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Fertilizer Recommended System for Disease Prediction

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ABSTRACT: Agriculture is a major aspect of the country's development. Plant diseases, especially leaf diseases, are one of the major factors that reduce both the quality and quantity of food crops. From an agricultural point of view, when plants are affected by leaf diseases, their agricultural level of growth is reduced. Detecting leaf diseases is an important role in agriculture and conservation. After preprocessing with an average filter, segmentation is performed by a guided active contour method and finally leaf diseases are identified using a support vector machine (SVM). Disease-based measures of similarity are used for fertilizer recommendations.

KEYWORDS: Disease prediction, graph cut algorithm, guided active contour method, leaf segmentation, leaf feature identification.

I. INTRODUCTION

Agriculture is the most important sector of life today. Most plants are affected by various bacterial and fungal diseases. Plant diseases have severely restricted production and posed a major threat to food security. Therefore, early and accurate detection of plant diseases is essential to ensure large quantities and the highest quality. Due to the diversification of plants, changes in cultivation methods, and deficiencies in pest control technology, plant diseases are increasing and the damage is expanding.

II. OBJECTIVE

The main purpose of this work can be used to effectively alleviate the problems of disease-affected crops. The proposed method uses SVMs to classify tree leaves, identify diseases, and suggest fertilizers. The proposed method is compared with existing CNN-based leaf disease prediction. The proposed SVM method yields better results compared with existing CNNs.

III. LITERATURE SURVEY

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IV. PROPOSED SYSTEM

An automated system that takes the images of plant parts as input identifies different diseases on plants by checking the symptoms shown on the leaves of the plant is built . Deep learning techniques are used to identify the diseases and suggest the fertilizes that can help cure the disease. The user need not consult any specialist for identification of diseases that affected the leaves or for the recommendation of the fertilizers.

Proposed solution:

The project aim is to build an application that provides a proper information about the disease in leaves, so that the plant may yield a healthy fruits, vegetables and flowers

S. No	Parameter	Description
1	Problem statement (problem to be solved)	To solve the disease in leaves it involves several steps, including finding the disease, fertilizer recommended, amount of fertilizer and near by store. The challenge is to perform all these task in the most efficient way.
2	Idea / Solution description	Creating an app that “ Helps to find disease in leaves ” ,so that it helps the farmer to yield a healthy crop .
3	Novelty / Uniqueness	It gives the botanical name of the plant and also tells us whether it is the starting stage of disease or an end stage [Based on the stage of disease it recommend whether to use organic or inorganic fertilizer] and also tells how much amount of fertilizer to be used.
4	Social Impact / Customer Satisfaction	Based on the disease of the leaves fertilizers are recommended , so that the farmers need not waste too much of money on other fertilizers which are useless and do not cure the disease and also it tells the near by store where the particular fertilizer are available.
5	Business Model (financial Benefit)	If the app is working good and gives a good result , not only the farmers even the roof gardeners will install our app , so that it may create a good impact in the society.
6	Scalability of Solution	As the technology is improving the life span of people is becoming less , this is due to eating an unhealthy food . The disease in leaves Occur due to lack of nutrients in soil, by using a proper organic fertilizers , the plants may get rid of the disease so that we may get a healthy fruits, vegetable and flowers

Figure 1 Proposed Solution

V. SOLUTION ARCHITECTURE

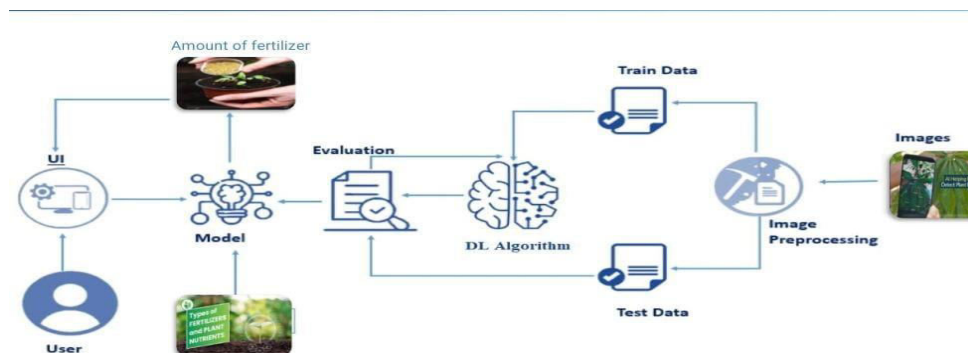


Figure 2 Solution Architrcture

VI. MATERIAL AND METHODS

Take different types of pictures, such as with a digital camera, to identify affected areas of the leaves. We then apply different kinds of image processing techniques to process these images to obtain various useful features that we need for later analysis purposes. Identification of plant leaf diseases is particularly necessary to predict both the quality and quantity of the first segmentation step, which is mainly based on mild polygonal leaf models, achieved first and later energy Used to guide contour development. By combining the global shape descriptor given by the polygonal model with local curvature-based features, leaves are classified as an overleaf dataset. This research paper presents a method developed to address the obstacles posed by complex images such as simple plant leaves. An initial segmentation step based on the graph-cut approach is first performed, after which it is used to control leaf boundary development and implement classification algorithms to classify diseases and recommend fertilizers for affected leaves.

6.1 Image Classification Steps:

The proposed image classification technique is divided into the following steps:

6.1.1 Image acquisition: To get the image of a leaf so that evaluation in the direction of a class can be accomplished.

6.1.2 Preprocessing: The purpose of image preprocessing is improving image statistics so that undesired distortions are suppressed and image capabilities which are probably relevant for similar processing are emphasized. The preprocessing receives an image as input and generates an output image as a grayscale, an invert and a smoothed one.

6.1.3 Segmentation: Implement a guided active contour method. Unlimited active contours applied to difficult natural drawings. Addresses unsatisfactory contours that try to cut through all possible grip cuts at the edge of the sheet. The proposed solution uses the polygonal model obtained after the first step not only as the initial sheet contour, but also as the shape before unfolding towards the real sheet boundaries.

6.1.4 Disease prediction: Leaves are attacked by bacteria, fungi, viruses and other insects. A support vector machine (SVM) algorithm classifies leaf images as normal or affected. Vectors are constructed based on leaf properties such as color, shape, and texture. A constrained hyperplane is then constructed to classify the preprocessed leaves and to implement a multi-class classifier to predict disease in leaf images with improved accuracy.

6.1.5 Fertilizer Recommendations: Fertilizers are recommended for infected foliage depending on severity. Fertilizers can be organic or inorganic. Managers can save fertilizer based on disease classification by severity. Suggested fertilizer measurements are based on disease severity.

6.2. SVM Classification Algorithm: Support Vector Machine (SVM) SVM is a binary classifier that analyzes data and recognizes patterns for classification. The main goal is to design a hyperplane that divides all training vectors into different classes. The purpose of SVM is to identify the function F_x that holds the hyperplane. Hyperplane separates the two classes of records. A linear classifier is defined as the optimal separating hyperplane. Data sets can be separated in two ways: linear separation or nonlinear separation. Vectors are said to be optimally separated if they are separated without error and the distance between the two closest vector points is maximal. For linearly separable datasets, training vectors for another class pair (a_m, b_m) , where $m = 1, 2, 3, 4, \dots, t$, $a_m \in R^n$ (reference vector) $b_m \in \{+1, -1\}$ Decision Created with the maximum distance between the nearest bounded points. w is a vector perpendicular to the road. Especially elegantly placing the unknowns after the decision boundary using bin, hyperplane $(w \cdot \text{Sample } (1) + c_0) \leq -1, \forall b_m = -ve$ sample (2) where $(w \cdot a_m)$ is the inner product of w and a_m . An inequality is added. H. Multiply equations (1) and (2) by $+1, -1$ and b_m . Assuming b_m such that $b_m = 1$ for $+ve$ samples and $b_m = -1$ for $-ve$ samples, then $b_m [(w \cdot a_m) + c_0] \geq 1$ $b_m [(w \cdot a_m) + c_0] \geq -1$ becomes. The points in the data set up to the above formula $b_m (w \cdot a_m) + c_0 - 1 \geq 0$ channel, i.e. the decision boundary $b_m (w \cdot a_m) + c_0 - 1 = 0$.

VII. EXPERIMENTAL RESULTS

Performance Metrics:

Metrics are a baseline for performance tests. Monitoring the correct parameters will help you detect areas that require increased attention and find ways to improve them.

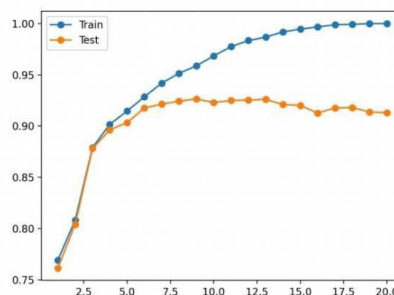


Figure 3 Performance Metrics



Figure 4 Output Screen

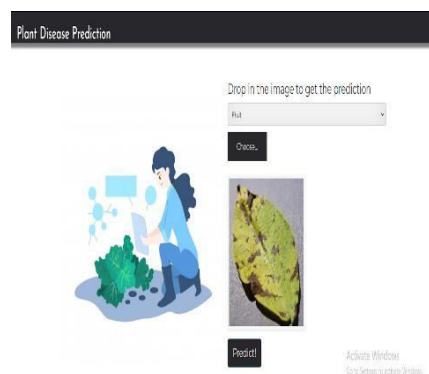


Figure 5 Input PhotoLeaf

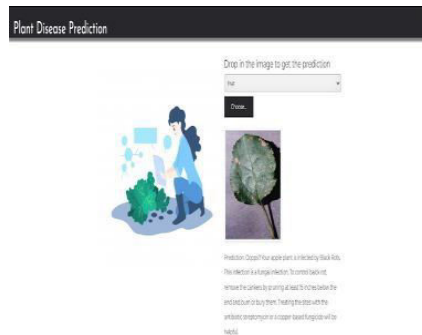


Figure 6 The output of the disease leaf

VIII. CONCLUSION

Hence a system that takes in images as user input, analyses those for certain symptoms and identifies the disease, recommends the fertilizer to counter the deficiency of the nutrients is built and deployed.

IX. FUTURE SCOPE

The system must be trained with numerous images of plant disease symptoms. In case of presence of multiple 50 50 diseases, suitable classification must be done to predict each disease accurately and recommend separate fertilizers as a solution to each deficiency or infection.

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