1. Intraduction

1.1 Overview

More than 10 million people are living with Parkinson’s Disease worldwide, according to the Parkinson’s Foundation. While Parkinson’s cannot be cured, early detection along with proper medication can significantly improve symptoms and quality of life

The researchers found that the drawing speed was slower and the pen pressure is lower among Parkinson’s patients. One of the indications of Parkinson’s is tremors and rigidity in the muscles, making it difficult to draw smooth spirals and waves. It is possible to detect Parkinson’s disease using the drawings alone instead of measuring the speed and pressure of the pen on paper. Our goal is to quantify the visual appearance(using HOG method) of these drawings and then train a machine learning model to classify them. In this project, We are using, Histogram of Oriented Gradients (HOG) image descriptor along with a Random Forest classifier to automatically detect Parkinson’s disease in hand-drawn images of spirals and waves.

1.2 Purpose

Identification of the correct biomarkers with respect to particular health issues and detection of the same is of paramount importance for the development of clinical decision support systems. For the patients suffering from Parkinson's Disease (PD), it has been duly observed that impairment in the handwriting is directly proportional to the severity of the disease. Also, the speed and pressure applied to the pen while sketching or writing something are also much lower in patients suffering from Parkinson's disease. Therefore, correctly identifying such biomarkers accurately and precisely at the onset of the disease will lead to a better clinical diagnosis

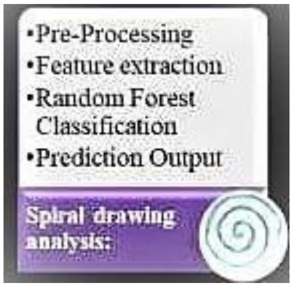
2 LITERATURE SURVEY

2.1 Existing problem

In existing system, PD is detected at the secondary stage only (Dopamine deficiency) which leads to medical challenges. Also doctor has to manually examine and suggest medical diagnosis in which the symptoms might vary from person to person so suggesting medicine is also a challenge. Thus the mental disorders are been poorly characterized and have many health complications. PD is generally diagnosed with the following clinical methods as, · MRI or CT scan - Conventional MRI cannot detect early signs of Parkinson's disease · PET scan - is used to assess activity and function of brain regions involved in movement · SPECT scan - can reveal changes in brain chemistry, such as a decrease in dopamine This results in a high misdiagnosis rate (up to 25% by non-specialists) and many years before diagnosis, people can have the disease. Thus existing system is not effective in early prediction and accurate medicinal diagnosis to the affected people

2.2 Praposed system

By using machine learning techniques, the problem can be solved with minimal error rate.our proposed system provides accurate results by integrating spiral drawing inputs of normal and Parkinson's affected patients. We propose a hybrid and accurate results analyzing patient spiral drawing data's. With that result, the doctor can conclude normality or abnormality and prescribe the medicine based on the affected stage.

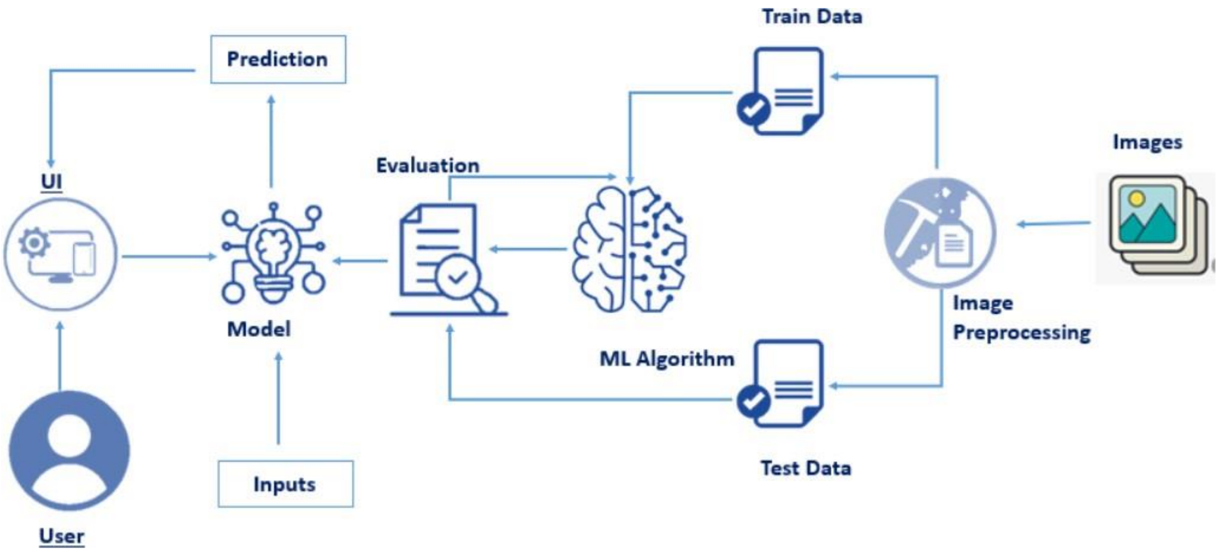


- Pre-Processing
- Feature extraction
- Random Forest Classification
- Prediction Output

Spiral drawing analysis:

3 THERTICAL ANALYSIS

3.1 Block diagram



3.2 Hardware / Software designing

Sohware requirements

- Operating System : Microsoft Windows 10
- Analytics and Visualization tool : IBM Cognos Analytics

Hardware requirements

- Main Processor : Intel core i3, Intel core i5

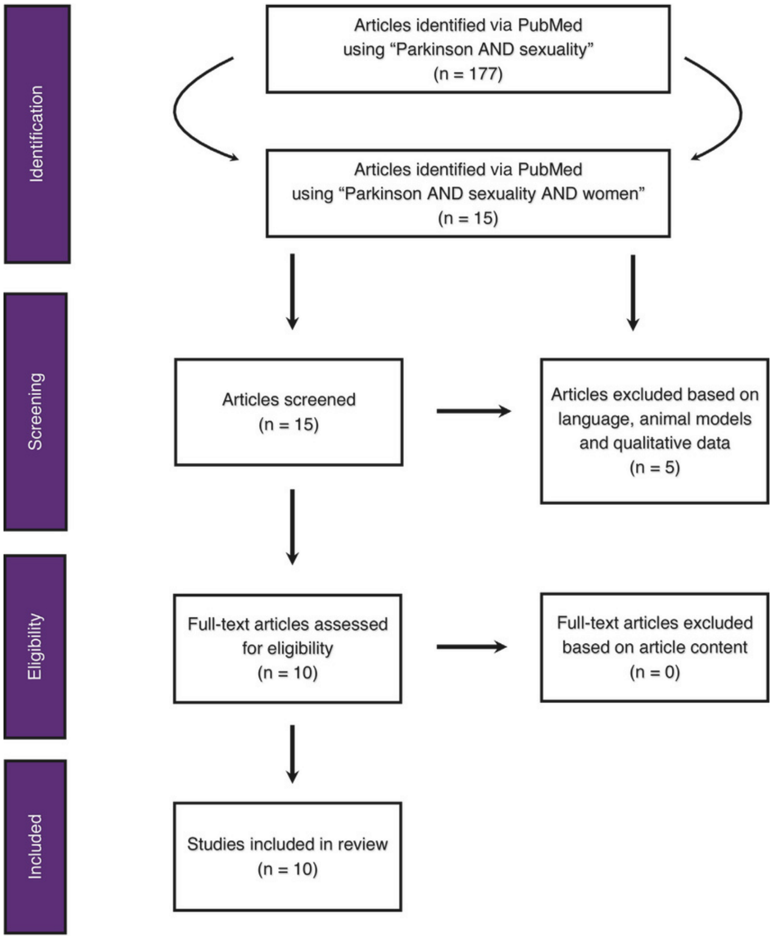
  RAM Size : 4.00 GB

- Processor Speed : 2.60 GHz

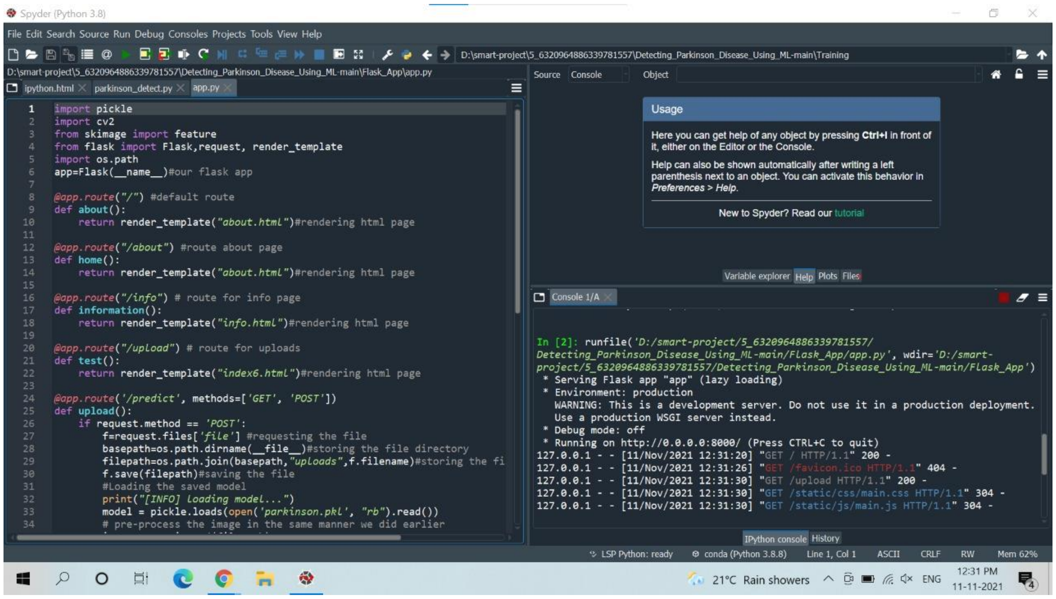
4 EXPERIMENTAL INVESTIGATIONS

Parkinson's disease (PD) was characterized by late-onset, progressive dopamine neuron loss and movement disorders. The progresses of PD affected the neural function and integrity. To date, most researches had largely addressed the dopamine replacement therapies, but the appearance of L-dopa-induced dyskinesia hampered the use of the drug. And the mechanism of PD is so complicated that it's hard to solve the problem by just add drugs. Researchers began to focus on the genetic underpinnings of Parkinson's disease, searching for new method that may affect the neurodegeneration processes in it. In this paper, we reviewed current delivery methods used in gene therapies for PD. we also summarized the primary target of the gene therapy in the treatment of PD, such like neurotrophic factor (for regeneration), the synthesis of neurotransmitter (for prolong the duration of L-dopa), and the potential proteins that might be a target to modulate via gene therapy. Finally, we discussed RNA interference therapies used in Parkinson's disease, it might act as a new class of drug. We mainly focus on the efficiency and tooling features of different gene therapies in the treatment of PD.

5 FLOW CHART


Identification
Screening
Eligibility
Included
Articles identified via PubMed using “Parkinson AND sexuality” (n = 177)
Articles identified via PubMed using “Parkinson AND sexuality AND women” (n = 15)
Articles screened (n = 15)
Articles excluded based on language, animal models and qualitative data (n = 5)
Full-text articles assessed for eligibility (n = 10)
Full-text articles excluded based on article content (n = 0)
Studies included in review (n = 10)

6 RESULT


Spyder (Python 3.8)
File Edit Search Source Run Debug Consoles Projects Tools View Help
D:\smart-project\5_6320964886339781557\Detecting_Parkinson_Disease_Using_ML-main\Training
D:\smart-project\5_6320964886339781557\Detecting_Parkinson_Disease_Using_ML-main\Flask_App\app.py
ipython.html
parkinson_detect.py
app.py
Source
Console
Object
Variable explorer
Help
Plots
Files
Console 1/A
IPython console
History
LSP Python: ready
conda (Python 3.8.8)
Line 1, Col 1
ASCII
CRLF
RW
Mem 62%
21°C Rain showers
ENG
12:31 PM
11-11-2021

```python
import pickle
import cv2
from skimage import feature
from flask import Flask,request, render_template
import os.path
app=Flask(__name__)#our flask app

@app.route("/") #default route
def about():
    return render_template("about.html")#rendering html page

@app.route("/about") #route about page
def home():
    return render_template("about.html")#rendering html page

@app.route("/info") # route for info page
def information():
    return render_template("info.html")#rendering html page

@app.route("/upload") # route for uploads
def test():
    return render_template("index6.html")#rendering html page

@app.route('/predict', methods=['GET', 'POST'])
def upload():
    if request.method == 'POST':
        f=request.files['file'] #requesting the file
        basepath=os.path.dirname(__file__)#storing the file directory
        filepath=os.path.join(basepath,"uploads",f.filename)#storing the fi
        f.save(filepath)#saving the file
        #Loading the saved model
        print("[INFO] Loading model...")
        model = pickle.loads(open('parkinson.pkl', "rb").read())
        # pre-process the image in the same manner we did earlier
```

Usage

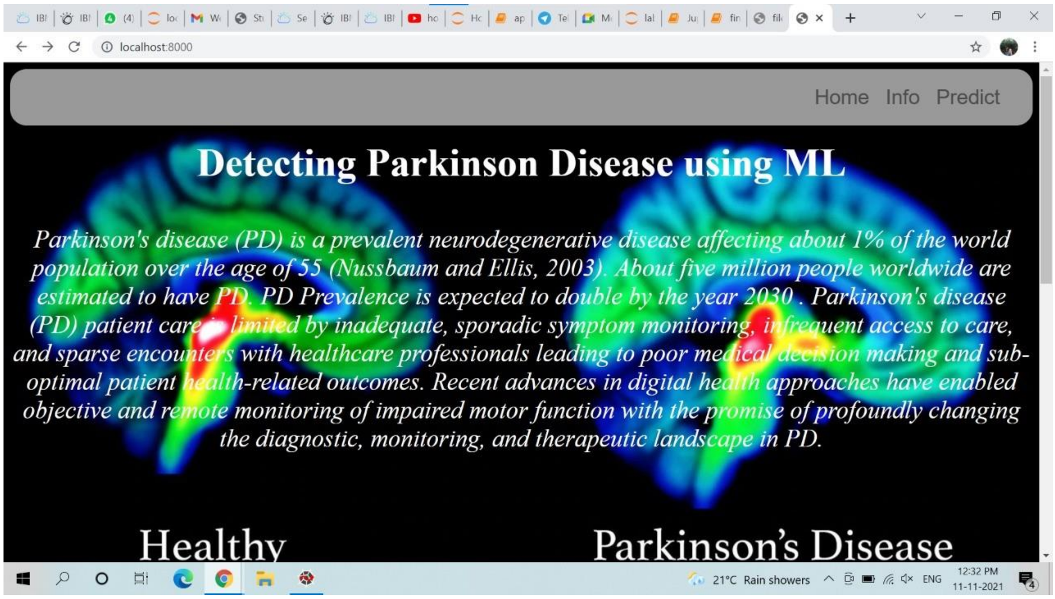
Here you can get help of any object by pressing **Ctrl+I** in front of it, either on the Editor or the Console.

Help can also be shown automatically after writing a left parenthesis next to an object. You can activate this behavior in *Preferences > Help*.

New to Spyder? Read our tutorial

```
In [2]: runfile('D:/smart-project/5_6320964886339781557/
Detecting_Parkinson_Disease_Using_ML-main/Flask_App/app.py', wdir='D:/smart-
project/5_6320964886339781557/Detecting_Parkinson_Disease_Using_ML-main/Flask_App')
 * Serving Flask app "app" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on http://0.0.0.0:8000/ (Press CTRL+C to quit)
127.0.0.1 - - [11/Nov/2021 12:31:20] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [11/Nov/2021 12:31:26] "GET /favicon.ico HTTP/1.1" 404 -
127.0.0.1 - - [11/Nov/2021 12:31:30] "GET /upload HTTP/1.1" 200 -
127.0.0.1 - - [11/Nov/2021 12:31:30] "GET /static/css/main.css HTTP/1.1" 304 -
127.0.0.1 - - [11/Nov/2021 12:31:30] "GET /static/js/main.js HTTP/1.1" 304 -
```

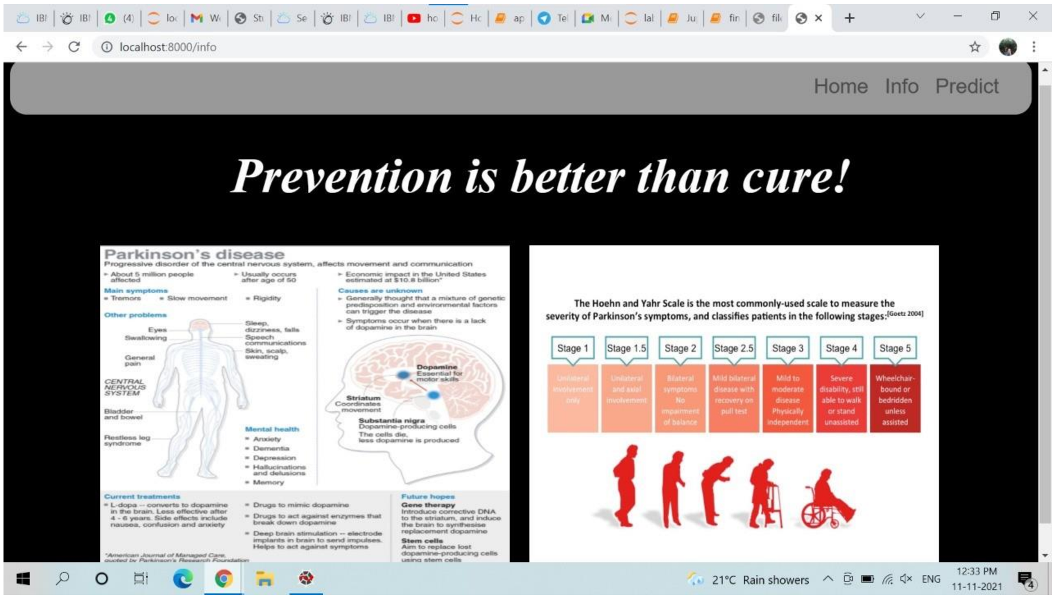
Fig: Snapshot of parkinson progect run on spyder.



Detecting Parkinson Disease using ML

Parkinson's disease (PD) is a prevalent neurodegenerative disease affecting about 1% of the world population over the age of 55 (Nussbaum and Ellis, 2003). About five million people worldwide are estimated to have PD. PD Prevalence is expected to double by the year 2030 . Parkinson's disease (PD) patient care is limited by inadequate, sporadic symptom monitoring, infrequent access to care, and sparse encounters with healthcare professionals leading to poor medical decision making and sub-optimal patient health-related outcomes. Recent advances in digital health approaches have enabled objective and remote monitoring of impaired motor function with the promise of profoundly changing the diagnostic, monitoring, and therapeutic landscape in PD.

Fig: Snapshot parkinson home page it give information about the project and about parkinson disease.



Prevention is better than cure!

Parkinson's disease

Progressive disorder of the central nervous system, affects movement and communication

- About 5 million people affected
- Usually occurs after age of 50
- Economic impact in the United States estimated at $10.8 billion*

Main symptoms
- Tremors
- Slow movement
- Rigidity

Other problems

Causes are unknown
- Generally thought that a mixture of genetic predisposition and environmental factors can trigger the disease
- Symptoms occur when there is a lack of dopamine in the brain

Mental health
- Anxiety
- Dementia
- Depression
- Hallucinations and delusions
- Memory

Current treatments
- L-dopa -- converts to dopamine in the brain. Less effective after 4 - 6 years. Side effects include nausea, confusion and anxiety
- Drugs to mimic dopamine
- Drugs to act against enzymes that break down dopamine
- Deep brain stimulation -- electrode implants in brain to send impulses. Helps to act against symptoms

Future hopes

Gene therapy
Introduce corrective DNA to the striatum, and induce the brain to synthesise replacement dopamine

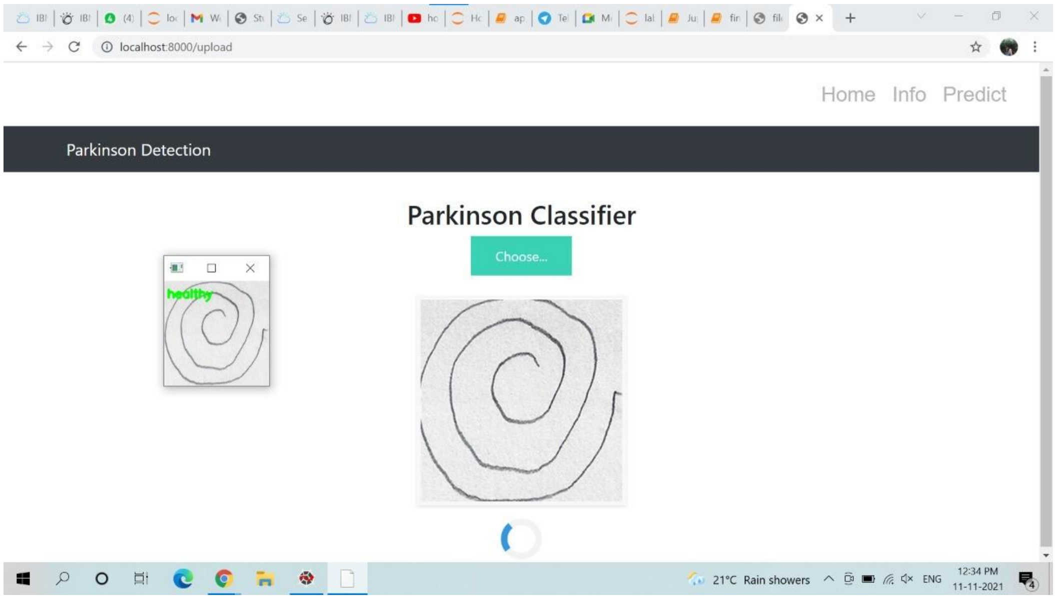
Stem cells
Aim to replace lost dopamine-producing cells using stem cells

*American Journal of Managed Care, quoted by Parkinson's Research Foundation

The Hoehn and Yahr Scale is the most commonly-used scale to measure the severity of Parkinson's symptoms, and classifies patients in the following stages:[Goetz 2004]

Stage 1	Stage 1.5	Stage 2	Stage 2.5	Stage 3	Stage 4	Stage 5
Unilateral involvement only	Unilateral and axial involvement	Bilateral symptoms No impairment of balance	Mild bilateral disease with recovery on pull test	Mild to moderate disease Physically independent	Severe disability, still able to walk or stand unassisted	Wheelchair-bound or bedridden unless assisted

Fig: Snapshot of parkinson info page, this gives brief about the diseas.

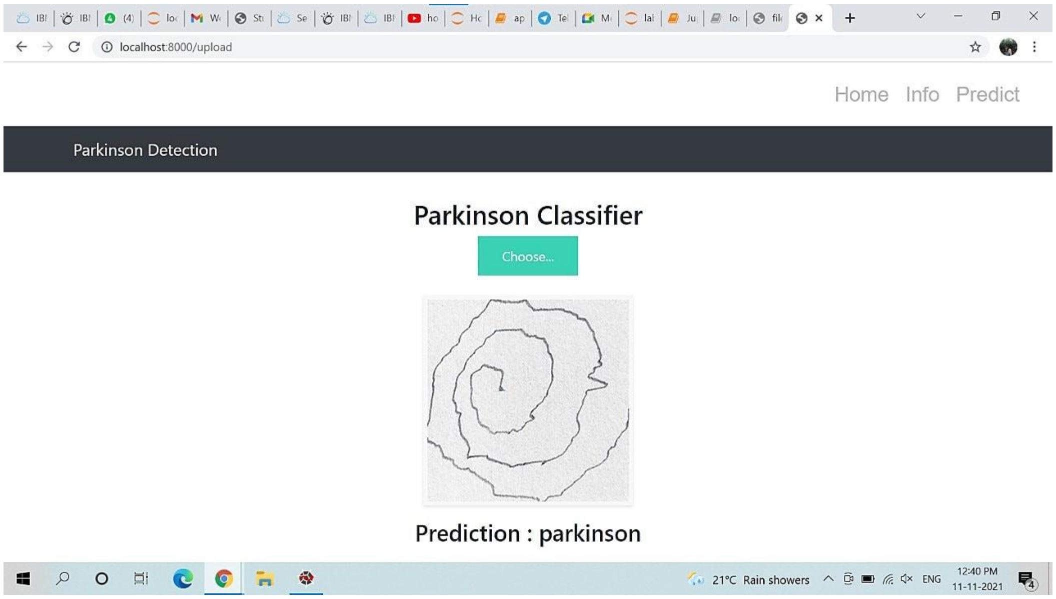


Parkinson Detection

Parkinson Classifier

Choose...

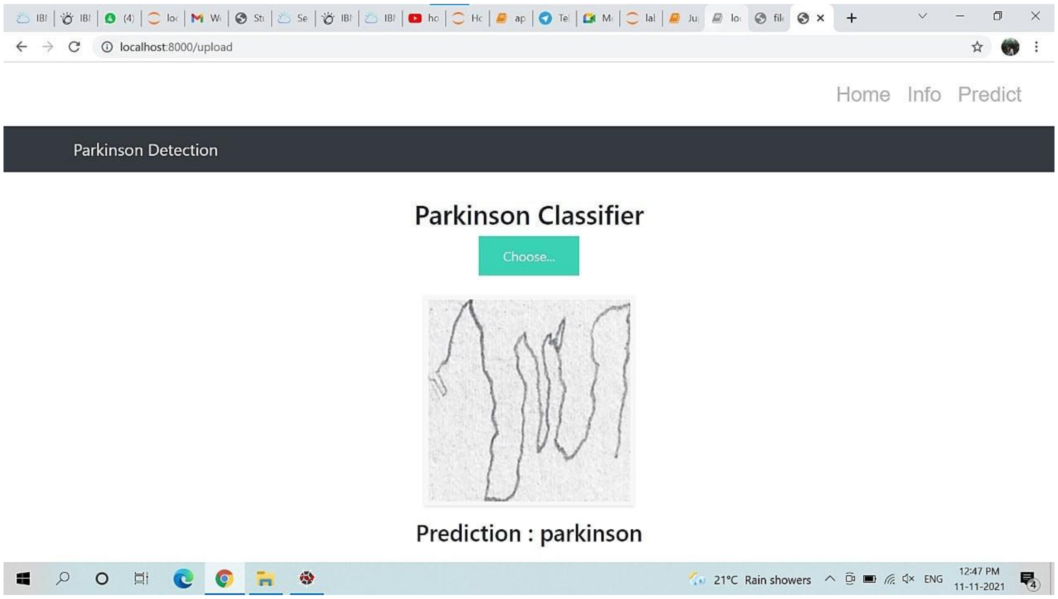
Fig: Snapshot of parkinson after predicting the spiral image of healthy person.



Parkinson Classifier

Prediction : parkinson

Fig: Snapshot of parkinson after predicting spiral image of the disease person.



Parkinson Classifier

Prediction : parkinson

Fig: Snapshot of parkinsons after predicting the wave image of disease person.

7 ADVANTAGES AND DISADVANTAGES

	Advantages	Disadvantages
ECSs	● Unlimited proferation capacity ● Potential to generate any cell type (pluripotent)	● Risk of teratomas (heterogenous composition) ● Time demanding/complex differentiation into dopaminergic neurons
NSCs	● Restricted differentiation ● Low risk of tumor formatio	● Limited proliferation capacity ● Risk of immune rejection
MSCs	● Easily harvested ● Possibility of generating patient specific cells	● Differentiation into "truly" functional dopaminergic neuron still uncertain
iPS	● Unlmited proliferation ● Generation of stem cell banks ● No ethical concerns	● Expensive procedure ● Risk of tumor formstion ● Risk of tertoma

8 APPLICATIONS

· Used to detect Dementia at early stage.

· Used to detect neurodegenerative disorders.

· Used for clinical diagnosis for patients above 50 years.

9 CONCLUSION

Previous review papers provides a comprehensive survey of relevant neuroimaging modalities and associated analysis techniques presented in the recent years for diagnosing Parkinson’s disease. Previous review papers have focused only on a particular imaging modality such as MRI or PET, or on one specific type of dementia only such as AD. 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.

10 FUTURE SCOPE

In future work, we can focus on different techniques to predict the Parkinson disease using different datasets. In this research, we using binary attribute (1- diseased patients, 0-non-diseased patients) for patient’s classification. 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.

11 BIBLOGAPHY

1. https://www.hindawi.com/journals/cin/2018/7613282/fig3/
2. https://www.pyimagesearch.com/2019/04/29/detecting-parkinsons-disease-with-opencv-computer-vision-and-the-spiral-wave-test/

APPENDIX

A. Source Code

```
import cv2
from skimage import feature
from flask import Flask,request, render_template
import os.path
app=Flask(__name__)#our flask app

@app.route("/") #default route
def about():
  return render_template("about.html")#rendering html page

@app.route("/about") #route about page
def home():
  return render_template("about.html")#rendering html page

@app.route("/info") # route for info page
def information():
  return render_template("info.html")#rendering html page

@app.route("/upload") # route for uploads
def test():
  return render_template("index6.html")#rendering html page

@app.route('/predict', methods=['GET', 'POST'])
def upload():
  if request.method == 'POST':
    f=request.files['file'] #requesting the file
    basepath=os.path.dirname(_file_)#storing the file directory
    filepath=os.path.join(basepath,"uploads",f.filename)#storing the file in uploads
folder
    f.save(filepath)#saving the file
    #Loading the saved model
    print("[INFO] loading model...")
    model = pickle.loads(open('parkinson.pkl', "rb").read())
    # pre-process the image in the same manner we did earlier
```

```
        image = cv2.imread(filepath)
        output = image.copy()
        # load the input image, convert it to grayscale, and resize
        output = cv2.resize(output, (128, 128))
        image = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)
        image = cv2.resize(image, (200, 200))
        image = cv2.threshold(image, 0, 255,
            cv2.THRESH_BINARY_INV | cv2.THRESH_OTSU)[1]


            # quantify the image and make predictions based on the extracted
            # features using the last trained Random Forest
        features = feature.hog(image, orientations=9,
                    pixels_per_cell=(10, 10), cells_per_block=(2, 2),
                    transform_sqrt=True, block_norm="L1")
        preds = model.predict([features])
        print(preds)
        ls=["healthy","parkinson"]
        result = ls[preds[0]]


            # draw the colored class label on the output image and add it to
            # the set of output images
        color = (0, 255, 0) if result == "healthy" else (0, 0, 255)
        cv2.putText(output, result, (3, 20), cv2.FONT_HERSHEY_SIMPLEX, 0.5,color, 2)
        cv2.imshow("Output", output)
        cv2.waitKey(0)
        return result
    return None

if __name__=="__main__":
    #app.run(debug=False)#running our app
    app.run(host='0.0.0.0', port=8000,debug=False)
```