Brain Tumor Detection using Deep Learning(Android)

Abstract

Brain tumors present a complex and challenging medical condition, necessitating accurate and timely diagnosis for effective treatment and improved patient outcomes. In this study, we propose an integrated approach to brain tumor detection utilizing advanced machine learning techniques within a web-based platform and an accompanying Android application. The dataset used comprises a diverse collection of medical imaging data, including MRI scans, encompassing both benign and malignant brain tumors, facilitating robust model training and validation.

The methodology employed in this study follows a structured approach. Initial preprocessing of the dataset is conducted to standardize image resolutions and enhance data consistency. Subsequently, data augmentation techniques are applied to augment the dataset, thereby improving model generalization and robustness. The machine learning model utilized for brain tumor detection consists of a deep learning architecture, such as Convolutional Neural Networks (CNNs) or Recurrent Neural Networks (RNNs), tailored for medical image analysis.

The trained model is integrated into a web-based platform developed using the Django framework, allowing users to upload MRI scans and receive real-time diagnostic predictions. Additionally, to extend the accessibility and usability of the system, an Android application interface is developed, enabling users to interact with the brain tumor detection system from their mobile devices. The Android app facilitates image uploads for prediction, leveraging network communication to send image data to the server.

Key features of the web-based platform and Android application include seamless image uploads, instantaneous prediction results, and visualization of diagnostic outcomes. The system's performance is evaluated using standard metrics, including accuracy, sensitivity, specificity, and area under the receiver operating characteristic curve (AUC-ROC). The results demonstrate the efficacy of the machine learning-based approach in accurately detecting and classifying brain tumors, distinguishing between benign and malignant cases with high precision.

This research contributes to the field of medical imaging and healthcare technology by providing a practical solution for early detection and diagnosis of brain tumors. By leveraging state-of-the-art machine learning techniques and user-friendly interfaces, this approach aims to enhance diagnostic accuracy and accessibility, ultimately leading to better patient outcomes and improved prognosis for individuals affected by brain tumors.

In conclusion, the integration of advanced machine learning models within web-based platforms and mobile applications represents a significant advancement in utilizing technology for medical diagnosis and treatment. This system holds promise for facilitating early detection and intervention for brain tumors, thereby contributing to the ongoing efforts to combat this complex disease and improve the quality of patient care in neurology and oncology practice.