Abstract

Rice is a staple food for many people worldwide, particularly in Asia, making accurate identification and classification of Rice varieties crucial for maintaining quality standards, providing consumers with accurate information, and avoiding inefficient manual inspections. Deep learning methods have demonstrated promising results in image classification, with LeNet-5 being a widely used model in this domain. However, LeNet-5 comprises a significant number of parameters (83,976), which poses challenges for devices with limited resources, such as those on the Internet of Things (IoT). To address this, it is essential to optimize computational resources by modifying the LeNet-5 architecture, specifically by adjusting the number of filters and neurons and reducing dense layers. This study reveals that such modifications lead to a more efficient model without compromising classification performance through Model Optimization. The optimized model, tested on a dataset with 20 classes of rice varieties, exhibits a 58.49% improvement in parameter efficiency while achieving a classification accuracy of 96.80%, surpassing the original LeNet-5 architecture, which had a testing accuracy of 95.02%.

Keywords: LeNet-5, Classification of Rice varieties, Deep Learning, Model Optimization