A COMPREHENSIVE STUDY OF PREDICTION OF PARKINSON'S DISEASE

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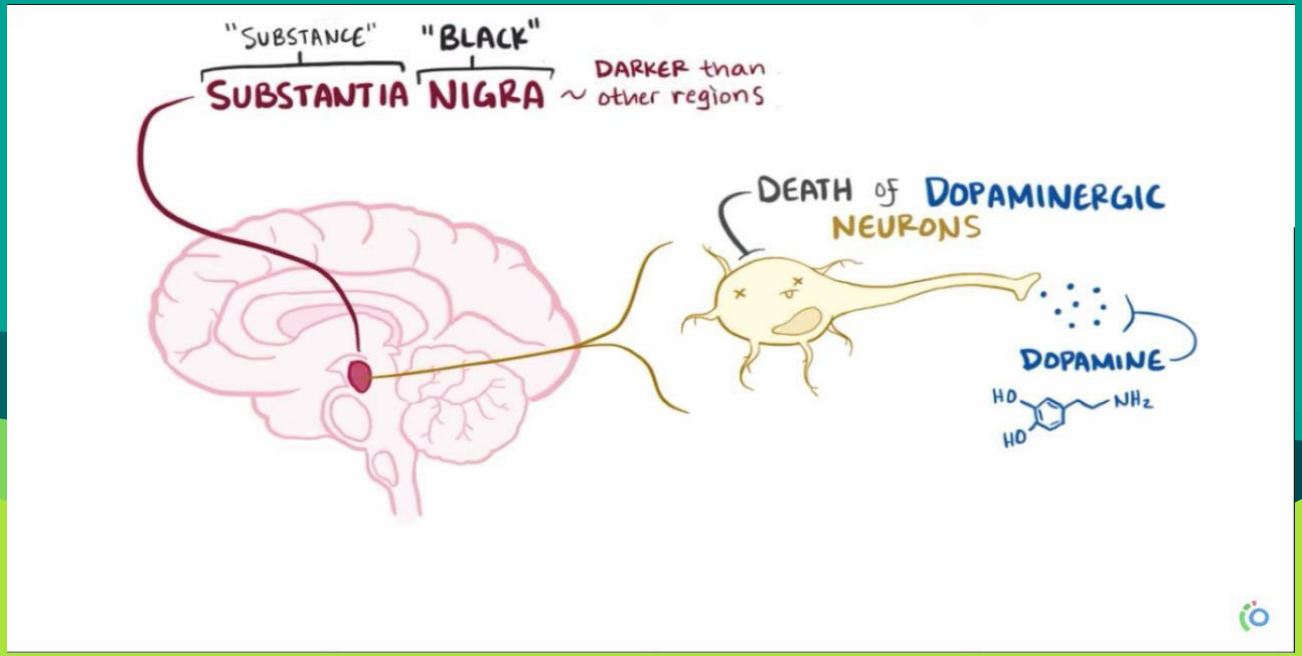
SETUP OF PAPER

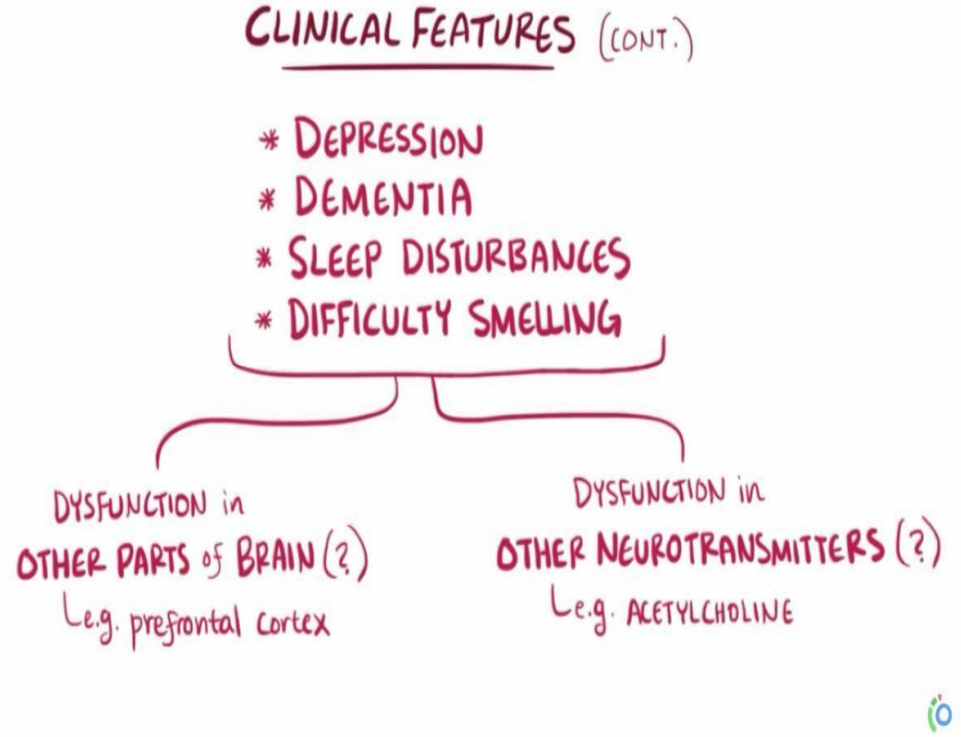
- Abstract
- Introduction
- Data Assembling
- Data Pre-processing and Model Building
- Figures and Tables
- Limitations
- Future Scope
- Conclusions
- References

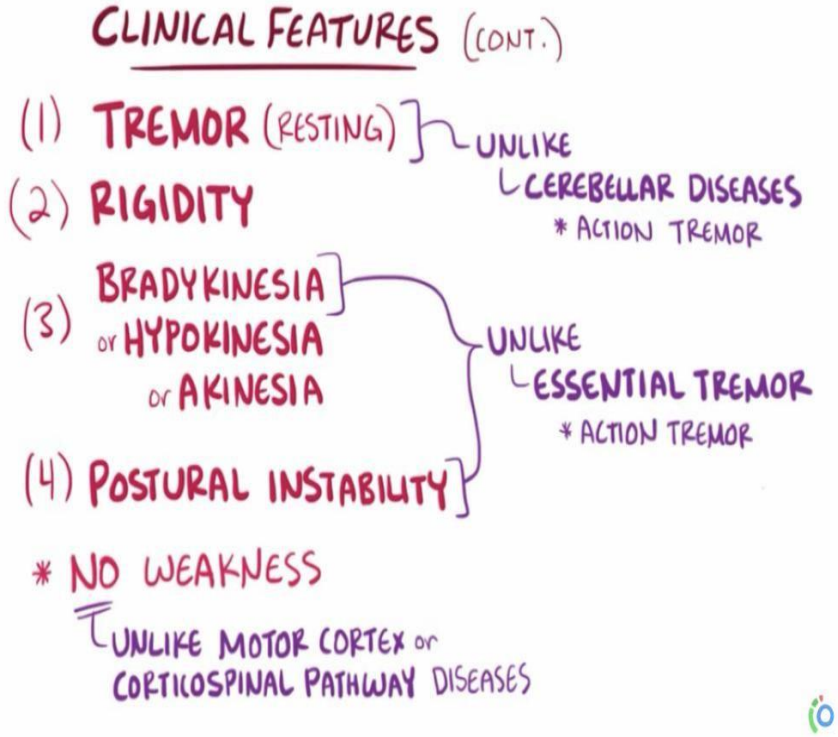
INTRODUCTION

What is Parkinson's disease?



Symptoms


CLINICAL FEATURES (CONT.)
* DEPRESSION
* DEMENTIA
* SLEEP DISTURBANCES
* DIFFICULTY SMELLING
DYSFUNCTION in OTHER PARTS of BRAIN (?)
e.g. prefrontal cortex
DYSFUNCTION in OTHER NEUROTRANSMITTERS (?)
e.g. ACETYLCHOLINE


CLINICAL FEATURES (CONT.)
(1) TREMOR (RESTING)
(2) RIGIDITY
UNLIKE CEREBELLAR DISEASES
* ACTION TREMOR
(3) BRADYKINESIA or HYPOKINESIA or AKINESIA
(4) POSTURAL INSTABILITY
UNLIKE ESSENTIAL TREMOR
* ACTION TREMOR
* NO WEAKNESS
UNLIKE MOTOR CORTEX or CORTICOSPINAL PATHWAY DISEASES

CLINICAL FEATURES

TREMOR

* INVOLUNTARY SHAKINESS *

"PILL-ROLLING"

"RESTING TREMOR"

- Present at rest
- Diminishes with MOVEMENT

RIGIDITY

* STIFFNESS *

"COGWHEEL RIGIDITY"

+ STOOPED POSTURE
+ ALMOST EXPRESSIONLESS

LITERATURE SURVEY

- In [1] the data utilized was collected at the time of mPower study, which was an observational study regarding PD. It was entirely based on a smartphone app. The participants(inclusive of both PD and generals) were required to execute 4 tests on the smartphone which were walking, voice recording, tapping game and memory game 3 times per day on their own.
- Data in [2] was generated from 40 participants(22 control and 18 PWP) using a smartphone and a wired head-worn omnidirectional microphone in .wav format.
- It comprises the users to record vowel /a/ and consonant /m/ while following protocols. Specifically for vowel ’a’ demographic data and vocal phonation records are extracted from mPower database in [3].
- In [4], Data is collected by making the participants read the first paragraph of ’Rainbow Passage’ which includes 3 pauses - Mandatory Pause Phrase as MPP, Optional Pause Phrase as OPP and No Pause Phrase as NPP.

- Tri-Axial Accelerations from the accelerometer sensor is extracted though the LG Optimus S in [5] by making the 20 users inclusive of 10 PD and 10 generals walk for 20 steps from point A to point B and back to point A for gait and sway stand for 30 seconds for 4 times a day - one before taking levodopa, one after 1 hour of taking it, one in mid-afternoon and one before bed..
- In [6] data is gathered from 3 clinics that perform 3 tasks first is the phonation task, second is the diadochokinetic task and third is the reading task within a time duration of 4 min using a portable device.
- In [7], 100 Spanish speakers from Columbia(25 men/25 women for both PD and general) each performing 42 speech tasks containing 24 isolated words, 10 sentences, 1 reading text, 1 monologue and rapid repetition of syllables /pa-ta-ka, /pa-ka- ta/ and /pe-ta-ka.
- In [8] Exceptionally little datasets (normally under 60 PD cases) are utilized in most studies performed so far with different achievement, utilizing ’a’ phonation from 33 PD and 10 HC subjects,using ’e’ phonation from 20 PD and 20 HC subjects,using ’i’ phonation from 50 PD and 50 HC subjects.

- In [9] the data used in this study is the voice recording originally done at the Oxford University by Max Little. The voices of 31 peoples among which 23 are suffering from PD and remaining have their normal character. 195 entries are extracted from the voice data of 31 people in which 147 are of PD and the remaining 48 are normal.
- Data in [10]were collected through mPower where an iPhone app that uses digital bio-markers and health data by recording the voices of participants with and without PD And a unique id is assigned to each entry in the dataset.

LIMITATIONS

- Less no of patients so less data.
- Not proper diagonising as the symptoms as similar with all diseases.
- Prediction accuracy decreases if data of young ones are added.
- Manual diagonising leads to failure sometimes as well as time consuming.
- As voice is used so depend very much on accent.
- Voice recording might contain voice during recording stage.
- Unconsistent execution of the exercises might have huge impact on results.
- Some parameters show multi collinearity therefore might use PCA, LDA etc techniques to reduce it.

FUTURE SCOPE

- Efficient data generation.
- Proper noise cancellation.
- Less overhead on patient doing exercises.
- Multiple symptoms to be considered for better predictions.
- Hybrid algorithms can be used.
- Constantly database should be updated for better results.

CONCLUSION

- To help the reseachers and various other contributors towards this domain to understand the depth of this research area, help in understanding different methods to tackle it.
- This Paper provides a easy interface to understand all techniques used by other researchers by displaying it on a table.
- It also helps to understand the challenges, techniques and assumptions used by contributors.
- Basically before diving into this area, this paper gives you a basic idea of its depth.

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THANK YOU