

ABSTRACT

Ceramics are an important material used in various industries. The inspection process for detecting defects in ceramics is currently performed manually, making it time-consuming and prone to human error. This research focuses on the automatic classification of ceramic surface defects, including cracked, stained, scratched, and normal conditions, using ceramic tile images as the object of study. The research dataset was sourced from the Roboflow platform, uploaded by the user *spencerflow*. The dataset initially consisted of 2.760 images and was later expanded through data augmentation to 6.659 images (224×224 pixels) to address class imbalance. The data was then divided into 70% training data, 15% validation data, and 15% testing data. Classification was performed using a Convolutional Neural Network (CNN) with the VGG-19 architecture, implementing transfer learning. The hyperparameters tested for optimization were batch size, learning rate, and dropout. The testing resulted in a highest test accuracy of 90.94%. Furthermore, ANOVA analysis revealed that the learning rate was the most dominant factor significantly influencing test loss and the number of epochs, followed by the batch size, which also had a significant impact on test loss. These results demonstrate that the developed model has good performance in classifying the four types of defects on ceramic surfaces.

Kata kunci : Ceramic, Classification, *Convolutional Neural Network*, *Transfer Learning*, VGG-19.