ABSTRACT

Soil is a crucial element in various fields, particularly agriculture and geology, where its utilization depends on the type of soil. Accurate soil type identification is essential for determining optimal land use and management. However, traditional methods that rely on laboratory testing tend to be costly and time-consuming. This study implements a Convolutional Neural Network (CNN) with a transfer learning approach using the Xception architecture to classify eight types of soil based on digital images. The dataset was obtained from an open-source platform, and the model was trained using various scenarios, including layer freezing, optimizer selection, and learning rate optimization. Experimental results show that the proposed model achieved a test accuracy of 97.72%, surpassing the standard CNN (vanilla) model, which only reached a test accuracy of 82.95% on the same dataset. Thus, this approach offers a more accurate and efficient alternative method for soil type identification using computer vision.

Keywords : CNN, Transfer Learning, Xception, Image Classification, Soil Type