This study (Abiwinanda et al., 2019)addresses the crucial issue of brain tumor misdiagnosis, which can lead to ineffective treatments and lower survival rates. Traditional MRI inspection methods are often inefficient and prone to errors, especially with large datasets. The researchers developed a simple Convolutional Neural Network (CNN) to improve accuracy and efficiency in classifying Glioma, Meningioma, and Pituitary tumors. Using a basic architecture with a single convolutional layer, max-pooling, flattening, and a fully connected layer, the CNN was trained on a publicly available dataset of 3064 T-1 weighted CE-MRI images. Without prior region-based segmentation, the CNN achieved a training accuracy of 98.51% and a validation accuracy of 84.19%, comparable to more complex algorithms with accuracies ranging from 71.39% to 94.68% on the same dataset.

Brain tumors are among the most aggressive diseases, often leading to a very short life expectancy at advanced stages. Effective treatment planning is essential to improve patient's quality of life. Various imaging techniques such as CT, MRI, and ultrasound are employed to evaluate tumors in different organs, including the brain. This study (Seetha & Selvakumar Raja, 2018)focuses on using MRI images to diagnose brain tumors. The large volume of data generated by MRI scans makes manual classification of tumors challenging and time-consuming, necessitating accurate and automated classification methods to reduce human error and improve diagnosis efficiency. The automatic classification of brain tumors is particularly challenging due to the variability in the spatial and structural characteristics of the brain's surrounding regions. This study proposes an automatic brain tumor detection method using a Convolutional Neural Network (CNN) with a deep architecture designed using small kernels and minimal neuron weights. Experimental results demonstrate that the CNN achieves a 97.5% accuracy rate with low complexity, outperforming other state-of-the-art methods.

This study (Paul et al., 2017) investigates the application of deep learning methods to classify brain images with meningioma, glioma, and pituitary tumors. Utilizing a dataset of 3,064 T1-weighted contrast-enhanced MRI (CE-MRI) images from 233 patients, the research focuses on 989 axial images from 191 patients to prevent neural network confusion from different imaging planes. Two fully connected and convolutional neural network types were used for classification, along with image augmentation techniques. The results showed that the neural networks achieved an average five-fold cross-validation accuracy of 91.43%, demonstrating that deep learning methods can effectively classify brain tumor types and outperform more specialized methods requiring complex preprocessing.

Brain tumors are among the most fatal cancers globally, affecting both adults and children, with a variety of types based on their location, texture, and shape. Misclassification of brain tumors can lead to severe consequences, making early and accurate identification crucial for selecting the right treatment plan. While examining MRI images is an effective method for distinguishing brain tumors, manual analysis is time-consuming and prone to errors due to the large volume of data and tumor variability. Therefore, an automated computer-assisted diagnosis (CAD) system is essential. Recent advancements in image classification, particularly with deep convolutional neural networks (CNNs), have shown significant progress in this field. This study (Ayadi et al., 2021) proposes a new CNN model for brain tumor classification, consisting of multiple layers designed to analyze MRI images. The model was experimentally evaluated on three datasets, demonstrating that it delivers strong performance compared to existing methods.