ABSTRACT

Brain tumor is an abnormal mass of tissue that disrupts normal brain activity and damages its cells. Tumor detection requires medical imaging through MRI. MRI scans are used to detect various types of brain tumors, including gliomas. Low-grade glioma (LGG) is a type of glioma classified by the WHO as grade II and III, characterized as infiltrative and with the potential to become more malignant. Early detection is crucial to prevent tumor progression, but not much research has been done on tumor segmentation, particularly for LGG. Early tumor detection can be achieved using deep learning. Deep learning approaches are increasingly used for segmentation, and the DeepLabv3+ model has gained popularity due to its ease of use and optimization potential. According to previous studies, variations and optimizations of the DeepLabv3+ model can improve brain tumor segmentation results. This study aims to optimize the DeepLabv3+ model on the TCGA LGG brain tumor dataset by modifying two parameter modules: the backbone module and the pyramid pooling module. The best-optimized DeepLabv3+ model was obtained using a combination of the ResNet50 backbone and SPPM+ pyramid pooling. The optimization results showed an improvement in model accuracy with an intersection over union (IoU) score of 92.36% and a dice coefficient of 94.8%. These results demonstrate the superiority of the optimized DeepLabv3+ model compared to the original DeepLabv3+ model in segmenting low-grade glioma (LGG) brain tumors.

Keywords : Convolutional Neural Network, Model DeepLabv3+ Optimization, Brain Tumor Segmentation, Low Grade Glioma Brain Tumors