

Diagnosis of Papaya Fruit Diseases Using Image Processing and Machine Learning Algorithms: A Systematic Literature Review

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Worldwide, diseases in fruit pose significant challenges to the agricultural industry, causing economic losses and disrupting production. This paper systematically reviews research focused on the prediction, detection, and classification of papaya fruit diseases, employing advanced techniques such as machine learning, deep learning, and image processing. Gathering a total of 50 papers from reputable sources like IEEE Digital Xplore, Springer, Science Direct, and Wiley Online Library, the study sets out to achieve its objectives. Following a rigorous process of applying primary selection criteria, inclusion/exclusion criteria, and quality assessment, 35 papers were chosen for in-depth analysis. The review identifies prevalent papaya fruit diseases in the agricultural sector, including Anthracnose, Phytophthora, Powdery Mildew, Black Spot, and Ring Spot. Significantly, the integration of image processing and machine learning approaches demonstrates substantial potential in transforming the diagnosis of papaya diseases. Researchers worldwide are actively exploring innovative techniques to enhance the accuracy, efficiency, and sustainability of papaya cultivation. The adoption of modern technologies, such as Convolutional Neural Networks, Hierarchical Convolutional Neural Network, Support Vector Machines, Decision Tree, Naïve Bayes, Artificial Neural Networks), Generative Adversarial Network, Feature Pyramid Network with an additional level of feature pyramids, Region of Interest Aggregation and hybrid approaches, indicates a shift towards data-driven systems for automated disease identification. This study underscores the importance of ongoing research to bridge knowledge gaps and guide future investigations, particularly in the context of enhancing papaya disease detection and treatment within the framework of Sri Lankan agriculture.

Keywords: *Classification; Deep learning; Feature extraction; Image processing; Machine learning; Papaya fruit disease*