

Brain Tumor Detection using Machine Learning

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Abstract: Brain tumors are one of the most life-threatening diseases, requiring early and accurate diagnosis to improve patient survival rates. Conventional diagnostic techniques, such as MRI analysis by radiologists, are time-consuming and prone to subjectivity. Machine learning (ML) techniques, particularly deep learning, have emerged as powerful tools for automating tumor detection, improving accuracy, and reducing human error. This paper presents an ML-based approach for detecting brain tumors using MRI images. Various classification models, including Convolutional Neural Networks (CNNs), Support Vector Machines (SVMs), and Random Forest, are analyzed for their performance in tumor detection. Experimental results indicate that CNNs outperform traditional ML models, achieving an accuracy of 98.5%. The study highlights the effectiveness of deep learning in medical imaging and suggests future directions for improving AI-based diagnostic systems.

Keywords: Brain Tumor Detection, MRI, Convolutional Neural Networks, Machine Learning, Medical Imaging, Deep Learning

