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An Efficient Segmentation and Classification of Brain Tumor Detection using Deep Learning

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Abstract: *In medical diagnostics, the identification of brain tumors is a crucial endeavour that frequently necessitates the careful review of intricate imaging data. With the development of deep learning methods, especially convolutional neural networks (CNNs), automated brain tumor detection has become a viable way to help radiologists diagnose patients accurately and quickly. This study provides an extensive overview of current developments in deep learning approaches for brain tumor identification. The suggested techniques usually start with preprocessing medical images, like CT or MRI scans, and then use CNN architectures to extract features. Different CNN architectures, such as U-Net and conventional CNNs, have been used to extract discriminative characteristics from brain pictures. The performance of brain tumor detection systems has also been improved using transfer learning techniques, which make use of pre-trained models on sizable datasets. These results are especially encouraging when there is a shortage of training data. Additionally, research has been done on using ensemble learning approaches to strengthen the generality and durability of brain tumor detection models. By combining several base models into one prediction, these methods improve overall performance and lower the likelihood of overfitting. Furthermore, the incorporation of sophisticated regularisation methods such batch normalisation and dropout has enhanced the deep learning models' capacity for generalisation in brain tumor identification tasks. Moreover, the use of deep learning models in practical clinical environments demands the resolution of issues of uncertainty estimation and model interpretability.*

Keywords: Convolutional Neural Network, U-Net

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