Project Proposal

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Subject: ALZHEIMER'S DISEASE DIAGNOSTICS BY ADAPTATION OF CONVOLUTIONAL NETWORK

EXECUTIVE SUMMARY

Introduction

Alzheimer's disease (AD) is a progressive brain disorder and the most common case of dementia in the late life. AD leads to the death of nerve cells and tissue loss throughout the brain, thus reducing the brain volume in size dramatically through time and affecting most of its functions. The estimated number of affected people will double for the next two decades, so that one out of 85 persons will have the AD by 2050. An estimated 5.5 million people aged 65 and older are living with AD, and AD is the sixth-leading cause of death in the United States. The global cost of managing AD, including medical, social welfare, and salary loss to the patients' families, was $277 billion in 2018 in the United States, heavily impacting the overall economy and stressing the U.S. health care system. Because the cost of caring the AD patients is expected to rise dramatically, the necessity of having a computer-aided system for early and accurate AD diagnosis becomes critical. Several popular non-invasive neuroimaging tools, such as structural MRI (sMRI), functional MRI (fMRI), and positron emission tomography (PET), have been investigated for developing such a system. The sMRI has been recognized as a promising indicator of the AD progression.

Objective

Early diagnosis, playing an important role in preventing progress and treating the Alzheimer's disease (AD), is based on classification of features extracted from brain images. The features have to accurately capture main AD-related variations of anatomical brain structures, such as, e.g., ventricles size, hippocampus shape, cortical thickness, and brain volume. CNN, which has shown remarkable performance in the field of image recognition, has also been used for the diagnostic classification of AD with multimodal neuroimaging data. This paper proposed to predict the AD with a deep convolutional neural

network (CNN), which can learn generic features capturing AD biomarkers and adapt to different domain datasets.

Dataset

For this purpose we use a dataset which is available through the link below:

https://www.kaggle.com/legendahmed/alzheimermridataset

The dataset consists of 5,121 MRI axial slices. It is separated into test and train set. The test set totally consists of 1,279 images. This number is 3,842 for the train set. The test set is categorized into four groups, similar to the train set. The groups consist of non demented, very mild demented, mild demented and moderate demented categories. The dimensions of all photos are 176 * 208 and all of them are jpg.