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Neuro Imaging Assisted Cognitive Disorder Detection

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ABSTRACT

Cognitive disorders like Alzheimer's disease and vascular dementia are global health concerns affecting millions of people worldwide. It is important to diagnose these disorders at an early stage to effectively intervene and provide treatment. This research proposes a complete computational framework for the detection of cognitive disorders using sophisticated deep learning and machine learning techniques. The proposed system is based on the combination of MRI analysis and CNN feature extraction VGG16 and Support Vector Machine (SVM) classification tech niques. This proposed system can classify Alzheimer's disease into four different stages: No Impairment, Very Mild Impairment, Mild Impairment, and Moderate Impairment. Moreover, the pro posed system can classify the presence or absence of vascular de mentia. This proposed system includes an explanation mechanism using Grad-CAM to offer visual explanations for the predictions made bythe system. A Flask-based web application is proposed to offer user-friendly access to the proposed diagnostic system with complete reporting capabilities. Analysis of the proposed system shows promising results in terms of accuracy, precision, recall, and F1-measure values. This work is a significant contribution to the new area of medical image analysis.

Keywords - Alzheimer's Disease, Vascular Dementia, MRI, CNN, VGG16, Support Vector Machine, Grad-