DETECTING PARKINSON'S DISEASE USING MACHINE LEARNING

NALAIYA THIRAN IBM PROJECT REPORT

TEAM ID : **PNT2022TMID30509**

Submitted by

JEEVASRI.K	**611419205013**
SEEMASRI.M	**611419205031**
THARANI.L	**611419205039**
YAZHINI.B	**611419205044**

UNDER THE GUIDENCE OF

R.P.ABINAYA

in partial fulfillment for the award of the degree

of

BACHELOR OF TECHNOLOGY

in

Department Of Information Technology

MAHENDRA ENGINEERING COLLEGE FOR WOMEN

CONTENT

1. INTRODUCTION

Parkinson's disease is•a disorder of the central nervous system affecting movement and inducing tremors and stiffness a neurodegenerative disorder affecting dopamine neurons in brain. Parkinson's disease is difficult to diagnose. Common diagnostic criteria require the medication before. In this model, the huge data is collected from previously affected person and then by using machine learning algorithm will process the user input data with previous data to check he/she affected.

1.1 Project Overview

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 our model, a huge amount of data is collected from the normal person and also previously affected person by Parkinson's disease.No tests can conclusively show that you have Parkinson's disease. Your doctor will base a diagnosis on your symptoms, medical history and a detailed physical examination.

1.2 Purpose

Accurately diagnosing PD is important so that patients can receive the proper treatment and advice regarding care. In addition, diagnosing PD early is important because treatments such as levodopa/carbidopa are more effective when administered early on in the disease.

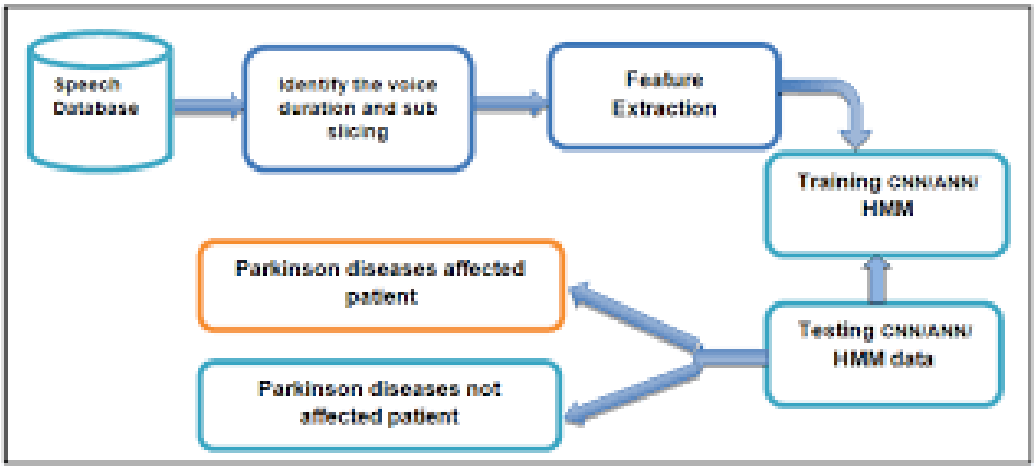
2. LITERATURE SURVEY

Speech or voice data is assumed to be 90% helpful to diagnose a person for identifying presence of disease. In general, Person with PD suffer from speech problems, which can be categorized into two: hypophonia and dysarthria. Hypophonia indicates very soft and weak voice from a person and dysarthria indicate slow speech or voice , that can hardly be understood at one time and this causes because of damage to central nervous system. So, most of the clinicians who treat PD patients observe dysarthria and try to rehabilitate with specific treatments to improvise vocal intensity.

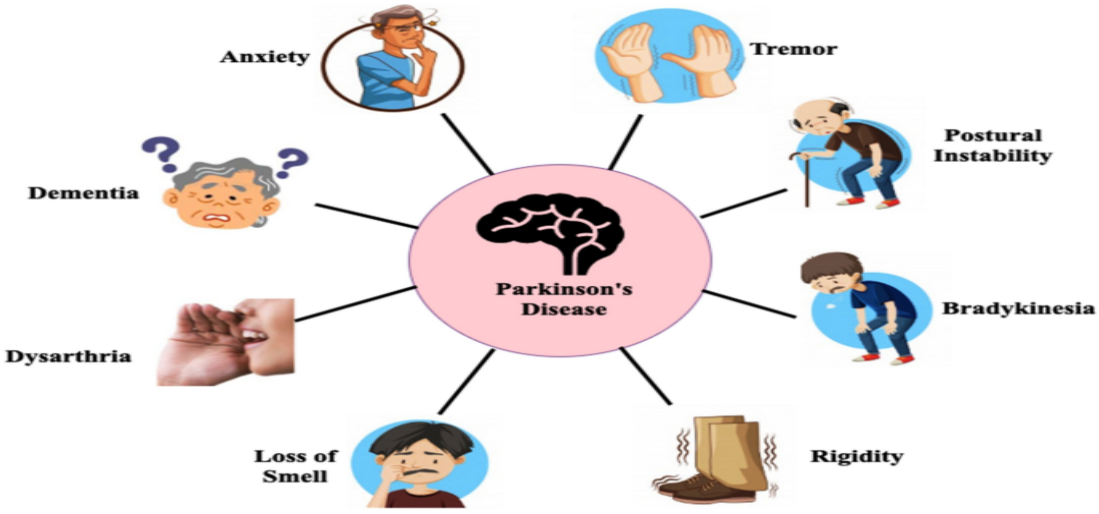
Max A. Little et al presented a new dysphonia measure, pitch period entropy (PPE) and used a kernel support vector machine and has achieved classification accuracy of 91%[10].

Marius Ene et al suggested NN based approach with three types of internal methods and discriminated persons having PD with healthy persons[7].

2.1 Existing Problem



Example:

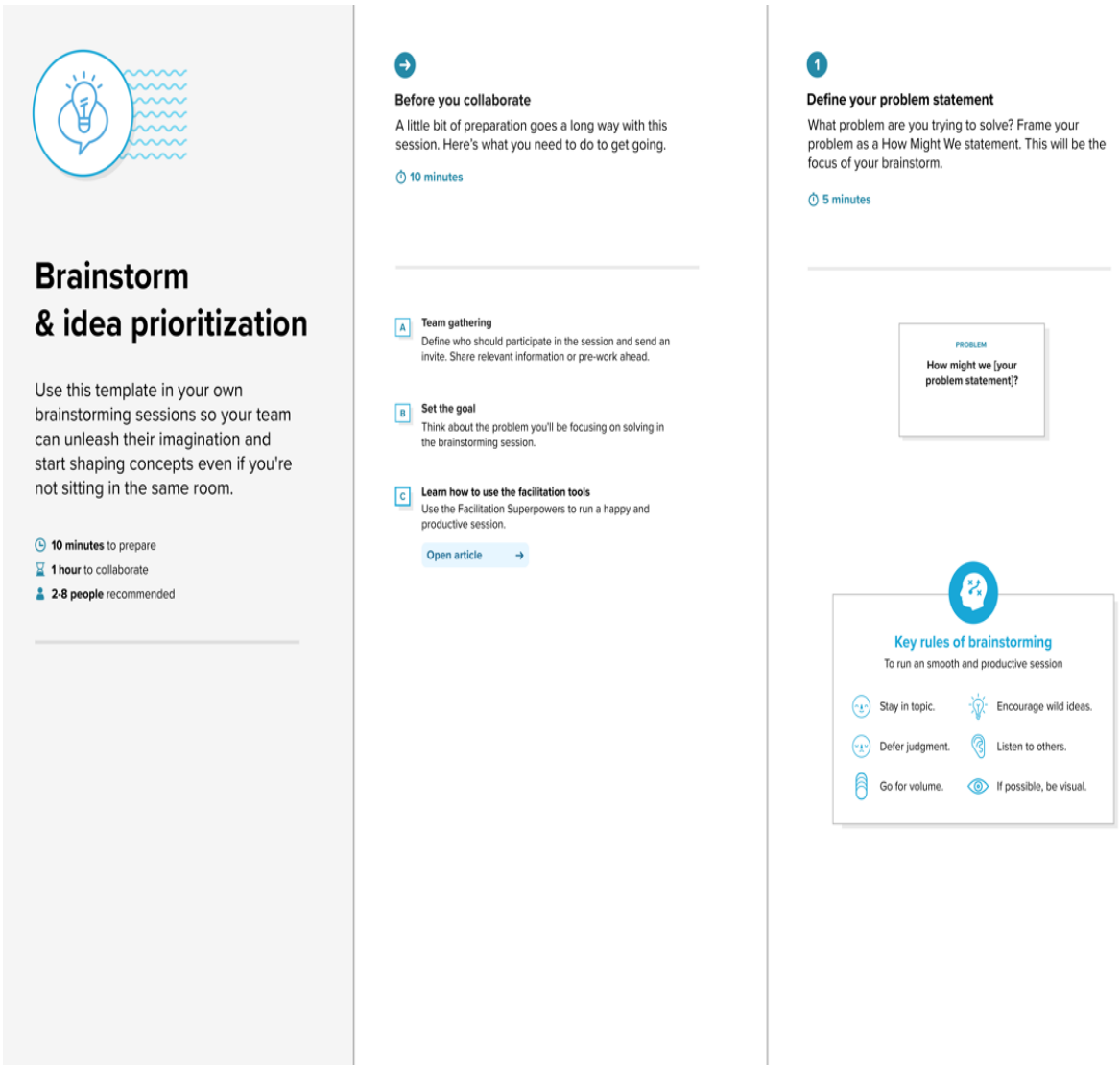


2.2 Problem Statement

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.The biggest risk factor for developing Parkinson's is advancing age. The average age of onset is 60. Gender. Men are more likely to develop Parkinson's disease than women.

3.IDEATION PHASE

3.1 Brainstorm & idea prioritization



2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

Amar

Yuktesh

Person 3

Person 4

Person 5

Person 6

Person 7

Person 8

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

Person 4

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

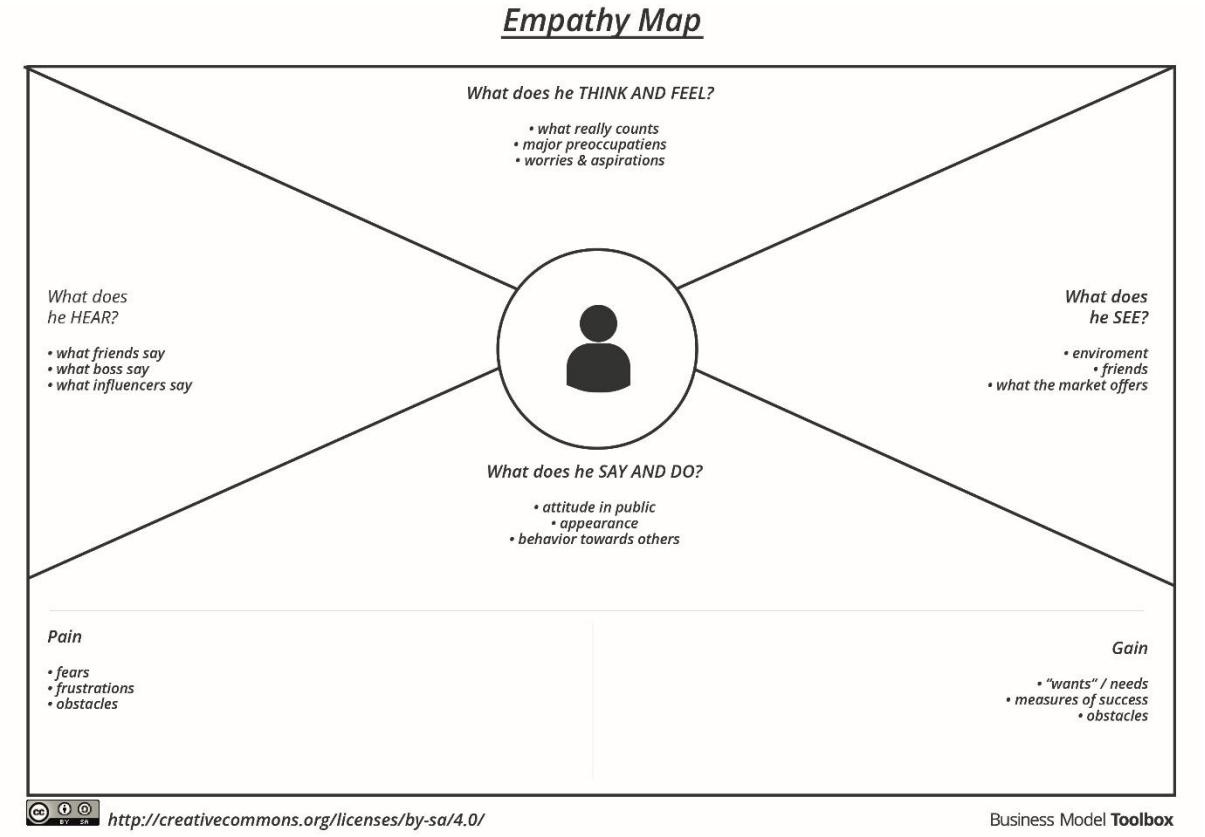
20 minutes

3.2 Empathy Map

Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to helps teams better understand their users.
Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



4 REQUIREMENT ANALYTICS

4.1 Functional Requirement

Following are the functional requirements of the proposed solution.

FR No	Functional Requirement(epic)	Sub Requirement(Story/Sub-Task
FR-1	User account registration	Registration through Google account and forms
FR-2	Input data	Application received the data and processes its roles
FR-3	User Authorization	Verifying the user's account
FR-4	Data classification	Classification of the real data for the user

FR NO	Non Functional Requirement	Description
NFR-1	Usuability	The application can be used for accurate prediction and classifier of the true and fake input data sample
NFR-2	Security	User's data is well encrypted using stable machine learning algorithms
NFR-3	Reliability	The application is monitored periodically in terms of its constant prediction ability, quality, and availability towards the user
NFR-4	Performance	It classifies the images and predicts the disease with careful accuracy output
NFR-5	Availability	The application is active throughout the day.

5 PROJECT DESIGN

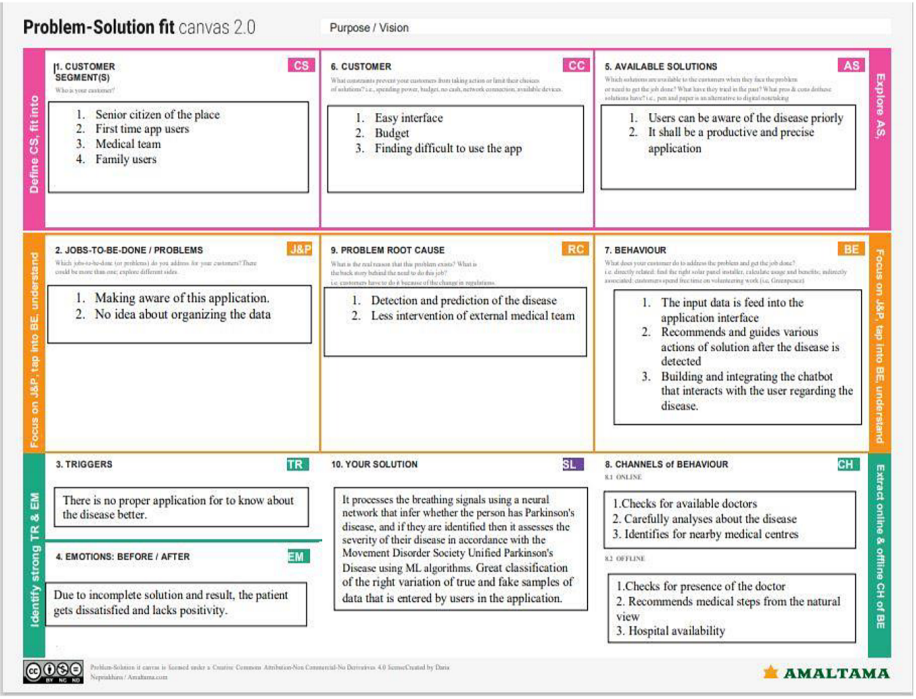
5.1 Proposed Solution

Proposed Solution Template:

Project team shall fill the following information in proposed solution template:

S.No	Parameter	Description
1	Problem Statement (Problem to be solved)	Parkinson's disease (PD) is a neurodegenerative movement disease where the symptoms gradually develop start with a slight tremor in one hand and a feeling of stiffness in the body and it became worse over time.
2	Idea / Solution description	It processes the breathing signals using a neural network that infer whether the person has Parkinson's disease, and if they are identified then it assesses the severity of their disease .
3	Novelty / Uniqueness	Parkinson's Disease is detected at the secondary stage only (Dopamine deficiency) which leads to medical challenges.
4	Social Impact/ Customer Satisfaction	Increasesinteractionwiththe humanand application Personalize theUI experience Improves accurate result as expected
5	Business Model (Revenue Model)	Solutions prospects of improvement Suits for better saving of involvements Economical Easy interface.

5.2 Problem Solution Fit



6 PROJECT PLANNING

6.1 Sprint Planning & Estimation

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	k.Jeevasri
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	M.Seemasri

Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	B.Yazhini
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	L.Tharani
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	k.Jeevasri

6.2 Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

7 CODING & SOLUTIONING

7.1 Machine Learning

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

Here, declared constructor is used to route to the HTML page created earlier.

In the above example, '/' URL is bound with about.html function. Hence, when the home page of the web server is opened in browser, the html page is rendered.

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

Here, **"about.html"** is rendered when home button is clicked on the UI.

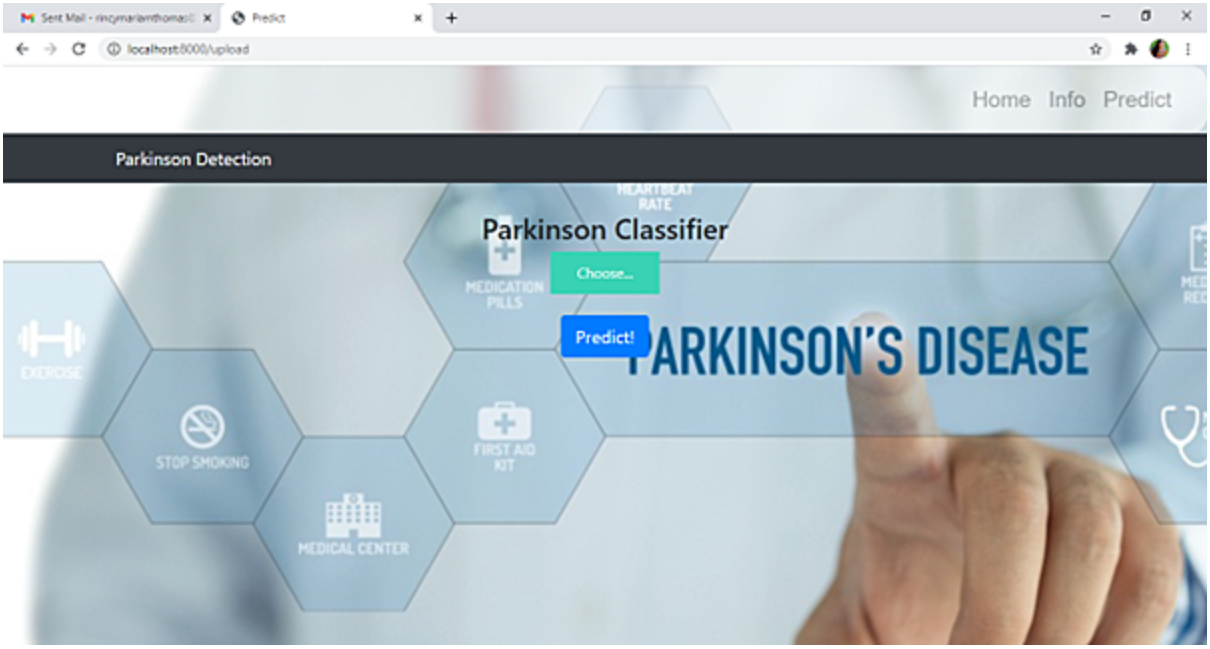
```
@app.route("/info") # route for info page
def information():
    return render_template("info.html")#rendering html page

@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]]
```

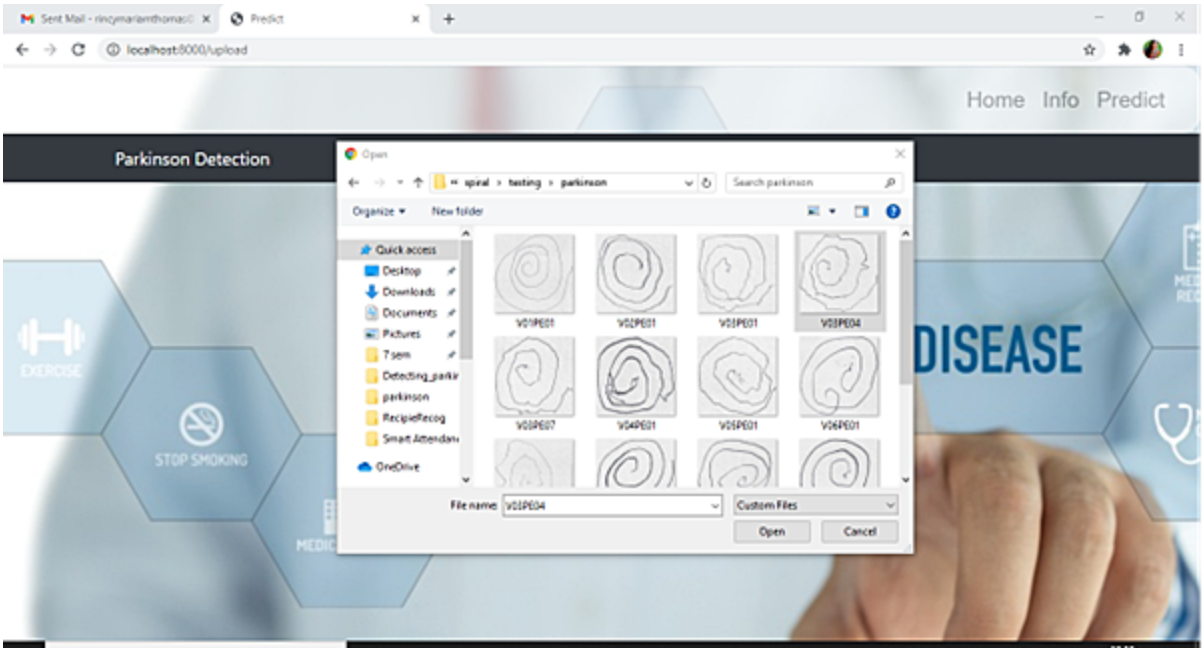
```
        # draw the colored class label on the output image and add it to
        # the set of output images
        color = (0, 255, 0) if result == "healthy" else (0, 0, 255)
        cv2.putText(output, result, (3, 20), cv2.FONT_HERSHEY_SIMPLEX, 0.5,color, 2)
        cv2.imshow("Output", output)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

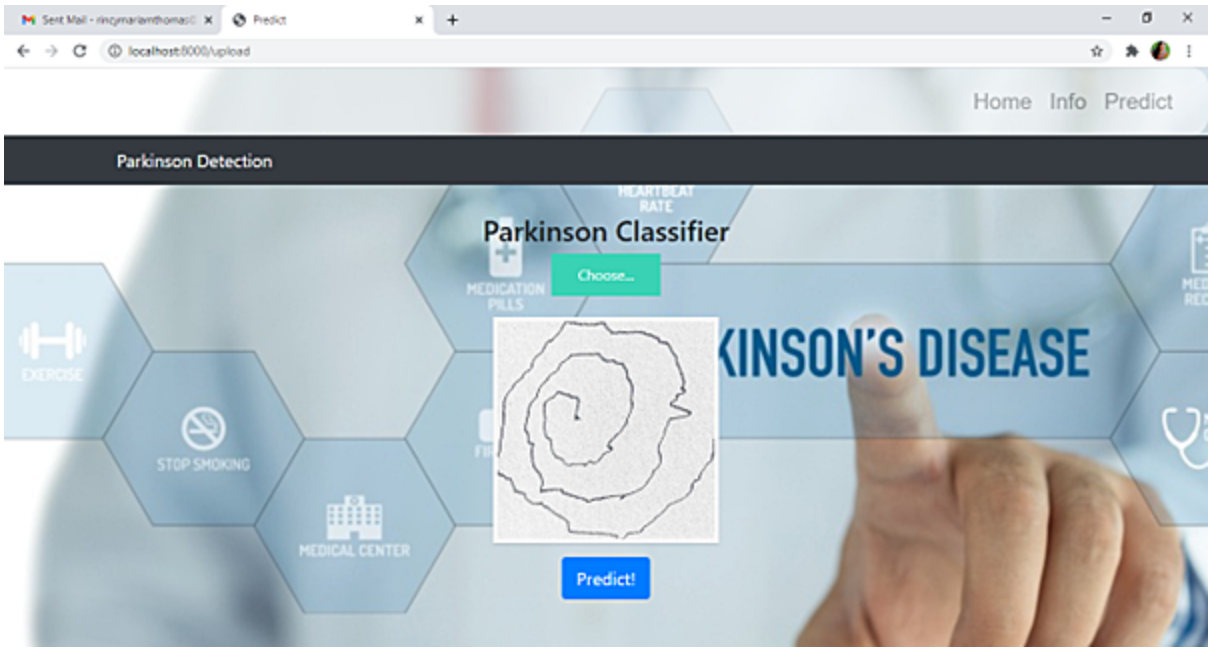
7.2 Dash Board

Open anaconda prompt from the start menu.

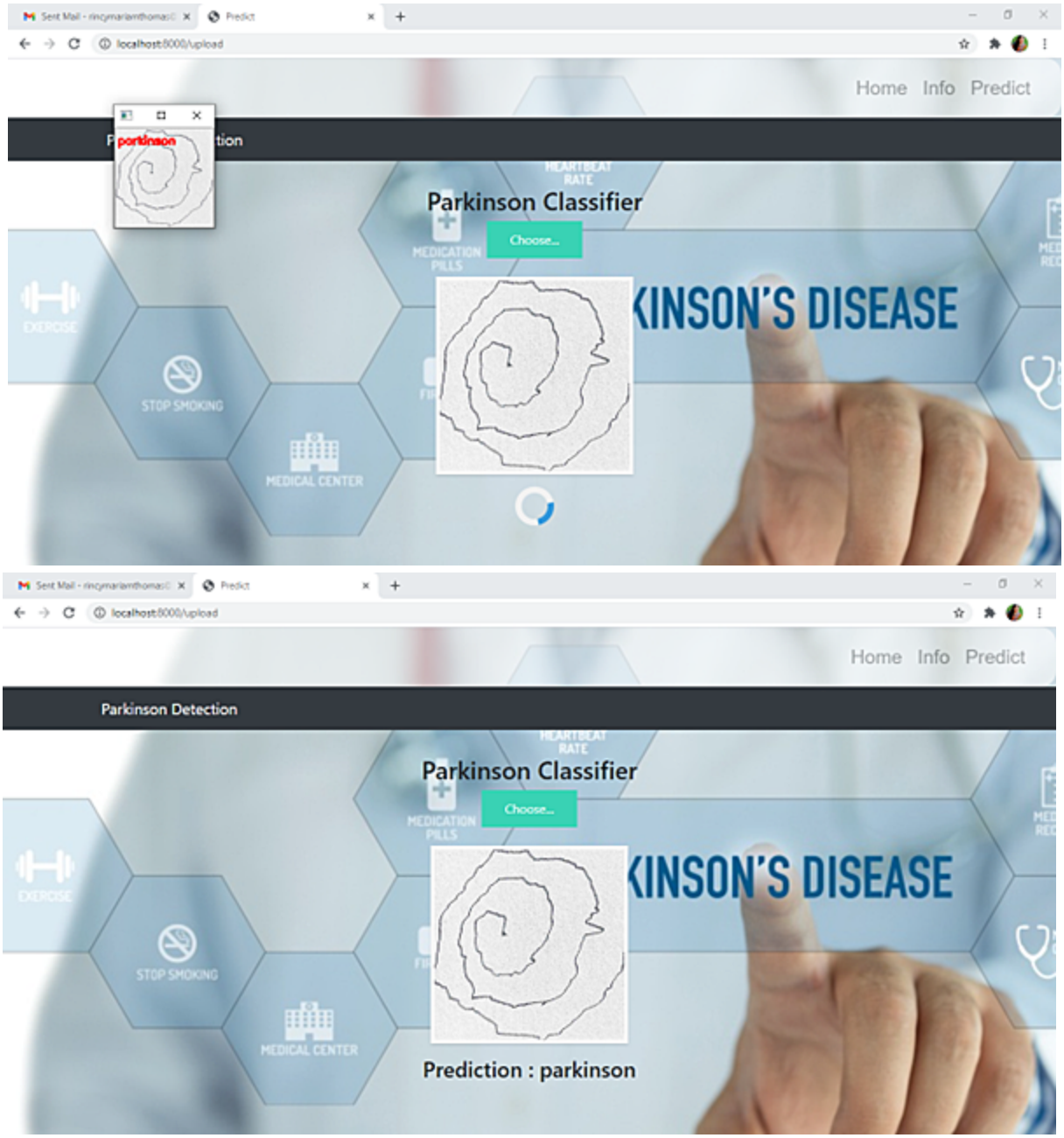


Click on choose and select the image and click on the **“Predict!”** button





Finally, the output is displayed on **predict.html**



8. TESTING

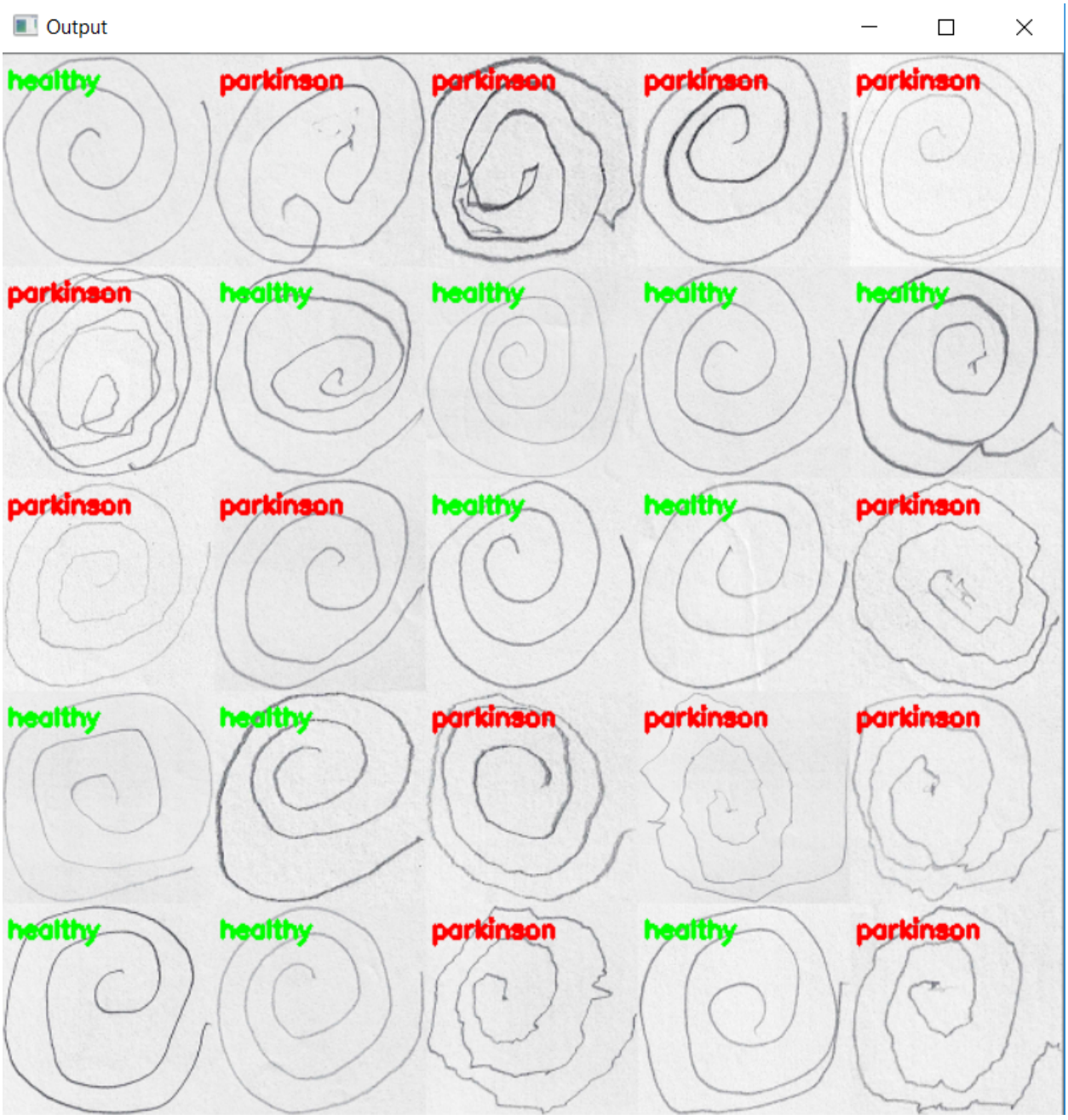
8.1 Test Cases

```
# quantify the image and make predictions based on the extracted
# features using the last trained Random Forest
features = quantify_image(image)
preds = model.predict([features])

label = le.inverse_transform(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 label == "healthy" else (0, 0, 255)
cv2.putText(output, label, (3, 20), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
    color, 2)
images.append(output)
```

The montage is then displayed until a key is pressed

```
# create a montage using 128x128 "tiles" with 5 rows and 5 columns
montage = build_montages(images, (128, 128), (5, 5))[0]

# show the output montage
cv2.imshow("Output", montage)
cv2.waitKey(0)
```

8.2 User Acceptance Testing



9.RESULT

9.1 Performance Metrics

It is a matrix representation of the results of any binary testing.

fig: Confusion matrix prediction of disease

```
    # make predictions on the testing data
predictions = model.predict(X_test)
    # compute the confusion matrix and and use it to derive the raw
    # accuracy
cm = confusion_matrix(y_test, predictions).flatten()
print(cm)
(tn, fp, fn, tp) = cm
accuracy = (tp + tn) / float(cm.sum())
print(accuracy)
```

10. ADVANTAGES AND DISADVANTAGES

Adavantages:

1. To help researchers find better ways to safely detect
2. provide control of signs and symptoms
3. Secure

Disadvantages:

1. No conclusive screening or test
2. Mental health disorders, sleep disorders
3. pain and sensory disturbances

11.CONCLUSION

Parkinson's disease affects the CNS of the brain and has yet no treatment unless it'sdetected early.Late detection leads to no treatment and loss of life.Thus its early detection is significant.For early detection of the disease ,we utilized machine learning algorithm such as XGBoost and Random Forest.We checked our parkinson disease data and find out XGBoost is the best algorithm to predict the disease which will enable early treatment and save a life.

12.FURURE SCOPE

While no cure currently exists, there is hope that there will be a cure in the future. Many researchers are looking to stem cell therapy as a possible cure for those who have Parkinson's disease. The hope is that stem cells can be used to replace damaged neurons that are no longer capable of making dopamine.There's currently no cure for Parkinson's. We're pushing to deliver new treatments for Parkinson's in years, not decades. And we're determined to develop a cure in the shortest possible time.

13.APPENDIX

Source Code:

https://github.com/IBM-EPBL/IBM-Project-1193-1658377860/tree/main/Final%20Deliverables