Early Detection of Parkinson's Disease and The Role of Artificial Intelligence and Machine Learning

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This research looks at the role that machine learning plays in the detection of Parkinson's Disease (PD). Machine learning (ML) is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns, and make decisions with minimal human intervention. In the past decade, there has been a focus on the application of Machine Learning and other AI techniques in the medical sciences. Studies have shown a correlation between PD and activities of daily living such as keystroke patterns and gait. There is evidence that these factors are early signs of the disease. For example, PD patients have significantly slower typing speeds compared to healthy patients and tracking typing characteristics of at-risk populations could help in the early detection of PD. Two datasets were studied, the first data set consisted of 31 subjects, 13 healthy controls and 18 patients with Parkinson's Disease. It looked at a variety of finger tapping tests including typing speed and typing accuracy. The second data set consisted of 166 subjects, 93 patients with idiopathic PD and 73 healthy controls both with a mean age of 66.3 years. Gait tests were conducted with subjects walking at their usual self-selected pace for about 2 minutes.

We then used R code to categorize the patients and a multivariate data analysis to identify what characteristics of keystrokes and gait are important in PD patients. We then created 2 predictive models for each data set, with and without clinical data for each, and found that gait with clinical data had an accuracy of 1.000, gait without clinical data had an accuracy of 1.000, keystroke with clinical data had an accuracy of 0.989, and keystroke without clinical data had an accuracy of 0.989. These findings show us that gait is an important factor in the detection and diagnosis of Parkinson's Disease. This is important because, the earlier that the disease is diagnosed, the more effective treatment will be, and patients will have a subsequent better quality of life. Gait, which is something that can be easily tracked for at risk populations, can be a vital indicator of this disease.