ALZHEIMER'S DISEASE CLASSIFICATION USING MACHINE AND DEEP LEARNING ALGORITHMS

ABSTRACT

Alzheimer's disease, the most common form of dementia is a neurodegenerative disease. This disease occurs when the neurons in the brain starts degenerating and it generally affects the elderly people. It has no cure if the patient is in the last stage, so the classification of the disease at an early stage is very important for the treatment. Alzheimer's disease accounts for 60 to 80 percent of cases of dementia. In early stages of disease, also known as mild cognitive impairment (MCI), memory loss is mild, but with late-stage Alzheimer's, the patient loses the ability to even carry on a conversation.Nowadays doctors widely use magnetic resonance imaging (MRI) to diagnose various neurodegenerative diseases like Alzheimer's, but this method is prone to human error. Thus,Deep learning plays a vital role in the classification, detection and segmentation of data.

However, early diagnosis of AD can reduce the progression of the disease at the early stages.Deep convolutional Neural Networks (CNN), a class of Artificial Neural Network (ANN) are most popularly used by the researchers for the classification, visualization and segmentation of data. The diagnosis of the disease require large amount of medical tests which leads to multivariate heterogeneous data and it becomes very difficult to classify this huge amount of data and so the chances of error increases.

As the reason behind the success of deep neural networks owes to its three characteristics, i.e, layer-to-layer processing and in-model feature transformation for classification , and sufficient model complexity.

The model can be trained on volumetric and thickness data obtained after pre-processing MRI images using FreeSurfer for various classifications tasks. The extracted features includes the volume and thickness of different parts of the brain, including cortical and sub-cortical parts of the brain.

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