A Deep Learning Approach to Correlating Neurodegenerative Disease, Chronic Illness, and Environmental Factors

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This study aims to develop a network for prominent chronic illnesses and neurodegenerative diseases, factoring in preexisting conditions, lifestyle decisions, and an individual’s environment. The primary variables being tested include patient medical history and demographic information. Data was derived from public datasets, with a focus on instances of Alzheimer’s disease, diabetes, and heart disease. The primary dataset was provided by the National Alzheimer's Coordinating Center. The data was first engineered to fit the specifications for this study and preprocessing procedures were conducted to ensure the quality of the data used. Algorithms were developed to process a more than 500 variables. These were analyzed to find correlations and trends between different variables. A total of 30 clinical & cognition-related variables were selected for further analysis based the results from the initial analysis. When this selection was split into 5 groups, only two trials resulted in variables that had significant results. Deep learning models were then developed, to first test these variables and their potential for further applications. The fifth model combined the best aspects of the previous and achieved an accuracy of 76.6%. These results prove the viability of the identified variables for assessing neurodegeneration. A second configuration set of deep learning models were developed for enhanced implementation; however, they require more development to maintain accuracies from the first configuration set. Expanding the correlation analysis to include other variables and continued training & testing has the potential increase accuracy of algorithms and extend the currently identified network of correlated factors leading to neurodegeneration.

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