Analyzing And Detection of Leaf Disease

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ABSTRAC: The identification of disease on the plant is a very important key to prevent a heavy loss of yield and the quantity of agricultural product. The symptoms can be observed on the parts of the plants such as leaf, stems, lesions and fruits.leaf shows the symptoms by changing color, showing the spots on it. This identification of the disease is done by manual observation and pathogen detection which can consume more time and may prove costly. The aim of the project is to identify and classify the disease accurately from the leaf images. The steps required in the process are Preprocessing, Training and Identification. For identification of disease features of leaf such as major axis, minor axis etc. are extracted from leaf and given to classifier for classification. In our project we have used tomato and brinjal leaf for identifying its disease.Support Vector Machine (SVM) which will be existing system and Convolution Neural Network (CNN) which will be proposed system.This proposed CNN algorithm will be compared to an existing SVM algorithm in terms of accuracy.

INTRODUCTION

Now days, a new concept of smart farming has been introduced where the field conditions are controlled and monitored using the self operating systems. The self recognition of the disease is based on the identification of the symptoms of disease. So that information about the disease occurrence could be quickly and accurately provided to the farmers, experts and researchers. This in turn reduces the monitoring of large field by human being. In disease recognition from image the key is to extract the characteristic feature of the diseased region. According to the disease the features may vary. The features that are extracted from the image are color, shape, texture etc. Sometimes for detection of the disease more features are extracted and these extracted features would increase the hardware as well as software cost.

LITERATURE REVIEW

Plant Leaf Disease Detection and Classification Based on CNN with LVQ Algorithm Melike Sardogan ; Adem Tuncer ; Yunus Ozen IEEE 2021. This paper presents a Convolutional Neural Network (CNN) model and Learning Vector Quantization (LVQ) algorithm based method for tomato leaf disease detection and classification. The dataset contains 500 images of tomato leaves with four symptoms of diseases. We have modeled a CNN for automatic feature extraction and classification. Color information is actively used for plant leaf disease researches. In our model, the filters are applied to three channels based on RGB components. The LVQ has been fed with the output feature vector of convolution part for training the network. **Automated Image Capturing System for Deep Learning-based Tomato Plant Leaf Disease Detection and Recognition Robert G. de Luna ; Elmer P. Dadios ; Argel A. Bandala IEEE 2021.**we train a deep convolutional neural network to identify three diseases or absence thereof. The system used Convolutional Neural Network to identify which of the tomato diseases is present on the monitored tomato plants. The F-RCNN trained anomaly detection model produced a confidence score of 80 % while the Transfer Learning disease recognition model achieves an accuracy of 95.75 %. The automated image capturing system was implemented in actual and registered a 91.67 % accuracy in the recognition of the tomato plant leaf diseases. **An application of image processing techniques for detection of diseases on brinjal leaves using k-means clustering method R Anand ; S Veni ; J Aravinth IEEE 2021.**The goal of proposed work is to diagnose the disease of brinjal leaf using image processing and artificial neural techniques. The diseases on the brinjal are critical issue which makes the sharp decrease in the production of brinjal. The study of interest is the leaf rather than whole brinjal plant because about 85-95 % of diseases occurred on the brinjal leaf like, Bacterial Wilt, Cercospora Leaf Spot, Tobacco Mosaic Virus (TMV). The methodology to detect brinjal leaf disease in this work includes K-means clustering algorithm for segmentation and Neural network for classification.

EXISTING SYSTEM

Support Vector Machine (SVM):

To detect an ideal hyperplane for different distinct examples in a high dimensional space is the main process of the SVM. To fulfill this model there is more than one hyperplane. This process depends upon the bolster vector which the information that lies nearest on the closed surface and coordinating with the ideal choice surface. It performs classification by planning the input vectors into a high dimensional space and constructing the hyperplane to separate the data. This strategy is mainly used to solve a quadratic programming problem and non-convex,unconstrained minimization problem.

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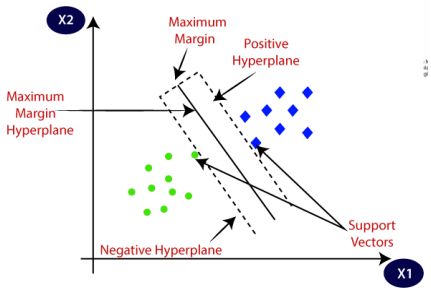


- Time Consuming Process.
- Recognition accuracy is less.
- Increased overhead.
- Existing method configuration is not applicable for buses and large vehicles.

PROPOSED SYSTEM

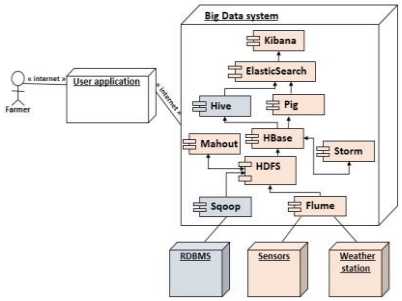
Convolutional Neural Network: (**CNN**) is a class of artificial neural networks where connections between nodes form a graph along a temporal sequence.This allows it to exhibit temporal dynamic behavior.Derived from feed forward neural networks,CNNs can use their internal state (memory)to process variable length sequences of inputs.This makes them applicable to tasks such as unsegmented,connected handwriting recognition or speech recognition. The term"Enhanced neural network"is used indiscriminately to refer to two broad classes of networks with a similar general structure,where one is finite impulse and the other is infinite impulse. Both classes of networks exhibit temporal dynamic behavior.A finite impulse recurrent network is a directed acyclic graph that can be unrolled and replaced with a strictly feed forward neural network,while an infinite impulse recurrent network is a directed cyclic graph that cannot be unrolled.

- Significantlyreduced computational complex size
- Reduced time / Estimation time is Low
- Region of interest is clear to identify
- Bounding box creation and tracking

METHODOLOGY

Convolutional neural network (CNN) is used in the proposed system for detection of driver drowsiness. Since a feature vector is needed for each drowsy image to compare with existing features in a database to detect either drowsy or not. Usually CNNs requires fixed size images as input so preprocessing is required. The preprocessing includes extracting the key frames from video based on temporal changes and store in database. From these stored images, feature vectors are generated in convolution layers of CNN.. CNN have layers like convolutional layers, pooling (max, min and average) layers, ReLU layer and fullyconnected layer.

Convolution layer is having kernels (filters) and each kernel having width, depth and height. This layer produces the feature maps as a result of calculating the scalar product between the kernels and local regions of image. CNN uses pooling layers (Max or Average) to minimize the size of the feature maps to speed up calculations. In this layer, input image is divided into different regions then operations are performed on each region. In Max Pooling, a maximum value is selected for each region and places it in the corresponding place in the output. ReLU (Rectified Linear Units) is a nonlinear layer. The ReLU layer applies the max function on all the values in the input data and changes all the negative values to zero. The following equation shows the ReLU activation function.



1.**Input Image and Blur Soften Image**.

Images can be taken by the digital camera and by using the images the data can be saved. After acquiring the image next step is to apply blur soften to the image. Blurring of the image means each pixels of the image gets spread over. Sharpening of the image can be reduced by using blurring and detection can be accurate.Blurring the image helps to reduce the amount of noise in the image. When the image is taken it contains some noise which can make detecting the affected area tough process. By blurring the image the noise can be reduced.

2. Converting the image from RGB to HSV Format

Blurring helps to reduce the noise and conversion of RGB to HSV (Hue Saturation Value) can be helpful where the color description plays an important role. RGB color space describes the colors in the form of red, green, blue present. Usually HSV model is preferred over RGB color model. RGB model determines color as a collection of primary colors. HSV model's description of color is identical as of the leaf

3. Separating the foreground

The separation of the foreground and background plays an important role in obtaining the diseased part of the leaf. In this approach the foreground of the image is extracted. So automatically therefore the foreground is separated and is helpful in detection.

4. Leaf Segmentation

The image is segmented into various parts according to the region of interest. This detects the division of the same and meaningful regions. In other words image segmentation is used to separate the objects from the background of the image. Then after the segmentation the segmented part is given to the clustering algorithm that is k-means.

CONCLUSION

The proposed system was developed taking in mind the benefits of the farmers and agricultural sector .The developed system can detect disease in plant and also provide the remedy that can be taken against the disease. By proper knowledge of the disease and the remedy can be taken for improving the health of the plant.The accuracy and the speed can be increased by use of CNN algorithm. This proposed system is based on python and gives an accuracy of around 78%.

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