

## ABSTRACT

Monitoring the health of cayenne pepper plants is an important challenge in agriculture that can significantly affect crop yields. Machine learning technology offers a potential solution to improve plant disease detection through image analysis and plant characteristics. This research aims to design an application based on a hybrid machine learning model that uses Convolutional Neural Network (CNN) and Artificial Neural Network (ANN) to diagnose the health of cayenne pepper plants. The research method involves collecting *dataset* leaf images and plant characteristic information, CNN and ANN model training, and development of a Gradio-based user interface for easy interaction. The analysis results show that the CNN model is effective in detecting disease through leaf images, while the ANN provides additional information based on plant characteristics. Limitations in analyzing stems and fruit were identified, however the application successfully achieved the research objectives by increasing the accuracy of plant health diagnosis.

**Keywords:** Machine Learning, Convolutional Neural Network (CNN), Artificial Neural Network (ANN), Plant Disease Detection, Machine Learning Based Applications, Leaf Image Analysis, Cayenne Pepper Plant Health, Hybrid Model, User Interface, Gradio