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# A Survey of Predicting Parkinson's & Atypical Parkinson Disease in the Primordial Stage by using Classification techniques in Data Mining

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**ABSTRACT** --- *Data mining has well known methods in extracting the information. Nowadays, people are not giving prominent attention to their health. Most of the people find it difficult in diagnosing their condition by means of symptoms at the exact time. Progressive Supranuclear Palsy (PSP) is a rare deteriorating neurological disorder that is often mispredicted as Parkinson's disease, because of its identical symptoms. There are many symptoms, that we can prognosis the neurological disorder in the primordial stage. It is a challenging task to diagnose if a person is affected by PSP. The Data Mining techniques are most significant in diagnosing & predicting the disease. This paper discusses the study of various data mining methods in diagnosing the Parkinson and atypical Parkinson disease in the early stage to enhance the quality of living.*

***Keywords*:** *Progressive Supranuclear Palsy, Parkinson's disease, Data Mining, atypical Parkinson disease and Classification.*

## I. INTRODUCTION

Data Mining plays a pivotal role in the healthcare industry to capacitate the data & analytics, to identify inefficiencies and best procedures to enhance care and decrease the cost for the treatment. Many specialists rely on some of the circumstances to improve care and to decrease the cost simultaneously that could apply as much as 40% spent for the overall complete healthcare. Due to the complication of the disease, it has become difficult to identify the right procedure to treat the disease by applying some of the effective data mining methods. The goal of this paper is to determine various data mining techniques that are available in recent years for diagnosing the right disease at the right time. Many researchers use data mining techniques in diagnosing PD (Parkinson's disease) and PSP (Atypical Parkinson Disease) such as Decision Tree Induction, Bayesian Classification, Support Vector Machine, Rule-Based Classification and other methods.

## II. LITERATURE SURVEY

P.Exarchos et.al [1] used the following methods such as Partial decision tree and association rule for building predictive models for discovering new knowledge for Parkinson disease in the form of association rule.(Partial) Decision trees and Association rules are reliable and effective. Decision making techniques that provide high classification accuracy range from 57.1 to 77.4% for the particular symptom by name tremor. Tremor, which is the most common symptom in Parkinson's disease.

A.Benba et.al [2] used the following methods Support Vector Machine and K-Nearest Neighbor. The authors used different vowels to test the voice recording for some set of healthy people & patients affected with Parkinson's disease. The classification accuracy achieved in this paper was 87.5%.

GeetaYadav et.al [3] used the following method such as Tree classifiers, Logistic Regression (LR),and Support Vector Machine(SVM) with the help of k-fold cross validation method to develop predication model for Parkinson's disease identification. Dataset has taken from UCI repository for this paper. When comparing all the algorithms, the classification accuracy for SVM-76% and Tree classifiers -75%.

Ismail Saritas et.al [4] used the following methods such as Rotation Forest, Random Forest(RF), Multilayer Perceptron(MLP), Classification via Regression, Bagging, Java Repeated Incremental Pruning , Sequential Minimal Optimization, OneR, Naïve Bayes Tree, Dagging, Decision Table/Naïve Bayes, Decision table, J48, Bayes Net and Naive Bayes. In this study, the performances of 16 different classification methods were evaluated in terms of classification accuracy on Parkinson's disease dataset. When comparing the performances of algorithms its been found that IB1 have highest accuracy(96.4103%).

 

Shianghau Wu et.al [5] suggests the algorithm such as logistic regression, decision tree, neural net analysis and used voice measurement variables as diagnostic tool for Parkinson's disease. This study shows to use of data mining method to analysis the data book of Parkinson's disease, discriminate PD patients from healthy people and to make Physicians and ordinary people to be aware of early symptoms of PD and make earlier treatment.

Chandrasekhar Azad et.al [6] used decision tree, LD3, decision stumps classification algorithms. The Parkinson's disease dataset is taken from UCI repository. Decision tree has highest classification accuracy of 85.08%. In this paper, speech articulation of Parkinson's disease affected people is considered and analyzed as one of the symptom.

Tarigoppula V.S. Sriram et.al [7] used Bayes net, Naïve Bayes, logistics, KStar, ADTree, J48, Random Forest algorithm. Logistics represents 100%. In this paper comparison analysis is done between two datasets and prediction of PD by comparing the data of PD and non-PD voice data.

PeymanMohammadi et.al [8] compares classification performance of eleven different data mining algorithm through using Parkinson's Telemonitoring dataset.

Tejeswinee.K, ShomonaGracia Jacob et.al [9] determines the objective of this study was to examine the performance of the classification algorithms such as support vector machine(SVM), random forest, decision tree, naïve Bayes, Adaboost and K-Nearest Neighbor.Support Vector Machine gave the best accuracy of 94%.

Bradley F.Boeve [10] suggests the importance of identifying patients with this disorder.

Brent Bluett et.al [11] analyses, this study was to identify clinical parameters most significantly associated with increase falls in PSP.

## III. ATYPICAL PARKINSON DISEASE AND ITS SYMPTOMS

PSP is an atypical Parkinson's disease that primarily affects the brain. PSP also referred as Steele - Richardson Olszewski syndrome or Parkinson's Plus. The disease results in damaging nerve cells in the brain. The progressive Supranuclear palsy name indicates that the disease worsens(progressive) and it causes damages (palsy) in certain parts of the brain above nerve cell clusters called nuclei (Supra nuclear). These nuclei will help to control movements of the eye. The Progressive Supranuclear Palsy (PSP) is often challenging, to diagnose it in early stage. This type of rare neurological condition causes difficulty in walking, balance & eye movements. The condition results from deterioration of cells in certain areas of your brain that control movement of the body & thinking. Researchers have found that the deteriorating brain cells of people with PSP have abnormal amount of protein called tau.

### A. SYMPTOMS OF PSP

Approximately, 3 to 6 in every 1, 00,000 people worldwide have PSP. A symptom of PSP commences on an average after 60 years, but sometimes it starts earlier too. Men are victims more than women. The signs & symptoms vary from person to person. The most continual first symptom is loss of balance while walking (unexplained falls) & unsteady walking.

As the disease progresses,

- Initial symptoms for most people starts with in eye such as blurring of vision, double vision.
- The movement of an eye can't be controlled efficiently in various directions.
- Feel sensitive for the light.
- Blinking of eye lids will be very slow.
- Slow, Slurred speech (sounds like humming bird).
- Handwriting will be changed and its looks small comparing to the early writing.
- Changes in behavior & personality.
- Sleep disturbances.
- Facial expression appears to be frightened.
- Inability to swallow (Dysphagia).
- Muscle stiffness.
- Stiffness of neck & limbs.
- Memory related problems.
- Stooped posture.

## IV. PARKINSON'S DISEASE AND ITS SYMPTOMS

Parkinson's disease is the most dangerous neurological disorder which mainly affects the some cells in the brain and gradually it reduces the secretion of dopamine in Substantia Nigra. This dopamine is a neurotransmitter found in the brain .It is essential one to function the central nervous system. The substance by name, dopamine will be produced by neurons. The

dopamine level decreases in the brain, then the person faces problems in movement. If the dopamine secretion is reduced, then all the symptoms will be subsequentially followed one by one within the life span of 3 to 4 years, then we make sure that the person is affected with Parkinson disease.

### A. SYMPTOMS OF PARKINSON'S DISEASE

Parkinson's disease treatment is critically more successful when the disease is diagnosed in its earliest stages. Symptoms can take years to develop, and most people live for many years with the disease. Parkinson's disease affects approximately 1 million Americans, with another 60,000 diagnosed each year. Diagnosis can be difficult, as many of the early signs are similar to those in other PSP.

Symptoms of Parkinson's disease:

- Small handwriting
- Tremor
- Sleep problems
- Stiffness & slow movement
- Voice changes
- Masking
- Posture

## V. DATA MINING

Data mining is a process of extracting useful information and patterns from huge data. Various algorithms and techniques like classification, clustering, regression are used for knowledge discovery from databases. Classification is the most commonly used data mining techniques. The classification test data are used to find the accuracy of the algorithm applied towards the methods. Some of the classification methods are

- Classification by Decision Tree Induction
- Bayesian Classification
- Support Vector Machines
- Rule-Based Classification

## VI. CONCLUSION

So far, several studies have been reported focusing on Parkinson's disease diagnosis through symptoms. In this study, various classification methods were used for diagnosing the Parkinson's & atypical Parkinson's disease through symptoms. The future study aims to propose an efficient method to diagnose this type of neurological disorder by some symptoms at the early stage with better accuracy using different data mining classification techniques such as Decision Tree Induction, Support Vector Machine, and Bayesian Classification.

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