Parkinson’s disease recognition

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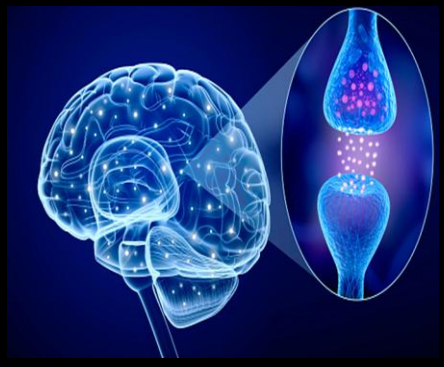
Motivation

There are no systems designed for Parkinson’s Disease recognition. More than 10 million of the world’s population suffers from Parkinson’s Disease and this disease is the cause of death in more than 100 000 cases every year. Our system in combination with measuring devices could be used as a diagnosis assistance.



Datasets

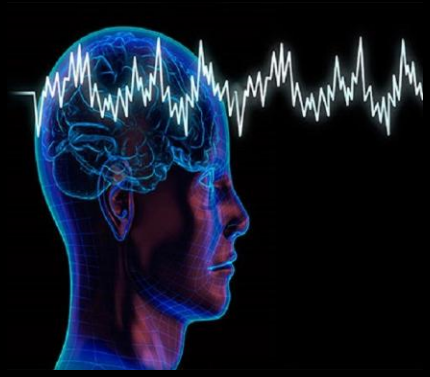
From machine learning repositories:
https://archive.ics.uci.edu/ml/datasets/Parkinson+Speech+Dataset+with++Multiple+Types+of+Sound+Recordings#
(29 attributes)
https://archive.ics.uci.edu/ml/datasets/parkinsons+telemonitoring (22 attributes)
https://archive.ics.uci.edu/ml/datasets/Parkinson+Disease+Spiral+Drawings+Using+Digitized+Graphics+Tablet#
(7 attributes and 77 files) representing a patient. Patients have 2 or 3 tests they did, we extracted 8 attributes from each test and used them to train NN. We extracted 10 attributes by correlation from first and second dataset and used them to train NN.

Methods

We used neurolab, numpy and keras. We used feed forward Neural Network with one input, one output and one to three hidden layers. About 70% of each dataset was used for training, 20% for testing, and 10% for validation. For the first and the third dataset we used resilient backpropagation as a training function. The networks were trained for Parkinson’s Disease classification. For the second dataset the neural network was used to calculate motor UPDRS and total UPDRS using stochastic gradient descent. Performances were compared with LASSO and SGDRegressor.

Results

Neural network accuracy was 100% for the first dataset, from 70-100% accuracy for the third dataset, and it guessed UPDRS from the second dataset with 7-8.5 RMSE. We don't have any relevant results in this field to compare with because there weren't any similar researches.



Further research

With further analysis and data mining for third dataset better accuracy could be achieved in recognizing Parkinson’s disease. Also we could improve this system if users could have access to devices used to collect data that we used. We could improve results for UPDRS guessing if we worked with doctors and scientists in this field and make a system which could give predictions up to 100% accuracy.