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 1, January 2026
Impact Factor: 7.67

Pomegranate Disease Detection System

Gagan N Gowda[1], Deepak K P[2], Darshan D P[3], Harish B M[4]
Students, Department of CSE [1-4]
Assistant Professor, Department of CSE[5]
Kalpataru Institute of Technology, Tiptur, India

Abstract: *Early detection of plant diseases is crucial for improving agricutural productivity and reducing crop loss. Pomegranate cultivation is highly affected by diseases such as anthracnose, fruit rot, and surface blemishes, which significantly reduce yield and quality.Traditional disease detection methods rely on manual inspection by farmers or agricultural experts, which is time-consuming, subjective, and often inaccurate during early stages of infection.This paper presents a Pomegranate Disease Detection System that uses AI-based image recognition through a web-based application.The system allows users to upload images of pomegranate fruits or leaves, which are preprocessed using basic image resizing techniques. A pre-trained image recognition model accessed through TensorFlow.js is used to analyze visual patterns and generate prediction labels. These predictions are matched with a predefined disease database using a keyword-based scoring mechanism to identify the most probable disease.*

The proposed system does not involve training deep learning or CNN models, making it lightweight, fast, and easy to deploy. Experimental results demonstrate that the system provides accurate disease identification with minimal response time, offering an efficient and user-friendly solution for early pomegranate disease detection..

Keywords: Pomegranate Disease Detection, Computer Vision, TensorFlow.js, Image Recognition, Web-Based AI System

I. INTRODUCTION

Agriculture plays a vital role in the economic development of countries like India, where fruit crops significantly contribute to farmers' income and food security. Among various fruit crops, pomegranate is widely cultivated due to its nutritional value, medicinal benefits, and long shelf life. However, pomegranate plants are vulnerable to several diseases that affect fruit quality and overall yield.

Traditional pomegranate disease identification methods mainly rely on manual visual inspection by farmers or agricultural experts. These approaches are often time-consuming, subjective, and unreliable, particularly during the early stages of disease development when visible symptoms are minimal or unclear. In rural and remote areas, limited access to agricultural experts further delays accurate diagnosis and appropriate treatment. With rapid advancements in computer vision and artificial intelligence, automated image-based disease detection systems have emerged as an effective and reliable alternative to traditional practices. These systems enable machines to analyze visual patterns from images and identify disease symptoms that may not be easily noticeable to the human eye.

This paper focuses on developing a web-based pomegranate disease detection system using AI-based image recognition. The system applies an existing pre-trained model via TensorFlow.js to identify disease patterns from uploaded images, ensuring fast execution and ease of access without complex hardware requirements.

.

II. EXISTING SYSTEM

In the existing agricultural practices, pomegranate disease detection is mainly carried out through manual observation and expert consultation. Farmers visually inspect pomegranate fruits and leaves to identify disease symptoms such as discoloration, spots, cracks, and surface blemishes. In some cases, agricultural experts are consulted or plant samples are sent to laboratories for further analysis.Although these methods are commonly used, they are highly dependent on

DOI: 10.48175/IJARSCT-30756

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 1, January 2026 Impact Factor: 7.67

human experience and expertise. The accuracy of disease identification varies from person to person and often fails during the early stages of disease development when symptoms are not clearly visible. Additionally, expert consultation is not easily accessible in rural and remote areas, which leads to delayed diagnosis and improper treatment.As a result, farmers may use excessive or incorrect pesticides, increasing production costs and causing environmental damage. These limitations make the existing system inefficient, time-consuming, and unsuitable for large-scale agricultural applications.

III. PROPOSED SYSTEM

The proposed Pomegranate Disease Detection System is an AI-based web application designed to identify diseases in pomegranate fruits and leaves efficiently. The system allows users to upload images through a simple and user-friendly interface. Uploaded images are preprocessed using basic resizing techniques to standardize input and improve analysis reliability. This automated approach eliminates the need for manual inspection and reduces dependency on agricultural experts.

After preprocessing, the images are analyzed using a pre-trained image recognition model executed through TensorFlow.js directly in the web browser. The AI model examines visual features such as color distribution, texture patterns, and surface irregularities and generates prediction labels with confidence values. These predictions are compared with a predefined pomegranate disease database using a keyword-based matching and scoring mechanism to identify the most probable disease.

The final detection result is displayed clearly to the user along with confidence information, enabling timely and informed decision-making. The system does not involve training deep learning models, making it lightweight, fast, and easy to deploy on standard devices such as smartphones and computers. Overall, the proposed system provides a practical, cost-effective, and accessible solution for early pomegranate disease detection.

IV. SYSTEM IMPLEMENTATION

The Pomegranate Disease Detection System is implemented as a web-based application using modern web technologies to ensure efficiency, scalability, and ease of use. The frontend of the system is developed using JavaScript-based frameworks to provide a responsive and interactive user interface. Users can upload images of pomegranate fruits or leaves through the browser, making the system easily accessible on devices such as laptops, tablets, and smartphones. User authentication and data handling are supported through backend services to ensure secure access and proper management of detection records.

Once an image is uploaded, the system performs image preprocessing using browser-based canvas operations. The uploaded image is resized to a fixed dimension to match the input requirements of the AI model. This preprocessing step reduces variations caused by different camera resolutions and improves the consistency of analysis. After preprocessing, the image is passed to the AI-based image analysis module.

The core of the implementation lies in the AI prediction module, which uses a pre-trained image recognition model executed through TensorFlow.js directly in the web browser. The model analyzes visual features such as color, texture, and surface patterns to generate prediction labels with confidence values. These predictions are processed using a keyword-based disease matching mechanism to identify the most probable pomegranate disease. The final result is displayed clearly to the user, ensuring fast response time and reliable disease identification without the need for complex model training or high computational resources.

V. RESULTS AND DISCUSSION

The system was tested using real pomegranate fruit images to evaluate its effectiveness and accuracy. The testing phase focused on verifying image upload functionality, preprocessing accuracy, AI prediction reliability, and result presentation clarity.

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 1, January 2026 Impact Factor: 7.67

The results show that the system is capable of accurately identifying common pomegranate diseases when clear images are provided. The AI-based recognition module generates meaningful prediction labels that are effectively matched with the disease database. Client-side execution ensures minimal response time and fast result generation.

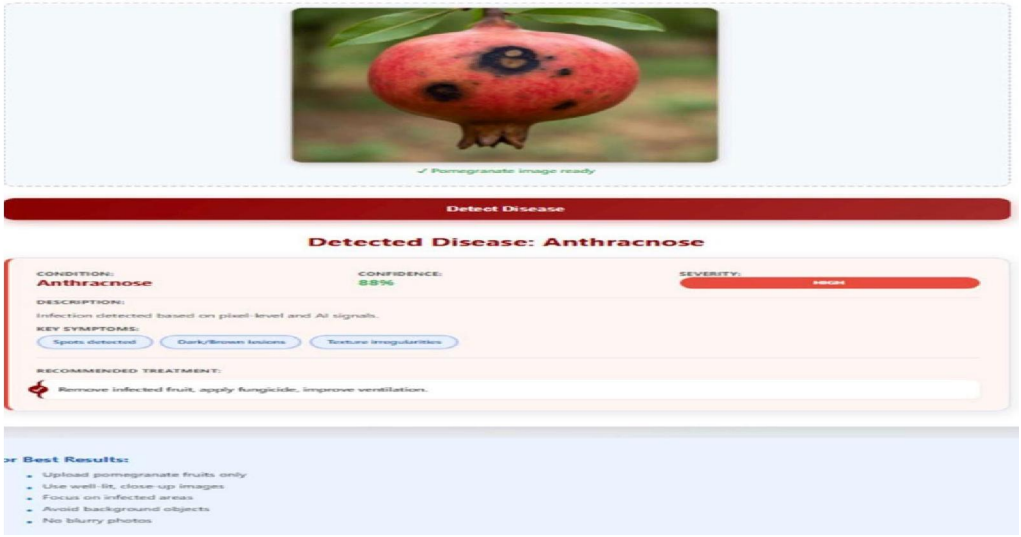
The web-based interface enhances usability by providing a simple and clear layout. Even users with minimal technical knowledge can upload images and understand the detection results. Confidence indicators help users evaluate the reliability of the detected disease.

Although the system performs well, it was observed that image quality plays a significant role in prediction accuracy. Poor lighting or blurred images slightly reduce confidence levels. However, the keyword-based disease matching mechanism helps mitigate this limitation by selecting the most relevant disease based on multiple prediction factors.

VI. CONCLUSION AND FUTURE SCOPE

The Pomegranate Disease Detection System has been successfully developed as an AI-based web application to enable early and accurate identification of pomegranate diseases using image-based analysis. By integrating image preprocessing with a pre-trained AI model executed through TensorFlow.js, the system overcomes the limitations of traditional manual inspection methods and provides fast, reliable results without requiring complex hardware or expert intervention. The web-based and user-friendly design ensures easy accessibility for farmers and agricultural users, helping them take timely preventive measures and reduce crop loss. Overall, the project highlights the practical application of artificial intelligence and computer vision in agriculture and demonstrates its potential to improve crop management and support sustainable farming practices.

The future scope of the Pomegranate Disease Detection System includes expanding the disease database to cover a wider range of pomegranate diseases and extending the system to support other crop varieties. The system can be enhanced by developing a dedicated mobile application and introducing multilingual support to improve accessibility for farmers in rural and diverse regions. Integration with agricultural advisory services can provide users with detailed treatment recommendations and expert guidance. Additional improvements such as image quality validation, historical data analysis, and predictive insights can further improve detection accuracy and enable proactive crop management, making the system more robust and scalable for real-world agricultural applications.



VII. ACKNOWLEDGMENT

The authors express their sincere gratitude to Kalpataru Institute of Technology, Tiptur, for providing the necessary infrastructure, resources, and academic support for the successful completion of this project. Special thanks are

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 1, January 2026 Impact Factor: 7.67

extended to the project guide for continuous encouragement, valuable guidance, and technical insights throughout the development process, and heartfelt appreciation is also conveyed to the faculty members and staff of the Department of Computer Science and Engineering for their cooperation and support.

REFERENCES

[1]. S .Sladojevic, M. Arsenovic, A. Anderla, D. Culibrk, and D. Stefanovic, "Deep Neural Networks Based Recognition of Plant Diseases by Leaf Image Classification," Computational Intelligence and Neuroscience, vol. 2026, pp. 1-11, 2016.

[2]. Arsenovic, M., Karanovic, M., Sladojevic, S., Anderla, A., & Stefanovic, D. (2019). Solving Current Limitations of Deep Learning Based Approaches for Plant Disease Detection. Symmetry, 11(7), 939. The authors proposed a novel two-stage neural network architecture for plant disease classification, achieving an accuracy of 93.67% and addressing challenges in real-world applications.

[3]. Sankaran, S., Mishra, A., Ehsani, R., & Davis, C. (2010). A Review of Advanced Techniques for Detecting Plant Diseases. Computers and Electronics in Agriculture,72(1), 1–13. This comprehensive review discusses various advanced techniques for plant disease detection, including sensor-based methods, and emphasizes the need for cost-effective and scalable solutions.

[4]. P. Mohanty, D. Hughes, and M. Salathé, "Using Deep Learning for Image-Based Plant Disease Detection," Frontiers in Plant Science, vol. 7, pp. 1–10, 2016.

[5]. Google Developers, " MobileNet: Efficient Convolutional Neural Networks for Mobile Vision Applications," Available: https://ai.googleblog.com

[6]. M. Barbedo, "A Review on the Use of Deep Learning for Plant Disease Detection," Biosystems Engineering, vol. 194, pp. 1- 20 ,2020.

[7]. React Documentation, "A JavaScript Library for Building User Interfaces," Available: https://reactjs.org

[8]. MongoDB Documentation, "NoSQL Database for Modern Applications," Available: https://www.mongodb.com/docs/