LITERATURE SURVEY FERTILIZER RECOMMENDATION SYSTEM FOR DISEASE PREDICTION

ABSTRACT

Agriculture is the main aspect of country development. Many people lead their life from agriculture field, which gives fully related to agricultural products. 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 disease then it reduces the growth of the agricultural level. Finding the 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 disease is identified by using Support Vector Machine. The disease-based similarity measure is used for fertilizer recommendation.

Keywords

Disease Prediction, Graph Cut Algorithm, Guided Active Contour method, segmentation, Feature Identification

INTRODUCTION

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.

MATERIAL AND METHODS

A digital camera or similar devices are used to take images of different types, and then those are used to identify the affected area in leaves. Then different types of image-processing techniques are applied to them, the process those images, to get different and useful features needed for the purpose of analyzing later-Plant leaf disease identification is especially needed to predict both the quality and quantity of the First segmentation step primarily based on a mild polygonal leaf model is first achieved and later used to guide the evolution of an energetic contour. Combining global shape descriptors given by the polygonal model with local curvature

SVM Classification Algorithm:

Support Vector Machine(SVM) SVM is a binary classifier to analyze the data and recognize the pattern for classification. The main goal is to design a hyper plane that classifies all the training vectors in different classes. The objective of SVM is to identify a function which obtain the hyper-plane. Hyper plane separates two classes of data sets. The linear classifier is defined as the optimal separating hyper plane. The data sets can be separated in two ways: linearly separated or nonlinearly separated. The vectors are said to be optimally separated if they are separated without error and the distance between the two closest vector points is maximum. For linear separable data sets, training vectors of a different class of pairs (am, bm),

where m = 1,2,3,4 …,t am ϵ Rn(Reference Vector) bm ϵ { +1, -1} The decision boundary is placed using a maximal margin between the closest points. w is being a vector perpendicular median to the street. am be the unknown of to be positioned especially elegance according to the decision boundary, and hyper plane (w. a) + c =0 with c as constant For classification (w . am) + c0 ≥ 1, ∀ bm = +v e samples (1) (w . am) + c0 ≤ -1, ∀ bm = −v e samples (2) where (w.am) has a dot product of w and am. The inequalities if added i.e multiplying equations (1) and (2) with +1, −1 and bm. Suppose bm such that bm = 1 for +v e samples bm = -1 for –v e samples it results, bm [(w.am) + c0] ≥ 1 bm [(w.am) + c0] ≥ -1 Therefore rearranging the above equations bm (w.am) + c0 – 1 ≥ 0 for points into dataset to in the gutter i.e on the decision boundary bm (w.am) + c0 – 1 = 0.

RESULTS AND DISCUSSION

To compare the performance of the proposed SVM method with the existing CNN (Convolutional Neural Network) method. Metrics such as True Positive, False Positive, True Negative, False Negative are used. The proposed method is implemented using .NET. The code existing CNN method was written in Python was downloaded from the web 15 images were captured using a camera for testing purpose

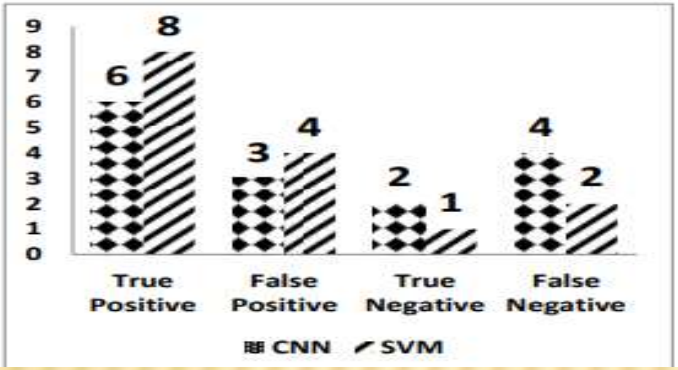
True Positive:

True Positive is an outcome where the model correctly predicts positive class . False Positive: False Positive is an outcome where the model incorrectly predicts positive class . True Negative: True Negative is an outcome where the model correctly predicts negative class . False Negative: False Negative is an outcome where the model incorrectly predicts negative class . The True Positive, False Positive, True Negative, and False Negative value for captured 15 images are shown in table 1. The pictorial representation of this comparisone

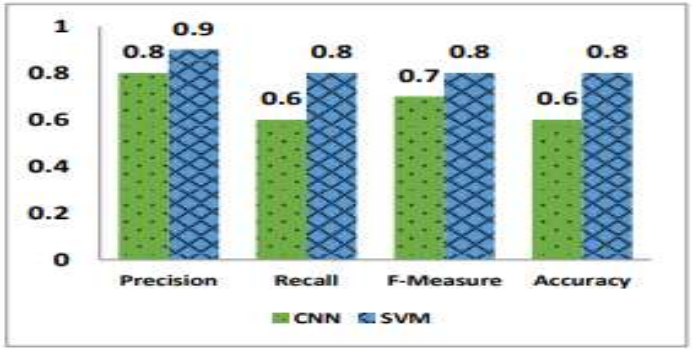
Firstly, some secondary metrics such as true positive (TP), true negative (TN), false positive (FP), and false-negative (FN) [18] are calculated as follows,

TABLE 1
COMPARISON OF CNN AND SVM IN TERMS OF TP, FP, TN, AND FN

Methods	TP	FP	TN	FN
Existing [CNN]	6	3	2	4
Proposed [SVM]	8	4	1	2



Performance comparison of CNN and SVM in terms of True Positive, False Positive, True Negative and False Negative.



Precision, Recall, F-Measure and Accuracy comparison chart for CNN and SVM

CONCLUSIONS

The proposed method uses SVM to classify , identify the disease and suggest the fertilizer. The proposed method is compared with the existing CNN based 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 0.7and 0.8 for SVM, the accuracy of identification of leaf disease of CNN is 0.6 and SVM is 0.8.

FUTURE SCOPE

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.