

ABSTRACT

Orange, as a crucial agricultural commodity in Indonesia, plays a central role in the economy and livelihoods of farmers. The current orange harvesting process relies predominantly on manual methods, leading to inefficiencies and inaccuracies in assessing fruit quality. This research aims to address these issues by applying the Distance Weighted K-Nearest Neighbors (DWKNN) algorithm using Gray Level Co-occurrence Matrix (GLCM) feature extraction to enhance the efficiency of orange harvesting. The study aims to test the effectiveness of the DWKNN algorithm and GLCM in classifying oranges based on the texture patterns derived from fruit images. The experimental method utilized a dataset consisting of 3852 orange images, evenly labeled as fresh and rotten, and divided for training, validation, and testing. GLCM feature extraction was employed to capture texture patterns in the images, followed by the implementation of the DWKNN algorithm for orange quality classification. The research results indicate that the model using GLCM with $n_neighbor = 4$ produces the best performance, achieving a test accuracy of 90% with a standard deviation of 7.78%. Hyperparameter exploration reveals a significant impact on model stability, where the use of GLCM has a positive effect but requires monitoring to prevent overfitting. Overall, this study successfully applied the DWKNN algorithm and GLCM feature extraction in the context of orange harvesting. The best-performing model can serve as a foundation for improving efficiency and accuracy in assessing orange quality. Thus, the use of artificial intelligence technology can contribute positively to the agricultural sector in Indonesia

Keywords: Citrus, Classification, Distance Weighted K-Nearest Neighbors (DWKNN), Gray Level Co-occurrence Matrix (GLCM), Image Processing.