

Project Report

Detection of Parkinson's Disease using Machine Learning

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| Date | 13.11.2022 |
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| Project Name | Detecting Parkinson's Disease using Machine Learning |

Parkinson's disease

- Parkinson's disease is a brain disorder that causes unintended or uncontrollable movements, such as shaking, stiffness, and difficulty with balance and coordination.
- Symptoms usually begin gradually and worsen over time. As the disease progresses, people may have difficulty walking and talking. They may also have mental and behavioral changes, sleep problems, depression, memory difficulties, and fatigue.
- While virtually anyone could be at risk for developing Parkinson's, some research studies suggest this disease affects more men than women. It's unclear why, but studies are underway to understand factors that may increase a person's risk.

Project objective

- To understand the problem for to classify if it is a regression or a classification kind of problem.
- To pre-process the image by using different data pre-processing techniques.
- To implement the algorithm by using OpenCV framework and machine learning to automatically detect Parkinson's disease in hand-drawn images of spirals and waves.
- To know how to find the accuracy of the model.
- To build web application using the Flask framework that features the detection of Parkinson's Disease.

Problem Statement

Parkinson's disease is a brain disorder that causes unintended or uncontrollable movements, such as shaking, stiffness, and difficulty with balance and coordination. Symptoms usually begin gradually and worsen over time. As the disease progresses, people may have difficulty walking and talking.

Literature Survey

1. Jie Mei, Christian Desrosiers, Johannes Frasnelli, "Machine Learning for the Diagnosis of Parkinson's Disease," 2021.

This paper conveys extremely about the importance of Diagnosis of Parkinson's disease (PD) is commonly based on medical observations and assessment of clinical signs, including the characterization of a variety of motor symptoms. However, traditional diagnostic approaches may suffer from subjectivity as they rely on the evaluation of movements that are sometimes subtle to human eyes and therefore difficult to classify, leading to possible misclassification. In the meantime, early non- motor symptoms of PD may be mild and can be caused by many other conditions. Therefore, these symptoms are often overlooked, making diagnosis of PD at an early stage challenging. To address these difficulties and to refine the diagnosis and assessment procedures of PD, machine learning methods have been implemented for the classification of PD and healthy controls or patients with similar clinical presentations (e.g., movement disorders).

2. C K Gomathy, "The Parkinson's Disease Detection using Machine Learning Techniques." 2021.

The Parkinson's disease is progressive neuro degenerative disorder that affects a lot only people significantly affecting their quality of life. It mostly affects the motor functions of human. The main motor symptoms are called "parkinsonism" or "parkinsonian syndrome". There is a model for detecting Parkinson's using voice. The deflections in the voice will confirm the symptoms of Parkinson's disease. This project showed 73.8% efficiency. In this model, a huge amount of data is collected from the normal person and previously affected person by Parkinson's disease. these data are trained using machine learning algorithms. From the whole data 60% is used for training and 40% is used for testing. The data of any person can be entered in database to check whether the person is affected by Parkinson's disease or not.

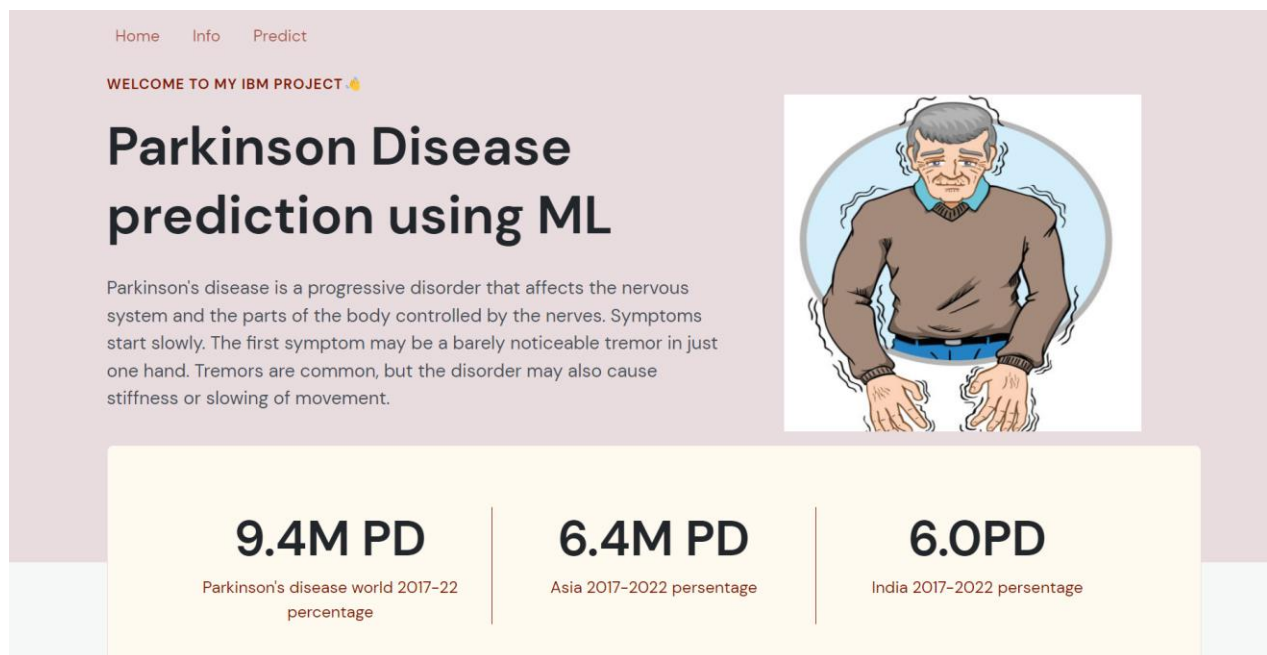
3. Iqra Nissar, Waseem Ahmad Mir, Izharuddin, Tawseef Ayoub Shaikh, "Machine Learning Approaches for Detection and Diagnosis of Parkinson's Disease," 2021.

Parkinson's disease (PD) is a disabling disease that affects the quality of life. It happens due to the death of cells that produce dopamine's in the substantia nigra part of the central nervous system (CNS) which affects the human body. People who have Parkinson's disease feel difficulty in doing activities like speaking, writing, and walking. However, speech analysis is the most considered technique to be used.

Deployment of ML Model

The Machine Learning model which is developed using Random Forest Classifier Algorithm generates accuracy of 0.8666 approximately is deployed using IBM Watson which enhances scalability, reliability, security and performance of the ML model.


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Symptoms of Parkinson




Slowed movement (bradykinesia)

Over time, Parkinson's disease may slow your movement, making simple tasks difficult and time-consuming. Your steps may become shorter when you walk. It may be difficult to get out of a chair. You may drag or shuffle your feet as you try to walk.




Rigid muscles

Muscle stiffness may occur in any part of your body. The stiff muscles can be painful and limit your range of motion.




Impaired posture and balance

Your posture may become stooped. Or you may fall or have balance problems as a result of Parkinson's disease.




Loss of automatic movements

You may have a decreased ability to perform unconscious movements, including blinking, smiling or swinging your arms when you walk.



Speech changes


You may speak softly, quickly, slur or hesitate before talking. Your speech may be more of a monotone rather than have the usual speech patterns.



Writing changes

It may become hard to write, and your writing may appear small.

Predict Page



Test Yourself

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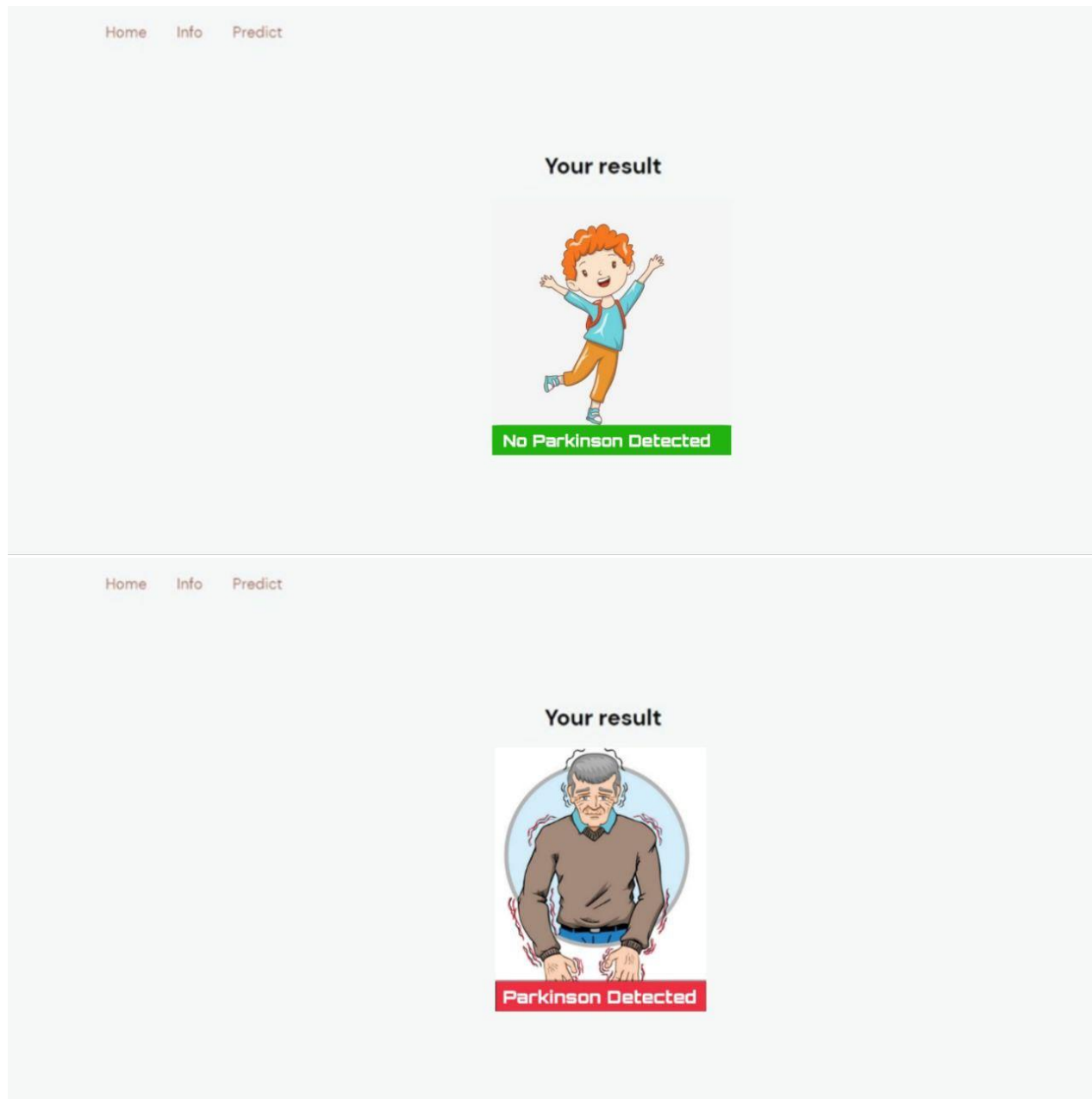
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☐ Sprial ☐ Wave

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Upload sprial or wave diagram to predict the parkinson's disease

Result Page



Conclusion

Parkinson's disease affects the CNS of the brain and has yet no treatment unless it's detected early. Late detection leads to no treatment and loss of life. Thus, its early detection is significant. Machine Learning techniques is used to improve the accuracy of early diagnosis significantly. So, our Machine Learning model can help doctors and assist them in detecting Parkinson's disease at an earlier stage and increase the chances of survival.