

PROJECT TOPIC

Automated Brain MRI Segmentation for Neurological Disorder Diagnosis

Abstract:

Medical imaging, particularly Magnetic Resonance Imaging (MRI), has become an indispensable tool in the diagnosis and treatment of neurological disorders. Accurate segmentation of brain structures from MRI scans is crucial for understanding and diagnosing such disorders. **This project aims to develop and implement an automated brain MRI segmentation system to assist healthcare professionals in accurately delineating various brain regions and DFZSF abnormalities.** The proposed system leverages state-of-the-art deep learning techniques, specifically convolutional neural networks (CNNs) and advanced image processing algorithms. A large dataset of diverse brain MRI scans, comprising both healthy individuals and patients with neurological disorders, is used for training and validation. The project focuses on the segmentation of key brain structures, including the white matter, gray matter, cerebrospinal fluid, and various pathological regions such as tumours, lesions, and plaques.

The system's architecture is designed to be modular and adaptable, allowing for easy integration into existing healthcare workflows. It offers real-time or near-real-time segmentation, enabling timely diagnosis and treatment planning. Moreover, the system's accuracy and generalization capabilities are rigorously evaluated using a wide range of performance metrics, including Dice similarity coefficient, sensitivity, specificity, and Hausdorff distance, among others. The potential impact of this project is substantial. Accurate and efficient brain MRI segmentation can significantly reduce the burden on radiologists and neurologists, allowing them to focus on clinical interpretation and decision-making. It can lead to earlier detection of neurological disorders, more personalized treatment plans, and improved patient outcomes.

Additionally, the system can aid researchers in large-scale studies by providing precise quantification of brain structures and abnormalities. In conclusion, this project aims to advance the field of medical imaging by developing an automated brain MRI segmentation system that combines cutting-edge technology with practical healthcare needs. It has the potential to revolutionize neurological disorder diagnosis and research, ultimately improving the quality of care for patients with such conditions.

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