# DEEP LEARNING FOR RIPENESS AND FRESHNESS DETECTION OF LOCAL FRUITS IN THE EXPORT INDUSTRY

**Amath A. A. S**[*] **and Jahan A. M. A. C.**

*Department of Computer Science, Faculty of Applied Sciences, South Eastern University of Sri Lanka, Sammanthurai, Sri Lanka.*
*[*]stevealan55@gmail.com*

In the export industry, ensuring consistent fruit quality is crucial for meeting international standards, satisfying customer expectations, and minimizing food waste. This study focuses on the classification of two key fruit quality attributes ripeness (raw or ripe) and freshness (fresh or rotten). The research examines local varieties of papayas, mangoes, and bananas, which are significant for export markets. By employing advanced image classification techniques, the study aims to develop a reliable system that can support quality control in the export process. A Convolutional Neural Network (CNN) was used as the primary model for image classification. Additionally, other machine learning algorithms such as Decision Tree, Random Forest, and K-Nearest Neighbors (KNN) were evaluated for performance comparison. The dataset comprises over 10,000 images, sourced from both local markets and online databases, with a particular focus on local papayas. Two training strategies were implemented one using a larger, online-only dataset and another combining online data with additional samples from local markets. The CNN model achieved over 95% accuracy in predicting fruit freshness using both methods. However, for ripeness prediction, the second approach integrating local market data produced slightly better results than the online-only dataset. This underlines the importance of including diverse data to build robust models. The comparison of different algorithms revealed that CNN consistently outperformed others, especially in freshness detection. These findings provide actionable insights for improving quality assurance and operational efficiency in the export industry, helping reduce food waste and increase customer satisfaction through the adoption of advanced machine learning techniques.

***Keywords****: Deep Learning, CNN, Fruit quality detection, Image classification, Machine learning.*