Early Diagnosis of Alzheimer's Disease Using Machine Learning

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Alzheimer's Disease (AD) is the sixth leading cause of death in the United States. Despite its significance, there is currently no cure for the disease. The early diagnosis of AD is essential for patient care and relevant researches. The purpose of this project is to create a machine learning classifier that can accurately distinguish between healthy subjects and subjects with AD. This classifier can potentially aid doctors in diagnosis and treatment. Data and MRI images from the Alzheimer's Disease Neuroimaging Initiative were used to train the classifier. Using SPM 12, selected features were extracted from the MRI images. These features were input into the neural network, which was coded using MATLAB. The overall accuracy, test performance, and sensitivity of the network were calculated in order to grade the classifier. The artificial neural network learned to classify between subjects with Alzheimer's Disease and normal subjects at a 95.6% accuracy level. Additionally, volume of cerebrospinal fluid, Mini Mental State Examination, and volume of gray matter were found to be the most influential features on the network. Though far from being able to replace a neurological radiologist, the classifier is of great benefit in prioritizing scans for radiologists to analyze and identifying important biomarkers for the disease.

Awards Won:

Mu Alpha Theta, National High School and Two-Year College Mathematics Honor Society: Second Award of $1,000