Alzheimer's Disease Prediction

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Alzheimer’s Disease (AD) significantly reduces memory, communication, focus, and reasoning skills in elderly individuals. There is no known cure with progressive deterioration. Early identification will be immensely helpful before the patient loses their cognitive abilities. Dementia patients typically start with Mild Cognitive Impairment (MCI) and some degenerate to AD. Cognitive tests and visualization of brain degeneration through MRI have been used to diagnose MCI and AD. Developing an automated approach that evaluates the longitudinal data for rate of the change of these variables to predict potential conversion from MCI to AD earlier than when AD is diagnosed will be very beneficial to the patients. Neural networks and Linear SVM are two very popular machine learning approaches that learn from the intricate relationships between variables to develop a model. This project developed Neural network and Linear SVM Classification Matlab programs to predict which patients with MCI will convert to AD using 23 variables (demographics, genetics, cognitive and Imaging) measured longitudinally for 477 patients, diagnosed as MCI, from the ADNI database. Neural Network accurately predicted 94% and SVM 92% of those converted to AD based on the rate of change from previous visit. Both predicted 65% of the patients who will convert to AD 9 months before they were diagnosed. 9 month head start to get their affairs ready will be extremely useful. Future work will focus on identifying other variables that might improve accuracy and help predict the progression of MCI to AD earlier.

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