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# Machine Learning-Based Pesticide Recommendation System for Greenhouse Farming in Sri Lanka

A Thesis by

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# ABSTRACT

*Problem*: In Sri Lanka, pest infestations pose a major challenge to agricultural productivity. Many traditional farmers, lacking formal education, struggle with accurate pest identification and selecting suitable pesticides. Current practices rely heavily on pesticide sellers, whose advice may be financially motivated rather than effective. This leads to excessive, unsustainable pesticide use raising production costs, harming the environment, and making food unsafe. Traditional methods are subjective, and often inaccurate, resulting in poor pest management and reduced crop yields.

*Methodology*: This project develops an innovative hybrid machine learning system that combines advanced computer vision with characteristic analysis to provide automated pest identification and to suggest pesticide recommendations. The solution utilizes a sophisticated neural network that integrates convolutional neural networks for image processing and feature extraction of pest-specific characteristics. By analysing images of the pests and observable pest infestation traits of the plants, the model can classify pest species with high accuracy and generate graduated pesticide recommendations tailored to specific pest types and infestation characteristics.

*Initial Results*: The deep learning model demonstrates promising performance across five major pest categories, including aphids, mites, leaf miners, thrips, and whiteflies. Preliminary testing shows the system can identify pest species with 99.21% accuracy, providing farmers with precise, actionable recommendations for pesticide application. This comprehensive approach to pest management can potentially reduce chemical usage, minimize environmental impact, and improve agricultural productivity.

**Subject Descriptions:**

Computing methodologies → Machine learning → Learning paradigms

→ supervised learning→Supervised learning by classification

**Keywords:** Pest Identification, Precision Agriculture, Machine Learning, Computer Vision, Pesticide Recommendation, Deep Learning