Smart Internz

Detecting Parkinson's Disease Using IBM Watson Machine Learning

1. Introduction

1.1 Overview

Detect Parkinson's disease in geometric drawings (specifically spirals and waves) using OpenCV and computer vision. We utilized the Histogram of Oriented Gradients image descriptor to quantify each of the input images.

1.2 Purpose

The purpose of this project is to create a nearly efficient way to diagnose parkinson's disease during the phase where the patient cannot write efficiently and his movements become somewhat sluggish with hints of possible parkinson's disease.

2. Literature Survey

2.1 Existing problem

Parkinson's Disease

Parkinson's disease is a nervous system disorder that affects movement. The disease is progressive and is marked by five different stages:

- Stage 1: Mild symptoms that do not interfere with daily life, including tremors and movement issues on only one side of the body.
- Stage 2: Symptoms continue to become worse with both tremors and rigidity now affecting both sides of the body. Daily tasks become challenging.

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- Stage 3: Loss of balance and movements with falls becoming frequent and common, The patient is still capable of (typically) living independently.
- Stage 4: Symptoms become severe and constraining. The patient is unable to live alone and requires help to perform daily tasks.
- Stage 5: Likely impossible to walk or stand. The patient is most likely wheelchair bound and may even experience hallucinations.

2.2 Proposed solution

We'll be leveraging the fact that two of the most common Parkinson's symptoms include tremors and muscle rigidity which directly impact the visual appearance of a hand drawn spiral and wave pattern.

The variation in visual appearance will enable us to train a computer vision + machine learning algorithm to automatically detect Parkinson's disease

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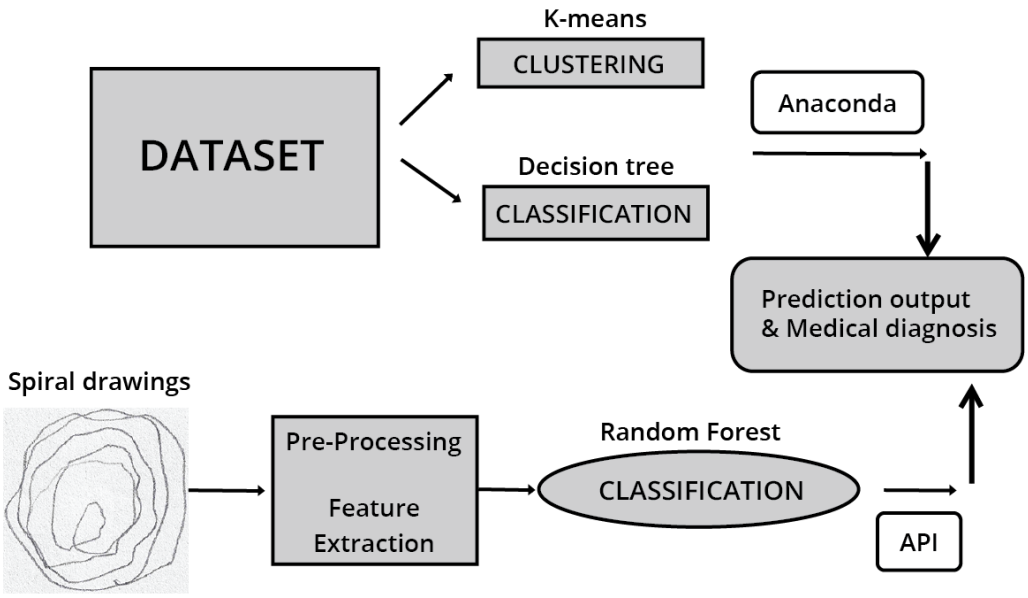
3. Theoretical analysis

3.1 Block Diagram



3.2 Hardware / Software designing

The only hardware used in this project is a Camera to capture the images for creating a dataset. The Program is created using Convolutional Neural Networks (Machine Learning) and Computer Vision and the Interface is created in Flask using IBM Watson AI.

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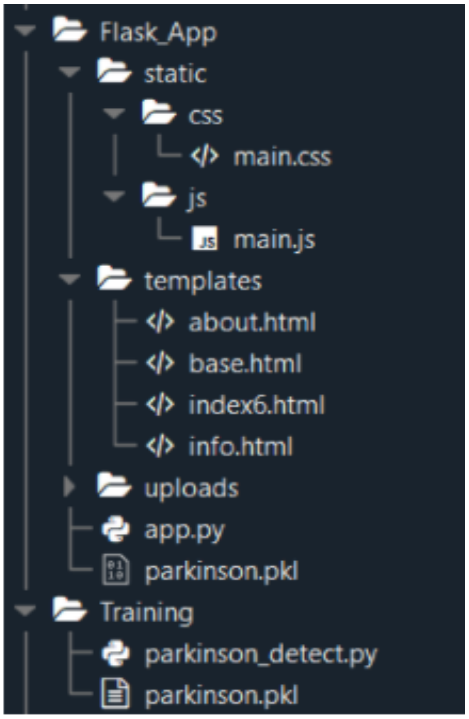
4. Flowchart

The workflow of the project was as follows:



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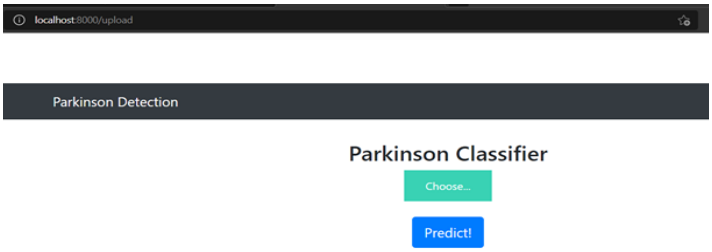
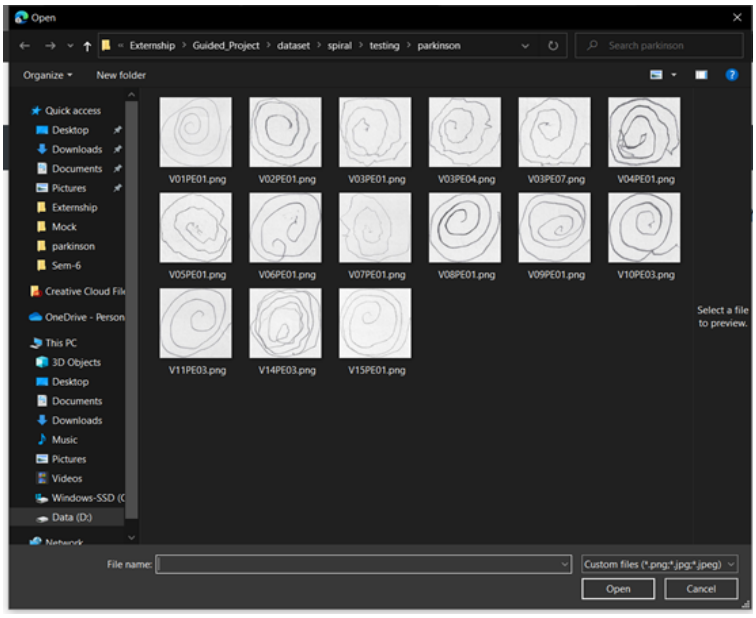
5. Result

Final findings (Output) of the project along with screenshots:





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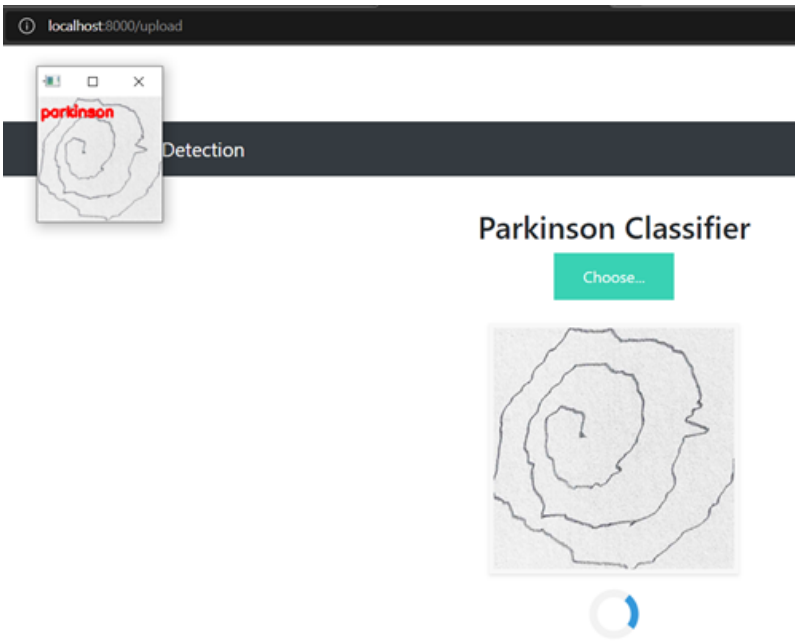

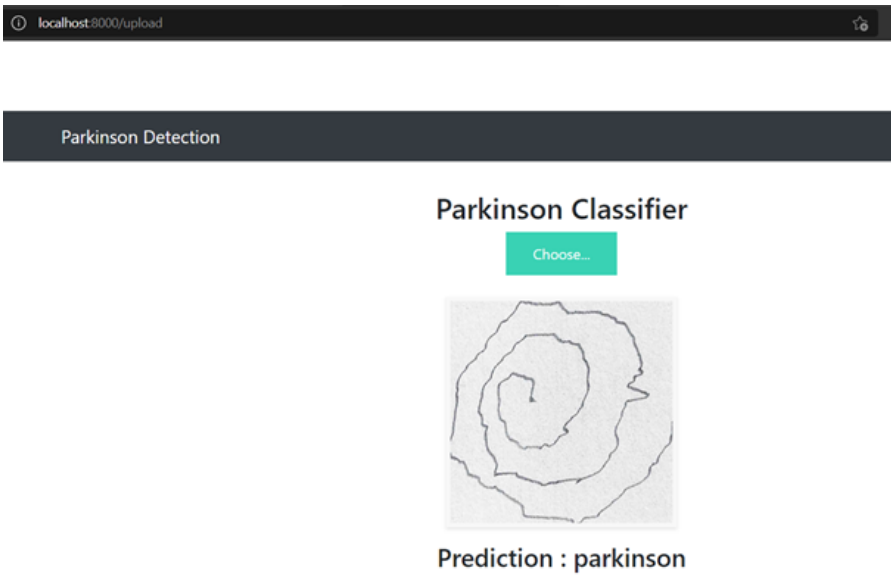

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6. Advantages and disadvantages

7.1 Advantages

- The proposed model predicts Parkinson's in images with a high accuracy rate of 83.33%.
- The early detection of parkinson's gives better understanding of disease causes, initiates therapeutic interventions and enables developing appropriate treatments.

7.2 Disadvantages

- Do not identify the different stages of Parkinson's disease.
- Do not monitor for motor symptoms.

7. Applications

- Used to detect Dementia at an early stage.
- Used to detect neurodegenerative disorders.
- Used for clinical diagnosis for patients above 50 years.

8. Conclusions

The implementation provides a solution for Parkinson's disease detection using CNN. This deployment is possible through the IBM Watson. Thus effectively bringing AI out on edge — in actual and physical real-world use cases.

This project aimed to cover a broader space of imaging and machine learning technologies for mental illness diagnostics such that researchers in the field could readily identify the state of the art in the domain. Moreover, we emphasize the importance of early detection and

prediction of Parkinson's disease, such that treatment and support can be provided to patients as soon as possible

9. Future scope

In future work, we can focus on different techniques to predict Parkinson disease using different datasets.

As indicated in Results, not all handwriting tasks provide the same level of discrimination power. After evaluating our results, it is evident that some features are more useful for diagnosis than others. We can use actual handwriting to improve on our results.

In the future we will use different types of attributes for the classification of patients and also identify the different stages of Parkinson's disease.