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# STAT525 Group 5 Project Proposal

Alzheimer's is a debilitating disease that is the subject of much research due to the frequency of its occurrence and the severity of its effects. Many questions surrounding this disease are unresolved. Predicting the patients Mini Mental State Exam (MMSE) baseline score using baseline physiological measures and demographic information is interesting in that it allows for the relative contribution of the predictor variables in causing cognitive decline in Alzheimer's patients.

The Mini Mental State Exam (MMSE) is a commonly used diagnostic to evaluate overall cognitive health in Alzheimer's patients and others with cognitive impairment. The patient's status as an Alzheimer's patient, cognitive impairment, and healthy control will also be used to separate out those with Alzheimer's from the other subjects in the study (dx.bl). ABETA (Amyloid Beta) and TAU are biomarkers that have historically been used as indicators of the presence of Alzheimer's in the brain. Ventricles are biomarkers that typically become enlarged in the presence of Alzheimer's disease. Hippocampus and total brain volume typically decrease as Alzheimer's progresses and cognitive decline becomes more apparent. Intracranial volume is the total brain volume and cerebrospinal fluid volume combined. Two different bile acids are considered - CA and CDCA, which are the primary bile acids associated with the primary pathway and alternative liver synthesis pathways respectively. The patient's age, gender, years of education, marital status, race, and ethnicity are also considered as explanatory variables.

For missing data we have chosen to remove all incomplete cases. All observations will be evaluated to determine if they are influential outliers or not. Any influential outliers will be removed and the model refitted.

Using this data, the selection of the best model to predict MMSE score using from a selection of variables will be attempted. This data will be evaluated for a potential Box-Cox Transformation. The best model will then be selected using adjusted $R^2$. The goal of this will be to evaluate the role of the individual predictors. Potential challenges to this include multicollinearity and overparameterization.

References

http://adni.loni.usc.edu/

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