

ABSTRACT

The coffee industry in Indonesia, particularly in Temanggung, holds strong potential to compete in both domestic and export markets. One of the critical stages in post-harvest processing is the grading of coffee beans. However, the classification of coffee bean quality is generally still conducted manually, which is time-consuming, labor-intensive, and prone to inconsistencies. This study aims to develop a web-based system for classifying the grades of Temanggung Robusta coffee beans using a Convolutional Neural Network (CNN) model. The website was developed using the Streamlit framework and implemented the Agile methodology as the approach for the Software Development Life Cycle (SDLC). Testing was conducted using the black-box testing method over two iterations. In the first iteration, the system achieved a success rate of 93.62%, with 44 out of 47 scenarios executed successfully. This increased in the second iteration to 95.45%, with 42 out of 44 scenarios executed successfully. Additionally, the model's prediction accuracy was validated using three types of datasets: training data, valid data, and external data. When evaluated using the training data, the model reached a success rate of 98.89%, with 89 out of 90 data correctly predicted according to their grade. Valid data testing resulted in an accuracy of 52.22%, with 47 out of 90 data points correctly predicted. A similar performance was observed on the external dataset, with an accuracy of 56.67%, with 51 out of 90 data correctly predicted. The results of the accuracy validation suggest that the model may be experiencing overfitting due to the limited quantity and variety of training data. Therefore, it is necessary to increase the amount and expand the variety of training data to reduce the risk of overfitting. Overall, the system was successfully developed and capable of performing its intended functions, including coffee bean classification, displaying prediction results with confidence levels, and storing classification history.

Keywords: *coffee classification, Temanggung Robusta, Convolutional Neural Network (CNN), Streamlit, Agile, Black-box Testing*