

Fertilizer Recommendation System For Disease Prediction

Usecase

Detection and recognition of plant diseases using machine learning are very efficient in providing symptoms of identifying diseases at its earliest. Plant pathologists can analyze the digital images using digital image processing for diagnosis of plant diseases. Application of computer vision and image processing strategies simply assist farmers in all of the regions of agriculture. Generally, the plant diseases are caused by the abnormal physiological functionalities of plants. Therefore, the characteristic symptoms are generated based on the differentiation between normal physiological functionalities and abnormal physiological functionalities of the plants. Mostly, the plant leaf diseases are caused by Pathogens which are positioned on the stems of the plants. These different symptoms and diseases of leaves are predicted by different methods in image processing. These different methods include different fundamental processes like segmentation, feature extraction and classification and so on. Mostly, the prediction and diagnosis of leaf diseases are depending on the segmentation such as segmenting the healthy tissues from diseased tissues of leaves.

Existing solutions:

[1] The proposed method uses SVM to classify tree leaves, identify the disease and suggest the fertilizer. The proposed method is compared with the existing CNN based leaf disease prediction. The proposed SVM technique gives a better result when compared to existing CNN. For the same set of images, F-Measure for CNN is 0.7 and 0.8 for SVM, the accuracy of identification of leaf disease of CNN is 0.6 and SVM is 0.8.

Advantages : The prediction and diagnosing of leaf diseases are depending on the segmentation such as segmenting the healthy tissues from diseased tissues of leaves.

Disadvantages : This further research is implementing the proposed algorithm with the existing public datasets. Also, various segmentation algorithms can be implemented to improve accuracy. The proposed algorithm can be modified further to identify the disease that affects the various plant organs such as stems and fruits.

[2] Detection of Leaf Diseases and Classification using Digital Image Processing International Conference on Innovations in Information, Embedded and Communication Systems(ICIECS), IEEE, 2017.

Advantages: The system detects the diseases on citrus leaves with 90% accuracy.

Disadvantages: System only able to detect the disease from citrus leaves.

The main objective of this paper is image analysis & classification techniques for detection of leaf diseases and classification. The leaf image is firstly preprocessed and then does the further work. K-Means Clustering used for image segmentation and then system extract the GLCM features from disease detected images. The disease classification done through the SVM classifier.

Algorithm used: Gray-Level Co-Occurrence Matrix (GLCM) features, SVM, K-Means Clustering .

[3] Semi-automatic leaf disease detection and classification system for soybean culture IET Image Processing, 2018.

Advantages: The system helps to compute the disease severity.

Disadvantages: The system uses leaf images taken from an online dataset, so cannot implement in real time. This paper mainly focuses on the detecting and classifying the leaf disease of soybean plant. Using SVM the proposed system classifies the leaf disease in 3 classes like i.e. downy mildew, frog eye, and septoria leaf blight etc. The proposed system gives maximum average classification accuracy reported is ~90% using a big dataset of 4775 images.

Algorithm used: SVM.

[4] Cloud Based Automated Irrigation And Plant Leaf Disease Detection System Using An Android Application. International Conference on Electronics, Communication and Aerospace Technology, ICECA 2017.

Advantages: It is simple and cost effective system for plant leaf disease detection.

Disadvantages: Any H/w failures may affect the system performance.

The current paper propose an android application for irrigation and plant leaf disease detection with cloud and IoT. For monitoring irrigation system they use soil moisture and temperature sensor and sensor data send to the cloud. The user can also detect the plant leaf disease.

K-means clustering used for feature extraction.

Algorithm used: K-means clustering,

Other than this there are some other levels which can be used for sentimental analysis these are document level, sentence level, entity and aspect level to study positive and negative, interrogative, sarcastic, good and bad functionality, sentiment without sentiment, conditional sentence and author and reader understanding points.

[5] The author proposes a method which helps us predict crop yield by suggesting the best crops. It also focuses on soil types in order to identify which crop should be planted in the field to increase productivity. In terms of crop yield, soil types are vital. By incorporating the weather details of the previous year into the equation, soil information can be obtained.

Advantages : It allows us to predict which crops would be appropriate for a given climate. Using the weather and disease related data sets, the crop quality can also be improved. Prediction algorithms help us to classify the data based on the disease, and data extracted from the classifier is used to predict soil and crop.

Disadvantages : Due to the changing climatic conditions, accurate results cannot be predicted by this system.

[6] The current work examines and describes image processing strategies for identifying plant diseases in numerous plant species. BPNN, SVM, K-means clustering, and SGDM are the most common approaches used to identify plant diseases.

Disadvantages : Some of the issues in these approaches include the impact of background data on the final picture, optimization of the methodology for a specific plant leaf disease, and automation of the technique for continuous automated monitoring of plant leaf diseases in real-world field circumstances.

[7] The proposed method uses SVM to classify tree leaves, identify the disease and suggest the fertilizer. The proposed method is compared with the existing CNN based leaf disease prediction. The proposed SVM technique gives a better result when compared to existing CNN. For the same set of images, F-Measure for CNN is 0.7 and 0.8 for SVM, the accuracy of identification of leaf disease of CNN is 0.6 and SVM is 0.8.

Advantages : The prediction and diagnosing of leaf diseases are depending on the segmentation such as segmenting the healthy tissues from diseased tissues of leaves.

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[8] In this paper, we propose a user-friendly web application system based on machine learning and web-scraping called the 'Farmer's Assistant'. With our system, we are successfully able to provide several features - crop recommendation using Random Forest algorithm, fertilizer recommendation using rule based classification system, and crop disease detection using Efficient Net model on leaf images. The user can provide the input using forms on our

user interface and quickly get their results. In addition, we also use the LIME interpretability method to explain our predictions on the disease detection image, which can potentially help understand why our model predicts what it predicts, and improve the datasets and models using this information.

Advantages : For crop recommendation and fertilizer recommendation, we can provide the availability of the same on the popular shopping websites, and possibly allow users to buy the crops and fertilizers directly from our application.

Disadvantages : To provide fine-grained segmentations of the diseased portion of the dataset. this is not possible due to lack of such data. However, in our application, we can integrate a segmentation annotation tool where the users might be able to help us with the lack. Also, we can use some unsupervised algorithms to pin-point the diseased areas in the image. We intend to add these features and fix these gaps in our upcoming work.

Literature Review

1)In Year 2022,"A Machine Learning Based New Recommendation System To The Farmer".

AUTHORS: D.N.V.S.L.S.Indra, M.Sobhana, A.H.L.Swaroop, V.PhaniKumar.

Totally 54% of India's land area is deemed arable, making it the world's largest agrarian economy. Soil infertility owing to over fertilization, as well as a lack of access and awareness of contemporary agricultural practices, are the different factors that contribute to low agricultural production. The main purpose of this research work is to develop a machine learning-based recommendation system to increase agricultural productivity. A variety of datasets were used in this study to design and develop advanced models to estimate the crop, recommend fertiliser, and identify plant disease. An algorithm called Mobile Net uses an image of a leaf to identify the disease present in a plant. The XG Boost model predicts a suitable crop based on the local soil nutrients and rainfall. Random Forest [RF] model was used to propose fertilizer and develop ideas for improving soil fertility depending on nutrients present in the soil. When compared to other approaches, the proposed model delivers a high level of Accuracy.

2) In Year 2022,"Crop Prediction And Disease Detection System".

AUTHORS: Sambhav Bhansali, Punit Shah, Jinay Shah, Priyal Vyas,Poonam Thakre.

Economy of India highly depends on agriculture. Still traditional ways of recommendations are used for agriculture. Currently, farmers use traditional ways of approximations for amount of fertilizer used and the type of crop to be sown.

Agriculture extremely depends on the type of soil and climatic condition of the region. Therefore, it becomes vital to create advancement in this field. With the help of Machine Learning and Deep Learning Techniques we will create a Web-App which will be one-stop solutions for information regarding the agriculture. Crop and fertilizer recommendation system will help the farmers in increasing their yield production. We are going to take the soil parameters along with the weathers API to figure out the most suitable crop for that region. Using the decision tree and navies bayes algorithm we will make the recommendation model which will use the N-K-P, Ph. value. Basis on the crop and region of farming we will recommend the fertilizer and its uses to boost the yield productivity for farmers. Sometimes due to unwanted excess of rainfall or the pest attack can cause disease to crops. We will use the image classification technique where the user can upload the picture of the affected plant/crop and the system will figure out the type of disease which will be done using Support Vector Machine (SVM) or using the neural network techniques. And this disease detection will suggest that how that plant/crop can be cure or prevent. The aim is to make a common system for all the features and provide the results with the best accuracy for all the crops over most of the regions all over the India. Also, the price and news section will keep the farmers updated with daily market prices and government schemes and policies related to the agriculture and farming.

3) In Year 2019,"Fertilizers Recommendation System For Disease Prediction in Tree Leave".

AUTHORS: R.Neela , P.Nithya.

Agriculture is the main aspect of country development. Many people lead their life from agriculture field, which gives fully related to agricultural products. Plant disease, especially on leaves, is one of the major factors of reductions in both quality and quantity of the food crops. In agricultural aspects, if the plant is affected by leaf disease then it reduces the growth of the agricultural level. Finding the leaf disease is an important role of agriculture preservation. After pre-processing using a median filter, segmentation is done by Guided Active Contour method and finally, the leaf disease is identified by using Support Vector Machine. The disease-based similarity measure is used for fertilizer recommendation.

References

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[5] R. Neela, P. Fertilizers Recommendation System For Disease Prediction In Tree Leave International journal of scientific & technology research volume 8, issue 11, november 2019

<http://www.ijstr.org/final-print/nov2019/Fertilizers-Recommendation-System-For-Disease-Prediction> In-Tree-Leave.pdf.

[6] Swapnil Jori¹, Rutuja Bhalshankar², Dipali Dhamale³, Sulochana Sonkamble, Healthy Farm: Leaf Disease Estimation and Fertilizer Recommendation System using Machine Learning, International Journal of All Research Education and Scientific Methods (IJARESM), ISSN: 2455-6211

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[8] Shloka Gupta, Nishit Jain, Akshay Chopade, Farmer's Assistant: A Machine Learning Based Application for Agricultural Solutions.