system will be trained with image dataset of disease effected parts of plants. The plant parts include root, leaf, fruit and stem. This system will help to identify the plant diseases at the initial stage and proper precautions can be taken without consulting the experts. The machine learning and image processing technology will ensure the high accuracy of the system.

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