

ABSTRACT

Diseases in sugarcane plants significantly reduce productivity, making fast and accurate detection systems essential for agricultural decision making. This study develops a sugarcane disease classification model using the ResNet-34 architecture with a transfer learning approach. Experiments were conducted using the Sugarcane Disease Dataset published in December 2024 on Mendeley Data, consisting of 3,358 images categorized into seven classes. Pretrained weights were utilized to improve feature extraction, while the final network layers were adjusted for disease-specific pattern recognition. To further enhance performance, Modified Particle Swarm Optimization (MPSO), combining Adaptive Inertia Weight and Comprehensive Learning PSO, was applied for hyperparameter optimization. Model performance was evaluated using accuracy and per-class metrics. The baseline ResNet-34 model achieved an accuracy of 95.25%, while the MPSO-optimized model reached 98.42%, demonstrating improved performance across disease classes. These results indicate that integrating transfer learning with MPSO produces a more accurate and reliable deep learning-based system for sugarcane disease classification.

Keywords: Sugarcane Disease, Image Classification, Resnet-34, Transfer Learning, Modified PSO, Hyperparameter Optimization, Deep Learning.