IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, January 2026
Impact Factor: 7.67

Pomegranate Fruit Disease Detection Using Image Processing

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Abstract: *Pomegranate farming plays a significant role in the agricultural economy, especially in India. However, diseases such as bacterial blight, alternaria, anthracnose, and cercospora negatively impact fruit quality and yield. Manual disease detection is time-consuming and requires expert knowledge. This paper presents an automated pomegranate fruit disease detection system using image processing and machine learning techniques. The system analyzes fruit images and classifies them into healthy or diseased categories with high accuracy. The proposed approach improves early disease detection, reduces crop loss, and supports precision agriculture.*

Keywords: Pomegranate, Disease Detection, Image Processing, Machine Learning, Agriculture

I. INTRODUCTION

In today's agricultural sector, early detection of crop diseases is essential to ensure high yield and quality. Pomegranate is an important horticultural crop that is vulnerable to various fungal and bacterial diseases. Traditional inspection methods rely heavily on human observation, which is inefficient for large-scale farming. Recent advancements in image processing and machine learning provide automated solutions for detecting plant and fruit diseases accurately. This project focuses on identifying pomegranate fruit diseases using image-based analysis techniques.

II. SYSTEM ARCHITECTURE

The proposed system architecture is designed to ensure efficient processing and accurate classification of pomegranate fruit images. The system begins with image acquisition using a digital camera or smartphone. Captured images are uploaded through a user-friendly interface. Image preprocessing techniques are applied to enhance image quality by removing noise and normalizing pixel values. The processed image is then analyzed by a trained machine learning model, which classifies the fruit condition and displays the result to the user.

III. TECHNOLOGY USED

3.1 Software Requirements

Python is used as the core programming language due to its simplicity and extensive library support. OpenCV and NumPy libraries are utilized for image preprocessing and manipulation. Machine learning and deep learning models are developed using TensorFlow and Keras frameworks. The development and testing process is carried out using Jupyter Notebook.

3.2 Hardware Requirements

The system requires a standard computer or laptop with sufficient memory and processing capabilities. A digital camera or smartphone is used for capturing pomegranate fruit images under different conditions.

IV. WORKING METHODOLOGY

The working methodology involves multiple stages starting from image acquisition to final classification. Captured images are resized and preprocessed to remove unwanted noise and background variations. Data augmentation

DOI: 10.48175/IJARSCT-30917

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techniques such as rotation and flipping are applied to improve model robustness. The processed images are then passed through a trained machine learning model that identifies whether the fruit is healthy or affected by a specific disease.

V. PERFORMANCE EVALUATION

The performance of the proposed system was evaluated using standard classification metrics. Accuracy, precision, recall, F1-score, and inference time were considered to measure effectiveness.

VI. APPLICATION

The proposed disease detection system is highly beneficial for farmers and agricultural professionals. It enables early identification of pomegranate diseases, reducing excessive pesticide usage and crop damage. The system can be used in agricultural research, smart farming applications, and integrated with mobile platforms for real-time disease monitoring.

VI. FUTURE SCOPE

Future enhancements may include deployment as a mobile application, integration with Internet of Things devices, real-time field analysis using drones, and extension of the system to detect diseases in other fruit crops.

VIII. CONCLUSION

This paper presented an automated pomegranate fruit disease detection system using image processing and machine learning techniques. The system provides accurate and reliable disease identification while reducing manual effort. The proposed approach contributes to improved agricultural productivity and supports sustainable farming practices.

ACKNOWLEDGEMENTS

The authors sincerely thank Yogesh G. for his valuable guidance and continuous support throughout the project. Gratitude is also extended to the Department of Computer Engineering, Pimpri Chinchwad Polytechnic, Pune, for providing necessary resources and encouragement.

REFERENCES

[1]. S. Sabrol and S. Satish, "Pomegranate Disease Detection Using Image Processing Techniques", International Journal of Advanced Research in Engineering and Technology (IJARET), 2023.

[2]. P. Revathi and M. Hemalatha, "Classification of Cotton Leaf Spot Diseases Using Image Processing Edge Detection Techniques", IEEE International Conference on Emerging Trends in Science and Engineering, 2019

[3]. A K. Dubey and V. Jain, "Automatic Leaf Disease Detection Using Image Processing and Machine Learning", International Journal of Engineering and Technology, Vol. 7, No. 2, 2018.

[4]. Mohanty, S. P., Hughes, D. P., & Salathé, M., "Using Deep Learning for Image-Based Plant Disease Detection", Frontiers in Plant Science, 2016.

[5]. R. Pydipati, T. Burks, and W. Lee, "Identification of Citrus Disease Using Color Texture Features and Discriminant Analysis", Computers and Electics in Agriculture, Elsevier, 2006.