Assignment 8
Algorithms

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PSYC 315

Context of the Problem

Emergence and Development of Plant Diseases

The leaf is considered the essential part of the plant body that has been utilized for plant identification. Various leaf characteristics have been used for plant recognition, such as shape, color, and texture. The plant leaf has been used as a health measurement.

When plants become diseased, they can display various symptoms, e.g., colored spots or streaks occurring on plant leaves, stems, and the seed of plants. This external appearance of plants/crops is an essential quality character for agriculture. Therefore, the inspection of quality and automation grading systems are essential in the agriculture field to cultivate good healthy plants. Without continuous monitoring of all the crops, the agricultural industry can suffer significant production and economic losses caused by plant diseases.

Various plant diseases can be detected with the help of image processing. Automatic detection plays a crucial role in detecting these plant diseases, measuring infected area by disease, and determining the color of the affected area. The advantage in using a 'computerized process' is the high level of accuracy in the diagnosis and prognosis and the significant reduction of costs compared to the traditional method of face-to-face diagnosis (Camargo Et al., 1990).

Automatic plant disease identification by visual inspection can significantly benefit users who have little or no information about their growing crop. Such users include farmers in underdeveloped countries, who cannot afford the services of an expert agronomist, and those living in remotes areas where access to assistance via an internet connection can become a significant factor.

Algorithm

Precise and accurate diagnosis can be made with the latest technologies and algorithms like machine learning and image processing. Machine learning algorithms can be further categorized into Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN), K-means Clustering, Support Vector Machine (SVM), Probabilistic Neural Network (PNN), K-Nearest Neighbour (KNN).

Specific algorithms may vary depending on the approach of the chosen Machine Learning algorithm adopted for plant disease detection. Even though the detail of each algorithm is specific to itself, a standard algorithm can be provided because other than the mathematics involved, the generic approach of each algorithm is similar in most manners.

Start;

Test Image;

RGB Image Acquisition through Image Preprocessing **Image Enhancement** (improve quality of Image for better segmentation);

Crossover of the Test Image with the Images inside the Dataset (Probabilistic process for generating the result)

Image Segmentation Locating Optimum Threshold (by comparison of the Test Image against Images found from Crossover) (To differentiate between the target object and the background);

Feature Extraction (Image Post Processing -> based on color, texture, and shape);

IF Successful Recognition of Disease(Yes /No) :

Yes

Classification of Plant Diseases (classification_Test = Healthy / Not healthy)

Healthy

IF classification_Test Healthy;

Labelled diseased regions

Display Extracted Regions

END

Not Healthy

ELSE

Labelled diseased regions

Display Extracted Regions

END

 # No

ELSE

Add Test Image to the Dataset

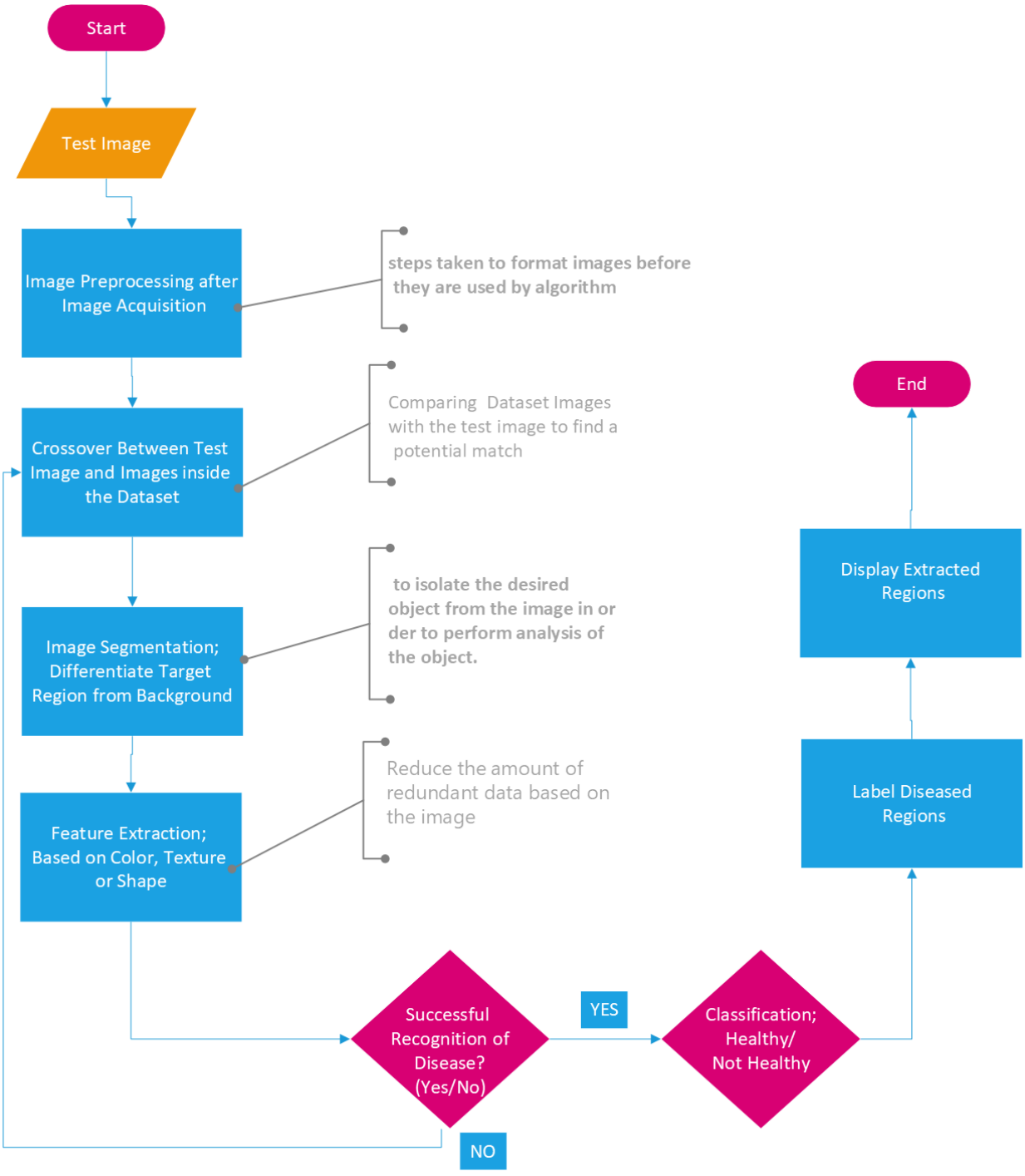
Perform Crossover

Image Segmentation

Feature Extraction

Classification

Flow Chart: Plant Leaf Disease Detection



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