Unified Survey of Supervised, Unsupervised, and Semi-supervised Learning Techniques for Plant Leaf Disease Detection â?? Volume 12 Issue 5

Description

International Journal of Computer Techniques
ISSN 2394-2231

default watermark

DOI Registered

Volume 12, Issue 5 | **Published:** September â?? October 2025

Author

Dr. T.Nagarathinam , Mr. T.Venkatesan , Dr.K.Arulmozhi

Abstract

The detection and classification of plant leaf diseases is critical for ensuring sustainable agricultural productivity. This survey presents a unified and comprehensive overview of supervised, unsupervised, and semi-supervised learning techniques applied to plant leaf disease detection and classification. Supervised approaches such as Convolutional Neural Networks (CNNs), Support Vector Machines (SVMs), and ensemble models have demonstrated high accuracy but require extensive labeled datasets. Unsupervised methods, including K-means clustering, autoencoders, and anomaly detection algorithms, offer promising results with unlabeled data, especially in early-stage disease detection. Meanwhile, semi-supervised learning bridges the gap by leveraging limited labeled and abundant unlabeled data through frameworks such as self-training, GANs, and hybrid models.