ABSTRAK

Cabai rawit (*Capsicum frutescens*) merupakan komoditas penting di Indonesia, namun ketergantungan impor masih tinggi akibat kendala sortasi dan distribusi yang tidak merata. Proses sortasi manual seringkali tidak akurat, menyebabkan cabai mentah, matang, atau rusak tercampur, sehingga menurunkan kualitas dan nilai jual. Penelitian ini bertujuan mengembangkan sistem klasifikasi otomatis kondisi kematangan cabai rawit menggunakan algoritma *Support Vector Machine* (SVM) dengan ekstraksi fitur kombinasi HSV, GLCM, dan *Local Binary Pattern* (LBP). Metode yang digunakan meliputi augmentasi data, segmentasi berbasis *HSV thresholding*, serta ekstraksi fitur warna dan tekstur. Hasil evaluasi menunjukkan model SVM dengan kernel RBF mencapai F1-Score % pada data *training* dan 73,94% pada data uji, dengan performa terbaik pada kelas matang (akurasi 91%). Namun, kelas rusak memiliki akurasi lebih rendah (73%) akibat ketidakseimbangan data. Simpulan penelitian ini menunjukkan bahwa kombinasi fitur HSV, GLCM, dan LBP efektif untuk klasifikasi, namun perlu pengembangan dataset dan pendekatan *deep learning* seperti CNN-SVM untuk meningkatkan akurasi pada kelas minoritas.

Kata kunci: Cabai Rawit, Kondisi Kematangan, Klasifikasi, *Machine Learning*, *Support Vector Machine* (SVM), HSV, GLCM, LBP

ABSTRACT

Capsicum frutescens (bird's eye chili) is a vital agricultural commodity in Indonesia, yet the country still relies on imports due to uneven distribution and suboptimal manual sorting processes. Inaccurate sorting often leads to mixed batches of unripe, ripe, and damaged chilies, reducing quality and market value. This study aims to develop an automated classification system for chili maturity using a Support Vector Machine (SVM) algorithm with combined HSV, GLCM, and Local Binary Pattern (LBP) feature extraction. The methodology includes data augmentation, HSV-based thresholding segmentation, and color-texture feature extraction. Evaluation results show that the SVM model with an RBF kernel achieved 87.27% training accuracy and 73.94% testing accuracy, with the highest performance on the ripe class (91% accuracy). However, the damaged class had lower accuracy (73%) due to data imbalance. The study concludes that HSV-GLCM-LBP hybrid features are effective for classification, but future work should expand the dataset and integrate deep learning (e.g., CNN-SVM) to improve minority-class accuracy.

Keywords: *Bird's Eye Chili (Capsicum frutescens), Ripeness Condition, Classification, Machine Learning, Support vector Machine Learning, HSV, GLCM, LBP*