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**Applying Machine Learning to Inexpensive, Predictive Diagnosis of Alzheimer's Disease**

The number of people suffering from Alzheimer’s is undergoing a boom as the elderly population grows. This makes it imperative that Alzheimer’s diagnosis is improved. However, current diagnosis methods like lumbar puncture or MRI are invasive and expensive. This study attempted to create a machine-learning model to diagnose, using non-invasive cognitive testing and deep neural networks, support vector machines, and k-means clustering.

The machine learning algorithm were programmed in Tensorflow and SciKit Learn and they “learned” the relationship between risk factors and the onset of Alzheimer’s using the NACC Universal Data Set.

The neural net proved to be a good representation of the “true function” or the clinical data from the UDS. The final MSE was 0.03 over the validation data of 34,000 people after being trained on 34,000 other examples in the training set. The low MSE indicated that the neural net had learned the relationship well, however it did not learn much better than the single-layered perceptron, which suggests that not much abstraction is necessary to learn this relationship. Finally the SVM algorithm had very low accuracies 63% and the K-means had even lower, 29%, even after extensive experimentation with the algorithm parameters.

The DNN is a better model for predicting the onset of Alzheimer’s than current methods, especially given the high accuracy and the large test set. Comparable studies used less than 100 subjects whereas this project used over 68,000. This neural net will advance Alzheimer’s research by identifying at risk individuals earlier and at a lower cost.