Deteksi Alzheimer berdasarkan Citra Medis MRI dengan Menggunakan External Attention Transformer

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Abstract

Alzheimer's disease is one of the major challenges in medical care this century, affecting millions of people worldwide. Alzheimer's damages neurons and connections in brain areas responsible for memory, language, reasoning, and social behavior. Early detection of this disease enables more effective treatment and proper care planning. One commonly used method is visual inspection using Magnetic Resonance Imaging (MRI). The limitations of visual inspection include subjectivity and its time-consuming nature, especially with large or complex MRI datasets, making accurate interpretation a significant challenge. Therefore, an alternative for detecting Alzheimer's disease is to use deep learning-based MRI image analysis. One promising approach is to implement the External Attention Transformer (EAT) model. It enhances image classification by using two shared external memories and an attention mechanism that filters out redundant information for improved performance and efficiency. The aim of this research is to evaluate and compare the performance of the baseline Convolutional Neural Network (CNN) model, Vision Transformer (ViT) model, and the EAT model in detecting Alzheimer's using a dataset of 6400 brain MRI images. The EAT model outperforms the baseline CNN model and ViT model in detecting Alzheimer's, achieving its best results with an accuracy of 0.965 and an F1-score of 0.747 for the test data.

Keywords: alzheimer's disease, detection, MRI, CNN, external attention transformer