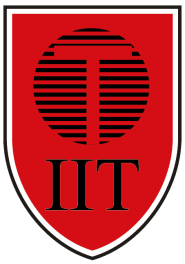

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IDENTIFICATION OF PARKINSON'S DISEASE AFFECTED SUBJECTS UTILIZING AN ARCHIMEDES' SPIRAL

A dissertation by

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Abstract

Parkinson's Disease (PD) is a common neuro-degenerative condition amongst the elder population induced due to low or non-existing dopamine levels in a human. The condition affects the nervous relays of information from the brain to muscles, a progressive disease deterring the day-to-day activities of the affected individual. If untreated, the disease leads to early death and current diagnosis for the disease is still done manually globalwide over a period of time. Manual diagnosis of the disease requires the patient to appear for multiple tests over a time period. Each test is carried out and the final results are accumulated and analyzed by a technician for the final verdict.

Given the exponential growth in technology, Artificial Intelligence has taken over processes and decision making in a variety of industries. One such challenging field for AI implementation is medical science. Medical diagnosis involves a variety of different tests each taking its own form of inputs. Similarly, tests for PD are varied and involve different forms of inputs. Some of them are brain images, vocal signals, tremor identification, gait signals etc. The main objective of the below research is to identify machine learning methods capable of classifying spiral diagrams in the form of coordinates transformed to statistical values with the help of Local Binary Pattern algorithms and efficiently help technicians perform diagnosis effectively.

Three different pattern recognition techniques were formulated and utilized to extract the features from the coordinate stream. The features set from each algorithm was saved as a .CSV file and multiple classifiers were employed on each feature set to identify the model with highest performance using 5 fold cross validation. The performance metrics evaluated in this study are sensitivity, specificity and accuracy. Out of all possible combinations of algorithm-classifier, the LNDP feature set combined with the SVM classifier configured to process through the linear kernel fared the highest performance. The accuracy achieved by this combination is 100%.

Keywords: Machine Learning, Artificial Intelligence, Pattern Recognition algorithms, Classification, Feature extraction, Parkinson's Disease