

BRAIN TUMOR DETECTION USING MACHINE LEARNING & DEEP LEARNING

ABSTRACT

Accurate brain tumor detection in MRI scans is essential for early diagnosis and effective treatment planning. This paper introduces a hybrid classification framework that combines traditional image processing techniques, deep learning-based feature extraction, and machine learning to improve brain tumor identification. The pipeline begins with MRI preprocessing—including grayscale conversion, noise removal, edge detection, and cropping—to enhance tumor localization. Features are extracted using four pre-trained CNNs: EfficientNetB7, MobileNetV2, Xception, and InceptionV3. These features are concatenated into a unified representation and classified using an XGBoost model for robust performance. The system is evaluated on both custom and publicly available brain tumor datasets, demonstrating superior performance in terms of Accuracy, Precision, Recall, and F1-Score.