

# Brain Tumor Classification using MRI Images and AI

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**Abstract:** Brain tumors pose a significant challenge in both pediatric and adult healthcare landscapes, constituting a majority share of primary Central Nervous System (CNS) tumors and annually affecting approximately 11,700 individuals. Survival rates for those diagnosed with cancerous brain or CNS tumors hover at 34 percent for men and 36 percent for women over a 5-year period. These tumors are diverse, spanning from benign to malignant, including pituitary tumors among others. Effective treatment planning and accurate diagnostics are pivotal in improving patient outcomes. Magnetic Resonance Imaging (MRI) serves as the cornerstone for tumor detection, generating vast amounts of imaging data for interpretation by radiologists. However, manual examination of these images can be error-prone due to the complexities inherent in brain tumor characteristics. Automated classification techniques powered by Machine Learning (ML) and Artificial Intelligence (AI) offer a promising avenue, consistently demonstrating superior accuracy compared to manual approaches. Thus, proposing a system integrating Deep learning techniques such as artificial neural networks (ANNs) and convolutional neural networks (CNNs) algorithms and Transfer Learning (TL) could revolutionize brain tumor detection and classification globally. This innovative approach would provide invaluable support to medical professionals, enhancing diagnostic accuracy and ultimately improving patient outcomes in the battle against brain tumors.

**Keywords:** FCM, CNN, segmentation, SVM, Medical Image