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DETECTION AND CLASSIFICATION OF FRUIT DISEASES USING IMAGE PROCESSING & MACHINE LEARNING

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ABSTRACT

An developing technology called fruit disease identification uses image processing and machine learning to identify and categorize several diseases that affect fruits using photographs of the fruits. The agriculture sector will be significantly impacted by this technology because it can assist farmers in identifying and diagnosing plant illnesses early on, which will increase crop yield and quality. The suggested system makes use of a number of image processing methods, including feature before classifying images using machine learning algorithms. This abstract gives a general overview of the technology and focuses on the possible advantages it could have for the agricultural industry. Machine Learning algorithms such as SVM, CNN.

INTRODUCTION

Finding fruit diseases is crucial for assuring high-quality crop yield and reducing financial losses. Plant diseases may be quickly identified and treated, which enables farmers to prevent their spread and crop harm. Plants must be manually examined by experts, which can be time-consuming and expensive, it possible to create automated systems for fruit disease identification using photographs of the fruits, which is a solution to this problem. These systems combine machine learning algorithms for classification with sophisticated image processing methods like segmentation and feature extraction. In this project, we suggest creating a system for detecting fruit diseases using machine learning and image processing methods. With the help of photographs of the fruits, the system seeks to precisely identify and categorize numerous fruit diseases, giving farmers timely and accurate information they may use to control the spread of disease and necropolises.

LITERATURE SURVEY

There have been several studies and research papers on fruit disease detection using image processing and machine learning techniques. Here are some examples of the recent literature survey:

"Deep Learning for Fruit Disease Detection: A Comparative Review" by Arnon Opulente and colleagues (2020). This paper provides a comprehensive review of deep learning techniques for fruit disease detection, including convolutional neural networks (CNNs), recurrent neural networks (RNNs), and generative adversarial networks (GANs). The authors compare the performance of different deep learning models on various fruit crops and disease types.

"Automated Fruit Disease Detection: A Review" by Shrutika Mishra and colleagues (2021). This paper provides an overview of the current state of automated fruit disease detection, including image processing techniques and machine learning algorithms. The authors discuss the advantages and limitations of different methods and highlight the need for developing robust and accurate systems for real-time fruit disease detection.

"Fruit Disease Detection using Deep Learning: A Review" by Manoj K. and colleagues (2021).This paper provides a detailed review of deep learning-based approaches for fruit disease detection. The authors discuss the challenges and opportunities in using deep learning for fruit disease detection and present a comparative analysis of different deep learning models.

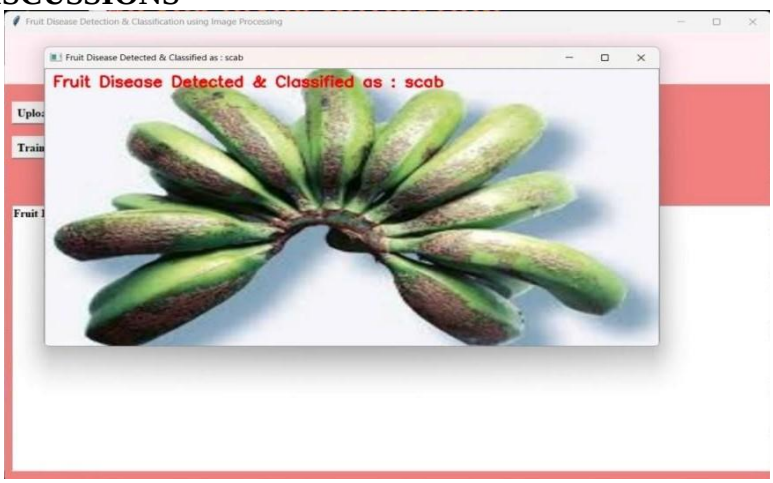
"Fruit Disease Detection using Image Processing and Machine Learning: A Review" by Rituraj Singh

and colleagues (2020). This paper provides a comprehensive review of image processing and machine learning techniques for fruit disease detection. The authors discuss the advantages
and limitations of different approaches and highlight the need for developing automated systems that can detect and diagnose fruit areas are segmented-time.
These studies and research papers highlight the potential of using image processing and machine learning techniques for fruit disease detection. The literature survey shows that the development of accurate and robust systems for automated fruit disease detection is an active area of research, and there is a need for further studies and research to address the challenges and limitations of existing systems.

PROPOSED SYSTEM

The following steps would normally be included in a suggested system for fruit disease diagnosis utilizing image processing and machine learning: Image acquisition: Using a camera or other imaging device, images of the fruit to be analyzed are taken.
Image preprocessing: The images are cleaned up and improved in quality in order to eliminate any noise or artifacts that can obstruct the detecting procedure. This may entail techniques like picture enhancement, normalization, and filtering.
Image segmentation: Using image processing methods including threshold, edge detection, and morphological procedures, the fruit in the image is isolated from the background and individual fruit areas are segmented.
Feature extraction: From each segmented fruit region, a set of features that can be utilized to distinguish between healthy and unhealthy fruit are recovered. These attributes may have traits of color, texture, shape, and size.
Machine learning: The retrieved characteristics are trained using a machine learning technique, like a neural network, decision tree, or random forest. Based on the retrieved attributes, the system learns to categorize the fruit photos as healthy or unhealthy.
Disease detection: After being taught, the machine learning system may be used to categorize fresh fruit photos as healthy or unhealthy. Farmers can use this classification to help them when making management choices, such as whether to cure damaged fruit or remove it from the crop.
System evaluation: Accurate measures including accuracy, precision is used to assess the performance of the suggested system. Based on the evaluation finding, the system can be improved and optimized to function better. A variety of fruit crops, including apples, pears, mangoes, grapes, and others, can be grown using the suggested system. It could enhance crop management, decrease the use of dangerous chemicals, and boost the productivity and sustainability of fruit production.

RESULTS AND DISCUSSIONS



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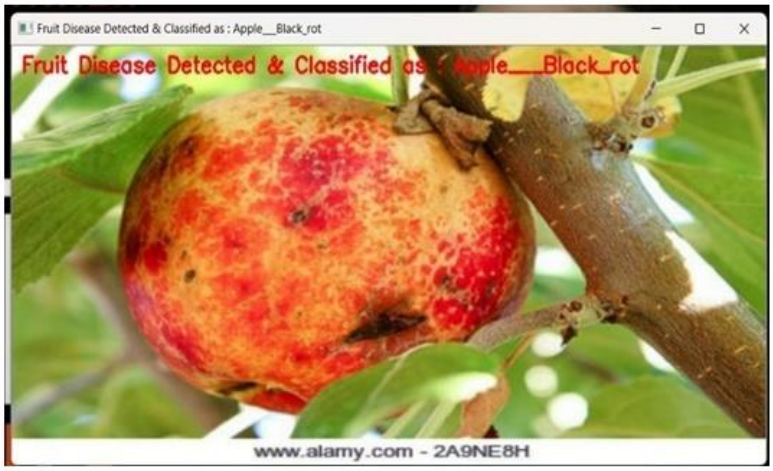

CONCLUSION

In conclusion, a viable strategy for resolving the issues facing the agriculture sector is fruit disease identification utilizing image processing and machine learning. With the aid of this method, farmers may be able to rapidly and precisely identify diseases in their crops and take appropriate treatment before the illness spreads and results in substantial harm. Picture acquisition, picture pre-processing,feature extraction, and classification using machine learning algorithms are some of the components involved in the implementation of a fruit disease detection system employing image processing and machine learning. To guarantee that the system generates accurate and trustworthy results, these components must b e properly planned and optimized.

FUTURE SCOPE

The future scope of fruit disease detection using image processing and machine learning is very promising. With the advancements in technology and the availability of large datasets, image processing and machine learning algorithms have shown great potential in identifying and diagnosing diseases in fruits. Here are some potential areas for future research and development in this field:
Development accurate and efficient algorithms: With the continuous improvement of deep learning algorithms, the accuracy and efficiency of fruit disease detection systems can be improved. This will enable early and accurate detection of diseases, leading to better crop management and increased yield. Integration with IOT devices: Integrating fruit disease detection systems with IoT devices can provide real-time monitoring and alerts. This will allow farmers to take preventive measures and avoid crop loss due to diseases. Expansion to other crops: The same enable farmers to monitor and diagnose diseases in a wide range of crops, leading to better crop management and higher yields.Development of portable and affordable devices:The development of portable and affordable devices for fruit disease detection can make it more accessible to make informed decisions and take preventive measures to protect their crops. Overall, the future of fruit disease detection using image processing and machine learning is very promising.With the right research and development, this technology can revolutionize crop management and help ensure food security for the growing population.

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