AN ART OF REVIEW IN PREDICTING THE ROSE PLANT DISEASES USING IMAGE PROCESSING WITH MACHINE LEARNING

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Abstract: Rose Plant Horticulture performs a tremendous position in the field of trading in phrases of the enterprise. An overview of art in predicting rose plant leaf diseases using machine learning was considered in this paper. It also investigated various predictive systems mastering strategies developed by the researcher to identify rose plant diseases. Moreover, the researcher's manipulation of experimental outcomes was reviewed by current device requirements. The accuracy of the present methodologies became measured using a confusion matrix to evaluate the overall performance of the study's work became explored. In the end, the suggestion to are expecting the effective and green predictive device learning techniques to decide the rose plant using image processing was considered.
Keywords: Rose Plant Disease, Machine Learning, Image Processing, Mean Clustering, Segmentation, Feature Extraction.

I. INTRODUCTION

Image processing (IP), proliferate in numerous fields. IP may be methodology that usually, wants to improve raw pictures that are received from numerous resources. It is a way of transforming an image into a digital form and implementing related actions, training the staff member in the improved image of care, or extracting valuable information from it. It's a sort of signal dispensation wherever the image associated with nursing input and output is additionally a picture or options connected with the image. Image processing which is classified into many crew are given below

- **Visualization:** The image process is employed to spot those objects that don't seem to be detectable.
- **Image sharpening and restoration:** In image processing, numerous techniques applied to the image to provide a more robust picture.
- **Image retrieval:** By image, process user will observe solely that portion of the image that has relevancy to the user.

- **Pattern measurement:** various components in a picture are measured.
- **Image Recognition**: Substances in an image are perceived.

Image processing uses mathematical procedures for the process of pictures. Two ways used for the process of pictures are analog image process and digital image process. Digital image processing uses various techniques, such as a correction, and information data format, which improves the process to produce higher quality images. There are chiefly four operations employed in the digital image process image pre-processing, segmentation of the image, feature extraction, and classification of pictures.

1. Exploration of Existing Prediction Techniques of Rose Plant Diseases

Existing Predictive Techniques of Rose plant diseases mainly focused on image processing with ML plays a significant role in recent decades. The majority of the study has focused on applying image processing and machine learning techniques to predict rose plant diseases. This section describes the three research teams who implement their novel techniques to predict the Rose plant diseases using image processing with machine learning were explored below

Exploration of three research teams with their novelty and approach to predicting the level of rose plant diseases were described in the following figure 1.

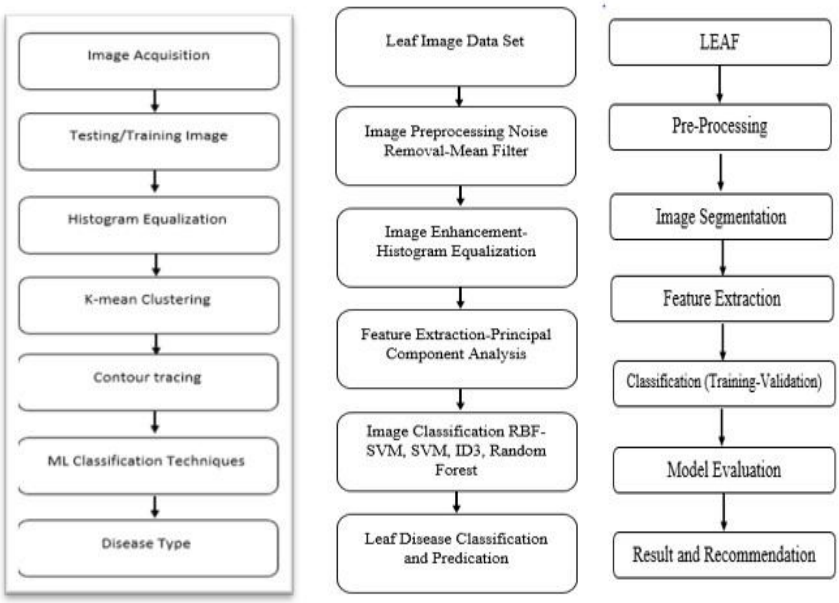


Figure 1: Exploration of Existing Methodology.

a) Sunil et.al (2022) describe their novelty in image processing with machine learning to predict the rose plant diseases described.

From the above Figure 1, the Six Layers used to predict the Rose Plant Diseases are as follows.

- Image Acquisition: The Initial Process of the research work (Yu, 2021)is to convert the given images into a digital array format, referred to as Image Acquisition.
- Testing/Training images: A Data and Attributes of the Rose Plant Leaf considered as Training Dataset. Testing Data is a subset of the dataset (Vadivel, 2021) that focuses on disease prediction in Rose plants' diseases.
- Histogram Equalization: The image processing technique (Khandouzi, 2022) used to improve the contrast or the intensity of the rose plant leaf images is considered Histogram Equalizations.
- K-Mean Clustering: This technique to find the affected portion (Esmaeel, 2018) of the rose plant diseases. These clustering images are used to predict the center part of the images and determine the distance between the center and other parts of the images of a rose leaf.
- Contour Tracing: Tracing the digital plant leaf (S Hossain, 2018)to extract the information of general shape. After the Contour extraction, the characteristics were analyzed to determine the classification of the pattern.
- ML Classification Techniques: This Phase was used to classify the prediction (T. S. M, 2021) of rose plant leaf diseases using a supervised algorithm such as SVM, KNN, etc.,

These techniques were used to predict the rose plant leaf diseases (PLD) using IP with ML techniques.

b) Abu Sarwar (2022)explains their novelty in predicting the Rose plant leaf diseases using

Image processing with machine learning methods as described. From the above figure, the prediction of rose leaf diseases consists of 6 layers were described below initially, the rose plant image was considered input of this research work. The second Phase includes Image processing techniques which use to remove the unwanted or noise data from the given images by a (Reza, 2019)mean filter technique.

The third phase includes the image enhancement with Histogram techniques, which were used to convert the given images into digital array format to predict the level of rose plant diseases. The fourth Phase referred to Feature Extraction based on the principal component analysis (PCA). The PCA mainly focused on unsupervised algorithms, which convert the observation of correlated features into relatively uncorrelated features of the images based on feature extraction using orthogonal transformations. The next Proposed phase mainly focused on machine learning techniques (C. Dou, 2021)to group the different types of rose plant leaf diseases using ID3, SVM, and RBF-SVM. The final stage of the research work is to determine the classification of rose plant leaf diseases.

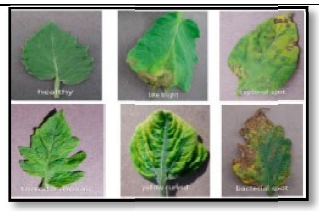
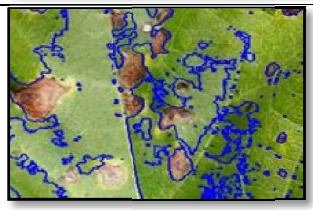
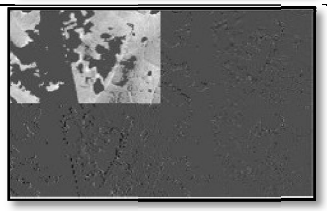
c) Sara Algethami (2022) elaborates on the concept of rose plant leaf disease prediction using image processing with a machine learning algorithm described.

- Leaf: Initially stage, the input of the rose plant leaf act as the input of the research work.
- Pre-processing: Image Pre-Processing consists of the removal of unwanted or noisy images of the rose plant leaf.
- Image Segmentation: (T. Fang, 2019)a specific portion of the image extraction was considered for further research termed to be Image Segmentation.
- Feature Extraction: The Extracted images were classified into various groups based on the dimensionality reduction process. This Process converts the raw data set into manageable groups referred to be Feature Extraction.
- Classification of the rose plant leaf prediction was done with machine learning techniques based on the supervised algorithm.
- Model Evaluation: Evaluation of the model was predicted in this phase
- Result and Recommendation: The level of disease prediction was determined in this stage.

2. Observation of Experimental Manipulations

The observation of three different types of plant leaf prediction using image processing with machine learning was discussed in this section.

a) Sunil predicts the following phases

Step 1: Image Acquisitions	
Step 2:K-Mean Clustering	
Step 3: Contour Tracing	
Step 4: Feature Extraction using Discrete Wavelet Transformation	

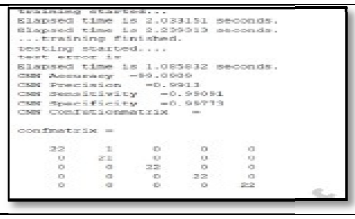
Step 5: ML Classification Techniques	

Figure 2: Experimental Observation by Sunil et.al

b) Abu Sarwar predicts the rose plant leaf disease with a stepwise explanation in the following Figure 3.

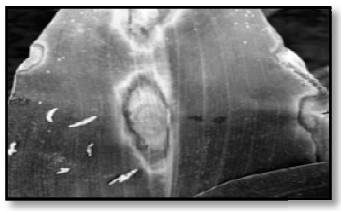
Step 1: Image Acquisitions	
Step 2:Mean Filtering	
Step 3: Histogram	
Step 4: Feature Extraction using principal components analysis	
Step 5:ML Classification Techniques	

Figure 3: Experimental Observation by Abu Sarwar

c) Sara Algethami predicts the rose plant leaf disease with a stepwise explanation in the following Figure 4.

Step 1: Image Pre-Processing	

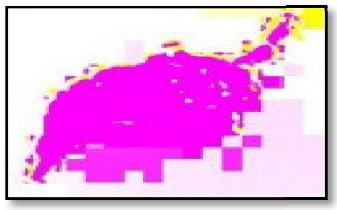
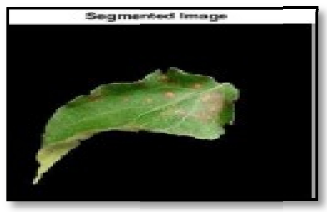
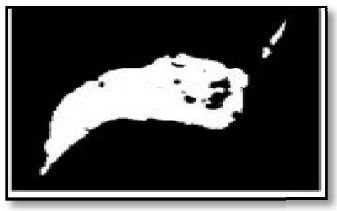
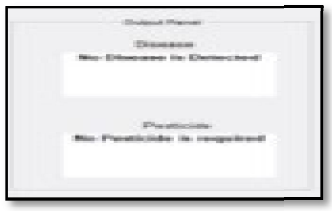
Step 2: Image Segmentation	
Step 3 : Feature Extraction	
Step 4: Classification (Training -Validation)	
Step 5:ML Classification Techniques	
Step 6: Model Evaluation and Result	

Figure 4: Experimental Observation by Sara Algethami

Hence, the observation of three different researchers predicts plant diseases using image processing with machine learning.

3. A study of System Requirements

A Study of System requirement was compared with three types of research in predicting the level of diseases using image processing were discussed below in the given table 1.

	Sunil et.al	Abu Sarwar et.al	Sara Algethami et.al
Hardware & Software Requirements	• MATLAB R 2020b • AMD Ryzen 5 3500U • 2.10GHz • Radeon Vega Mobile GFX • 8GB RAM • Windows 10 • 64 Bits	• WEKA Tool • Intel(R) Core(TM) i5-1135G7 • 2.40GHz • 8 GB RAM • Windows 10 • 64 Bits	• Open CV, Tensor Flow, Kera's, MATPlot • GPU-NVIDIA • 2.40GHz • 8GB RAM • Windows 10 • 64 Bits

4. Probe on Performance Evaluations

The Performance Evaluation was determined with the help of a confusion matrix. The Accuracy of the proposed model for three research was determined using a (Zhang, 2021)confusion matrix listed in table 2.

$$\text{Accuracy} = (T_{Pos}/T_{Neg}) / (T_{Pos}+T_{Neg}+F_{Pos}+F_{Neg}) \rightarrow 1$$

Where T_{Pos} – True Positive, T_{Neg}-True Negative, F_{Pos}- False Positive, F_{Neg}– False Negative.

Author	Accuracy
Sunil et.al	99.09%
Abu Sarwar et.al	97.80%
Sara Algethami et.al	98.50%

Table 1: Confusion Matrix with Accuracy.

Sunil et.al had taken a sample of 100 leaves for the proposed model (Harakannanavar, 2022), which result in 99 samples with an accuracy that leads to 99.09%. Abu Sarwar et.al was taken 40 photos of particular diseases. 120 photos of data collection were considered (Zamani, 2022)for the proposed model, out of 120 photos, 96 images were utilized for the training data set and 24 images are used for testing the data set. The Accuracy of the proposed model leads to 97.80%. Sara Algethami et.al considered 240 images of the plant leaf as input, 60 images were considered (Alqethami, 2022)as healthy and 180 images were infected by the diseases which lead to the accuracy of 98.50% of the proposed model.

5. Comparison and Analysis

From table 1, the following graph was generated to determine the accuracy of the proposed model displayed in Figure 5.

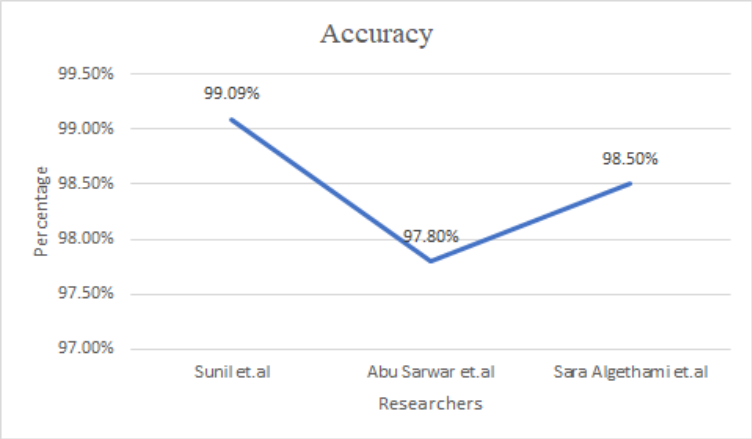


Figure 5: Comparative Study

Sunil et.al provides a proposed model with an accuracy of 99.09 to predict the plant leaf disease using image processing with machine learning, whereas Abu Sarwar et.al and Sara Algethami et.al provide an accuracy of less%, to predict the plant leaf diseases using image processing with a machine learning algorithm. The Process of Image acquisition, mean filtering, histogram, and feature extraction provide higher accuracy in determining the prediction of rose plant diseases using image processing with machine learning techniques.

VI. CONCLUSION

This paper concludes with a review of different research that predicts rose plant diseases with their novelty approach. A Review of the novelty approach, experimental observation with implementation, and comparisons were made with effective results. Based on the result of this review, the process of steps involved in image acquisition, mean filtering, histogram, and feature extraction provides higher accuracy in determining the prediction of rose plant diseases using machine learning.

REFERENCE

1. Alqethami, S. B. (2022). Disease Detection in Apple Leaves Using Image Processing Techniques. Engineering, Technology & Applied Science Research.
2. C. Dou, L. Z. (2021). Evaluation of urban environmental and economic coordination based on discrete mathematical model. Mathematical Problems in Engineering.
3. Esmaeel, A. a. (2018). A Novel Approach to Classify and Detect Bean Diseases based on Image Processing. IEEE Symposium on Computer Applications & Industrial Electronics.
4. Harakannanavar, S. S. (2022). Plant Leaf Disease Detection using Computer Vision and Machine Learning Algorithms. Global Transitions Proceedings .
5. Khandouzi, A. a. (2022). Underwater Image Enhancement using a Light Convolutional Neural Network and 2D Histogram Equalization. In 2022 International Conference on Machine Vision and Image Processing (MVIP).
6. Reza, M. N.-H. (2019). Rice yield estimation based on K-means clustering with graph-cut segmentation using low-altitude UAV images. Biosystems engineering.

7. S Hossain, R. M. (2018). Recognition and Detection of Tea Leaf's Diseases Using Support Vector Machine. IEEE International Colloquiumon Signal Processing & Its Applications.
8. T. Fang, P. C. (2019). Identification of Apple Leaf Diseases Based on Convolutional Neural Network. Intelligent Computing Theories and Application.
9. T. S. M, S. K. (2021). Leaf Disease Detection Using Deep Learning. IEEE International Conference on Electronics and Sustainable Communication Systems.
10.Vadivel, T. a. (2021). Automatic recognition of tomato leaf disease using fast enhanced learning with image processing. Acta Agriculturae Scandinavica, Section B—Soil & Plant Science.
11. Yu, K. L. (2021). Deep-learning-empowered breast cancer auxiliary diagnosis for 5GB remote E-health. IEEE Wireless Communications.
12. Zamani, A. S. (2022). Performance of Machine Learning and Image Processing in Plant Leaf Disease Detection. Journal of Food Quality.
13. Zhang, J. K. (2021). 3D reconstruction for motion blurred images using deep learning-based intelligent systems. CMC-computers Materials & Continua.