

Leaf Disease Prediction

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Introduction

Problem Statement- To develop a model which can predict the crop disease by providing the images of the leaves .

Agriculture is crucial for economies like India. Key challenges include weather conditions and crop diseases, which can significantly impact yield. Digitalizing the identification and classification of diseases can help agriculturists by reducing time and increasing precision. Potatoes, a staple in India, can suffer from diseases like late blight and early blight. Traditional identification methods are time-consuming and require expertise. Image analysis can effectively monitor and identify plant diseases by recognizing patterns on leaves. These patterns are compared with historical data to classify the disease using machine learning and deep learning methodologies. This combination is effective in disease identification and classification, leading to better crop management and yield.

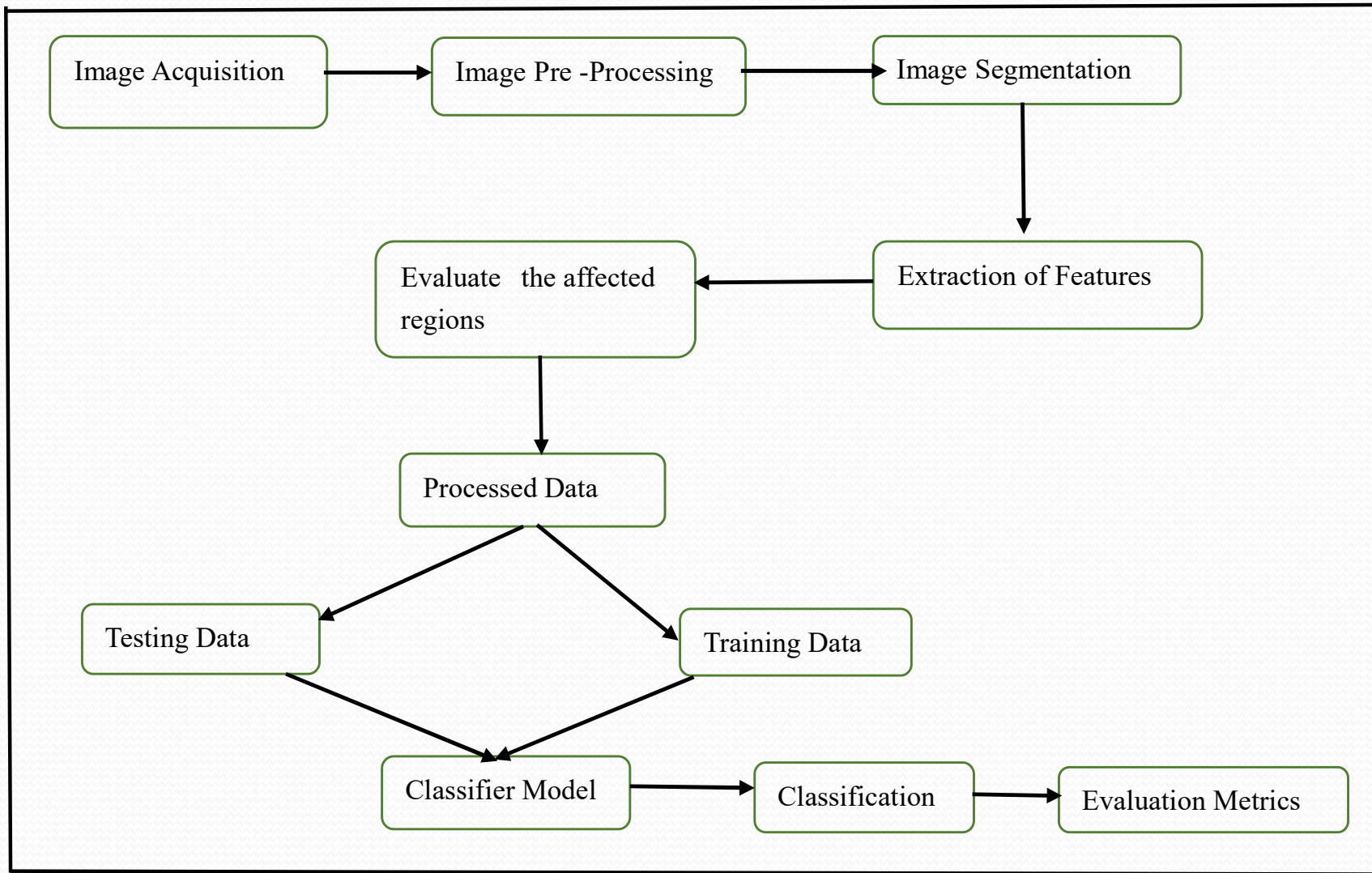
Literature Review

Author(s)	Date	Description
Monzurul Islam	2017	Proposed an automated system that uses image processing and machine learning to diagnose leaf diseases. The system, which uses multiclass SVM for image segmentation, can identify primary diseases in potatoes with high accuracy.
Harshal Waghmare and Radha Kokare	2016	Developed a method for detecting grape leaf diseases. The method uses image segmentation and a high-pass filter to analyze diseased components, and multiclass SVM to classify the diseases based on texture patterns.
Mrs. Shruthi U	2019	Demonstrated the use of machine learning methods for disease classification. The paper outlines the process of disease identification, from data acquisition to feature extraction and classification.

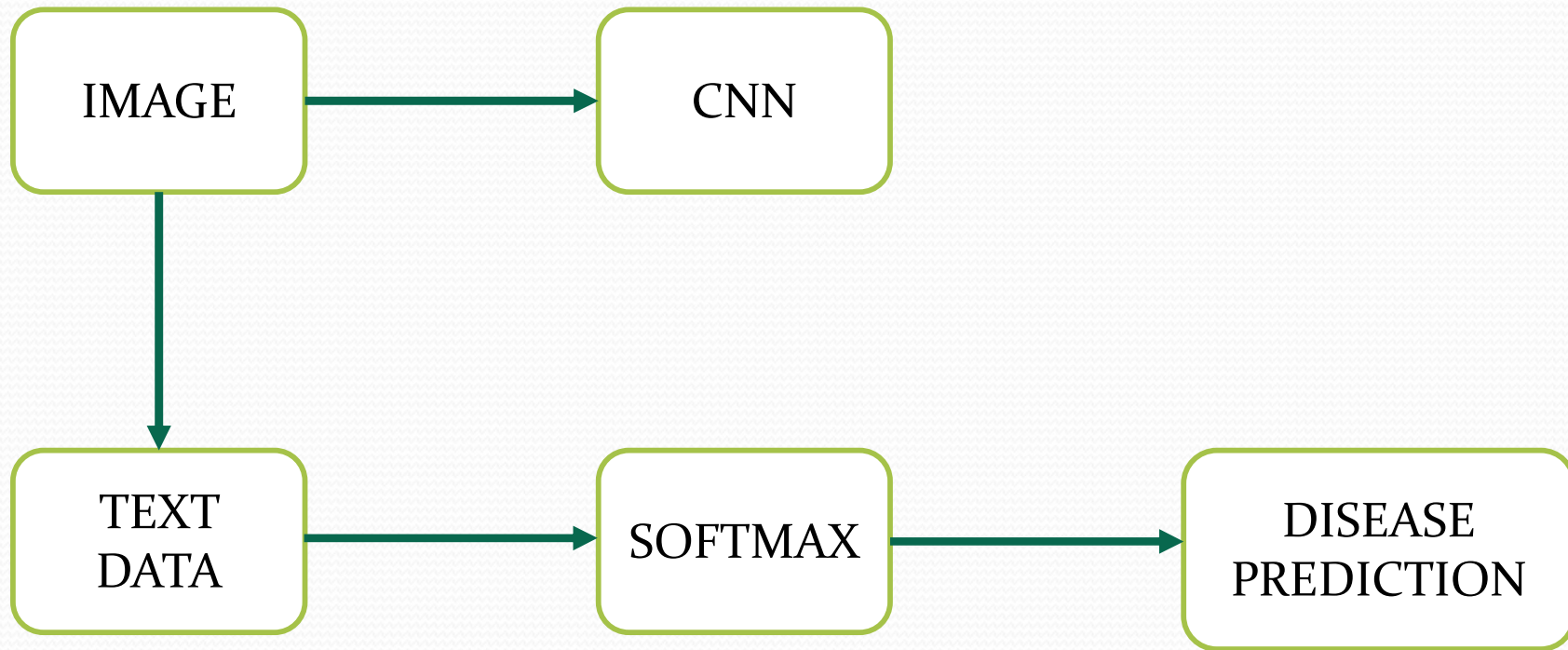
Objectives

- ❑ Develop a reliable, convenient, and accurate system.
- ❑ Identify causal agents of potato diseases, including fungi, bacteria, viruses, and nematodes.
- ❑ Characterize symptoms and damage caused by each type of potato disease and their impact on yield and economic outcomes
- ❑ Develop a classification system for potato diseases based on their characteristics, transmission mode, favorable environmental conditions, and diagnosis methods.
- ❑ Provide guidance to growers, researchers, and stakeholders on effective disease management and control strategies

Proposed Model



Experimental Set-up



Result: Example

Actual : Tomato_Tomato YellowLeaf_Curl Virus,
Prediction : Tomato_Tomato_mosaic_virus,
Confidence : 99.3%



Fig. Tomato Leaf
Prediction

Actual : Early_Blight,
Prediction : Healthy,
Confidence : 64.17%



Fig. Potato Leaf
Prediction

Actual : Late_Blight,
Prediction : Late_Blight,
Confidence : 100.0%



Fig. Pepper Leaf
Prediction

Result Analysis

```
import os
img_windows_path = input('Enter an image location\n')
img_posix_path = os.path.normpath(img_windows_path).replace("\\", "/")
img_posix_path = img_posix_path.replace('"', '')
```

```
prediction = model.predict(img)
for i in range(len(prediction)):
    predicted_class_index = np.argmax(prediction[i])
    predicted_class = class_name[predicted_class_index]
    print("Predicted:", predicted_class)
```

1/1  0s 480ms/step

Predicted: Healthy

Limitation

- ☐ Difficulty with Unusual or Unseen Content
- ☐ Sensitivity to Image Quality
- ☐ Over-Reliance on Training Data
- ☐ Difficulty in Abstract Conceptualization
- ☐ Inability to Provide Real-Time Descriptions

Conclusions & Future Scope

A CNN-based model was developed to classify potato leaf conditions, achieving 96.93% accuracy. The aim is to digitalize agriculture for better crop protection. The model can detect and classify affected and healthy potato leaves with over 90% accuracy. However, this can be improved by further research on CNN methodologies, including activation functions, batch normalizations, convolutional layers, and fully connected layers.

Future Scope:

Refining Deep Learning and CNN models can improve accuracy in predicting potato leaf diseases. Real-time prediction models, possibly using mobile devices or drones, can quickly detect and treat diseases in the field. Multi-class classification can predict different types of diseases simultaneously for comprehensive management. Leveraging pre-trained models from related datasets or crops through transfer learning can enhance the prediction model's performance. Developing interpretable models can provide insights into important features in potato leaf images, increasing trust and adoption.

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Thank You!

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