**DISEASE AND SEVERITY DETECTION OF CROP AND PRDEICTION OF PESTICIDES**

**Introduction**

Each year, plant viruses and fungal attacks lead to crop losses of up to 30 percent and moreover excess usage of pesticides leads to spreading of fatal diseases such as cancer, autism and asthma. That is why it is important to detect plant disease in its early stages. The laboratory tests are expensive and often time-consuming and farmers in India are less educated to understand the vulnerability and severe consequences of the diseases. They either ignore or recklessly use pesticides to get rid of the problem. This not only leads to spreading of fatal diseases and soil contamination but is also not economically beneficial for them.

Thus it is very important for them to know the disease and their proper treatment for better crop production and environmental balance.

**Objectives**

The main objective of this project is to design a software tool to identify the disease with which a crop is affected using its image. The underlying objectives are explained as follows:

* To apply image processing techniques to obtain affected portion of the crop and extraction of consequential feature values.
* To perform comparison of extracted values with sample values to identify and classify the disease using various classifier algorithms.
* To integrate and compare results of various classifier algorithms.
* To predict the necessary control measures to cure the disease without any environmental and economic damage.

**Materials and Methods**

We will use Segmentation technique of image processing to extract the symptoms of disease that a crop has been infected with. We will use four techniques of machine learning and compare the result to explore how well they perform for different kinds of feature representations.

1. Naive Bayes

2. Support Vector Machines

3. K-nearest Neighbors

5. Decision Trees

* **Naïve Bayes Method:**

Naive Bayes assumes that all features in the feature vector are independent, and applies Bayes’ rule on the sentence. Naive Bayes calculates the prior probability frequency for each label in the training set. Each label is given a likelihood estimate from the contributions of all features, and the sentence is assigned the label with highest likelihood estimate.

* **Support Vector Machine (SVM):**

An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible. New examples are then mapped into that same space and predicted to belong to a category based on which side of the gap they fall.

* **K-Nearest Neighbors Algorithm:**

K nearest neighbors is a simple algorithm that stores all available cases and classifies new cases based on a similarity measure (e.g., distance functions).It is a non-**parametric** method used for classification and regression commonly used in pattern recognition.

* **Decision Tree Method:**

Decision trees create a flowchart based classifier. At each level it utilizes decision stumps, a simple classifiers that check for the presence of a single feature. The label is assigned to the sentence at the leaf nodes of the tree.

**Expected Outcome**

The software tool determines the affected region of the image and extracts the consequential values and compares them with sample data to determine and classify the disease associated with the crop and predicts the necessary control measures. Further it also compares and analyze the outcome of various classifier algorithms.

**References**

* https://catalog.data.gov/dataset?tags=plant+disease
* <https://www.reddit.com/r/datasets/comments/5uljlp/plant_leaf_disease_datasets/>

**Team**

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* Segmentation Techniques for Image processing.
* Implementation of Naïve bayes technique of machine learning.
* Implementation of K-nearest Neighbors technique of machine learning.
* Designing and implementing prediction algorithm.

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* Web crawling for appropriate data set.
* Implementation of Decision Trees technique of machine learning.
* Implementation of Support Vector Machines technique of machine learning.
* Integration of the above techniques and comparing the results.
* Documentation.