

ABSTRACT

The increasing beef consumption in Indonesia presents challenges in halal verification due to the visual similarities with pork, while conventional identification methods are deemed impractical for field use and pure deep learning methods are prone to overfitting on limited datasets. This study aims to build an automatic classification model using a hybrid approach integrating the DenseNet121 architecture as a feature extractor and Support Vector Machine (SVM) as a classifier. Model performance evaluation was conducted using 244 digital images from a Kaggle dataset divided with a 64:16:20 ratio to examine the effects of data augmentation techniques and hyperparameter optimization, covering batch size, learning rate, dropout, kernel type, and regularization parameter (C). Experimental results indicate that the training scenario with data augmentation proved most effective in enhancing model generalization, achieving a perfect testing accuracy of 100%, outperforming the non-augmented scenario which reached 98%. This optimal performance was achieved using the DenseNet121 hyperparameter combination of batch size 32, learning rate 10^{-3} , and dropout 0.5, alongside an SVM configuration using a Linear kernel with a C parameter value of 1. This study concludes that the hybrid DenseNet121-SVM method with data augmentation strategies and precise parameter selection is an accurate and robust approach for meat image authenticity identification.

Keywords : Data Augmentation, Beef, Pork, DenseNet121, Hybrid Deep Learning, SVM.