Analysis of various Classification Techniques using CNN models for the Detection of Alzheimer's Disease using MRI images

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Abstract:
Alzheimer's disease (AD) is a brain disorder that is associated with memory loss and is typically observed in elderly and aging individuals. This condition is irreversible in nature. Neural networks have shown better performance than traditional machine learning algorithms when it comes to analyzing high-dimensional data from Magnetic Resonance Images (MRI) brain images. This is an approach for processing such data. Detection of Alzheimer's disease is essential because the early treatment can control the progression of the disease in a slower pace. In this work, the proposed model used different models of convolutional neural networks (CNN) techniques to process the MRI images of the brain and classified them into different classes. The proposed model detects AD using neural network feature extraction and classification methods based on the pre-processed datasets. Here, in the proposed model, various algorithms such as Resnet-50, DenseNet-169 and Hyperparameter tuning of Convolutional Neural Network are utilized to find the better performing model in terms of accuracy when compared with other traditional techniques.

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Contents

The most prevalent kind of dementia, Alzheimer's is a neurological or brain ailment that results in gradual memory loss and cognitive deterioration because of the death of brain cells. In most cases, individuals with AD experience a gradual onset of symptoms that eventually become significant enough to impact their day-to-day activities. Even though, the primary cause of this disease has ageing as its primary cause, loss of memory is minor and ability skills are drastically impaired in the early stages. By the year 2050, it has been predicted that 1 in 85 persons worldwide would have this condition. The sole effective way to treat AD is through early identification and prompt medical intervention [1]. Identifying Alzheimer's disease in its early stages is a difficult task. Majority of AD patients struggle to adapt with the suitable vocabulary and experience a lack of spontaneity and initiative. According to prior research, the neuropsychological examination can be employed for the earlier diagnosis of AD. The effectiveness of cognitive psychological testing relies entirely on the competence and expertise of the clinician. Further, this test is expensive and time consuming at a large scale to significant number of AD patients. The cost and time involved are more for administering the mentioned test to a significant number of AD patients. Nowadays, due to the advancements in biological methods are effectively employed for the detection of in-silico methods are used effectively for the detection of numerous diseases as the advancement of various biological techniques is used in computational approaches. Thus, it is essential to devise a novel model for categorizing individuals who are experiencing the onset of AD.

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