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Paper Title: Unleashing the Power of EfficientNet-ConvNeXt Concatenation for Brain Tumor Classification

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Abstract

Brain tumors, impacting a substantial global population annually, necessitate precise detection and classification for timely intervention and effective therapy. Though deep learning models have exhibited potential in medical image interpretation, a demand persists for enhanced accuracy and efficiency. This study introduces an optimized solution for brain tumor detection and classification via a concatenated EfficientNet-ConvNeXt model. This novel approach merges the power of EfficientNet and ConvNeXt-two formidable neural networks-to attain extraordinary precision in categorizing various brain tumor types, namely glioma, meningioma, pituitary tumor, and non-tumor. Experimental evaluations validate the model's superiority over standalone architectures and existing deep learning techniques in terms of accuracy, sensitivity, and specificity. Demonstrating robustness against image quality fluctuations and variability in tumor types, the model exhibits strong potential for real-world clinical usage. Implementation of our proposed concatenated EfficientNet-ConvNeXt model resulted in substantial performance elevation, achieving an exceptional 99% predictive accuracy. These findings underscore our approach's accuracy and efficiency, offering substantial aid to radiologists and clinicians in early-stage brain tumor detection and classification. The model's predictive capabilities can considerably influence patient prognosis and therapy planning through enabling early intervention.