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Brain Tumor Detection

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Abstract: *This research addresses the critical challenge of automated brain tumor diagnosis by developing a Deep Learning (DL) pipeline capable of classifying Magnetic Resonance Imaging (MRI) scans. Manual interpretation of MRI scans is time-consuming and prone to human error due to the subtle variations between tumor types. To overcome this, we propose a framework leveraging Transfer Learning with the MobileNet architecture, a lightweight Convolutional Neural Network (CNN) pre-trained on ImageNet. The model is fine- tuned to classify images into four distinct categories: glioma, meningioma, pituitary tumor, and no tumor. To ensure robustness against limited medical datasets, the study employs extensive data augmentation (rotation, zooming, flipping) and mixed precision training to optimize computational efficiency. The system is deployed via a Streamlit web application, offering real-time prediction capabilities with confidence scores, thereby serving as an effective assistive tool for radiologists.*

Keywords: *Brain Tumor Detection, Deep Learning, Convolutional Neural Network (CNN), MobileNet, MRI Classification, Transfer Learning, Medical Imaging*

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