Final Project report

Applied Data Science

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Project name	Detecting Parkinson's Disease using Machine learning

1. INTRODUCTION

1.1 Project Overview

Parkinson's disease is a progressive disorder of the central nervous system affecting movement and inducing tremors and stiffness. It has 5 stages to it and affects more than 1 million individuals every year in India. This is chronic and has no cure yet. It is a neurodegenerative disorder affecting dopamine-producing neurons in the brain. For detecting PD, various machine learning models such as logistic regression, naive Bayes, KNN, and forest decision tree were used, with the features used here being minimum-redundancy maximum-relevance and recursive feature elimination. The accuracy obtained was 95.3% using data from the UCI machine learning repository. 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 automaticallydetect Parkinson's disease in hand-drawn images of spirals and waves.

1.2 Purpose

By using machine learning techniques, the problem can be solved with minimal error rate. The voice dataset of Parkinson's disease from the UCI Machine learning library is used as input. Also, our proposed system provides accurate results by integrating spiral drawing inputs of normal and Parkinson's affected patients. Machine learning also allows for combining different modalities, such as magnetic resonance imaging (MRI) and single-photon emission computed tomography (SPECT) data. in the diagnosis of PD. By using machine learning approaches, we may therefore identify relevant features that are not traditionally used in the clinical diagnosis of PD and rely on these alternative measures to detect PD in preclinical stages or atypical forms. In recent years, the number of publications on the application of machine learning to the diagnosis of PD has increased. feasibility and efficiency of different machine learning methods in the diagnosis of PD, and (c) provide machine learning practitioners interested in the diagnosis of PD with an overview of previously used models and data modalities and the associated outcomes, and recommendations on how experimental protocols and results could be reported to facilitate reproduction. As a result, the application of machine learning to clinical and non-clinical data of different modalities has often led to high diagnostic accuracies in human participants, therefore may encourage the adaptation of machine learning algorithms and novel biomarkers in clinical

settings to assist more accurate and informed decision making. While Parkinson's cannot be cured, early detection along with proper medication can significantly improve symptoms and quality of life.

2. LITERATURE SURVEY

2.1 Existing problem

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.

2.2 References

Literature Survey

Detecting Parkinson's Disease using Machine Learning

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". The symptoms of Parkinson's disease will occur slowly, the symptoms include shaking, rigidity, slowness of movement and difficulty with walking, Thinking and behavior change, Depression and anxiety are also common. 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 db 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 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. Researches have shown that 90% of the people who suffer from Parkinson's disease have speech disorders. With the increase in the severity of the disease, the patient's voice gets more and more deteriorated. The proper interpretation of speech signals is one of the important classification problems for Parkinson's disease diagnosis. This paper contemplates the survey work of the machine learning techniques and deep learning procedures used for Parkinson's disease classification.

4.Radouani Laila, Lagdali Salwa, Rziza Mohammed, "Detection of voice impairment for parkinson's disease using machine learning tools," 2021.

In this paper, it proposes that Parkinson's disease (PD) is 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. Speech analysis is the most considered technique to be used. Researches have shown that 90% of the people who suffer from Parkinson's disease have speech disorders. With the increase in the severity of the disease, the patient's voice gets more and more deteriorated. The proper interpretation of speech signals is one of the important classification problems for Parkinson's disease diagnosis. The main purpose of this paper is to contemplate the survey work of the machine learning techniques and deep learning procedures used for Parkinson's disease classification.

5.Zehra Karapinar Senturk, "Early diagnosis of Parkinson's disease using machine learning algorithms," 2020.

Parkinson's disease is caused by the disruption of the brain cells that produce substance to allow brain cells to communicate with each other, called dopamine. The cells that produce dopamine in the brain are responsible for the control, adaptation, and fluency of movements. When 60–80% of these cells are lost, then enough dopamine is not produced and Parkinson's motor symptoms appear. It is thought that the disease begins many years before the motor (movement related) symptoms and therefore, researchers are looking for ways to recognize the non-motor symptoms that appear early in the disease as early as possible, thereby halting the progression of the disease. In this paper, machine learning based diagnosis of Parkinson's disease is presented. The proposed diagnosis method consists of feature selection and classification processes.

2.3 Problem Statement Definition

Lack of adequate knowledge poses a barrier in the provision of appropriate treatment and care for individuals with Parkinson's Disease. We had conducted a important survey between rural and urban areas in which we found that 68% of rural people from agricultural field are getting majorly affected by Parkinson's disease whereas 32% of urban people are affected by the disease with the ages

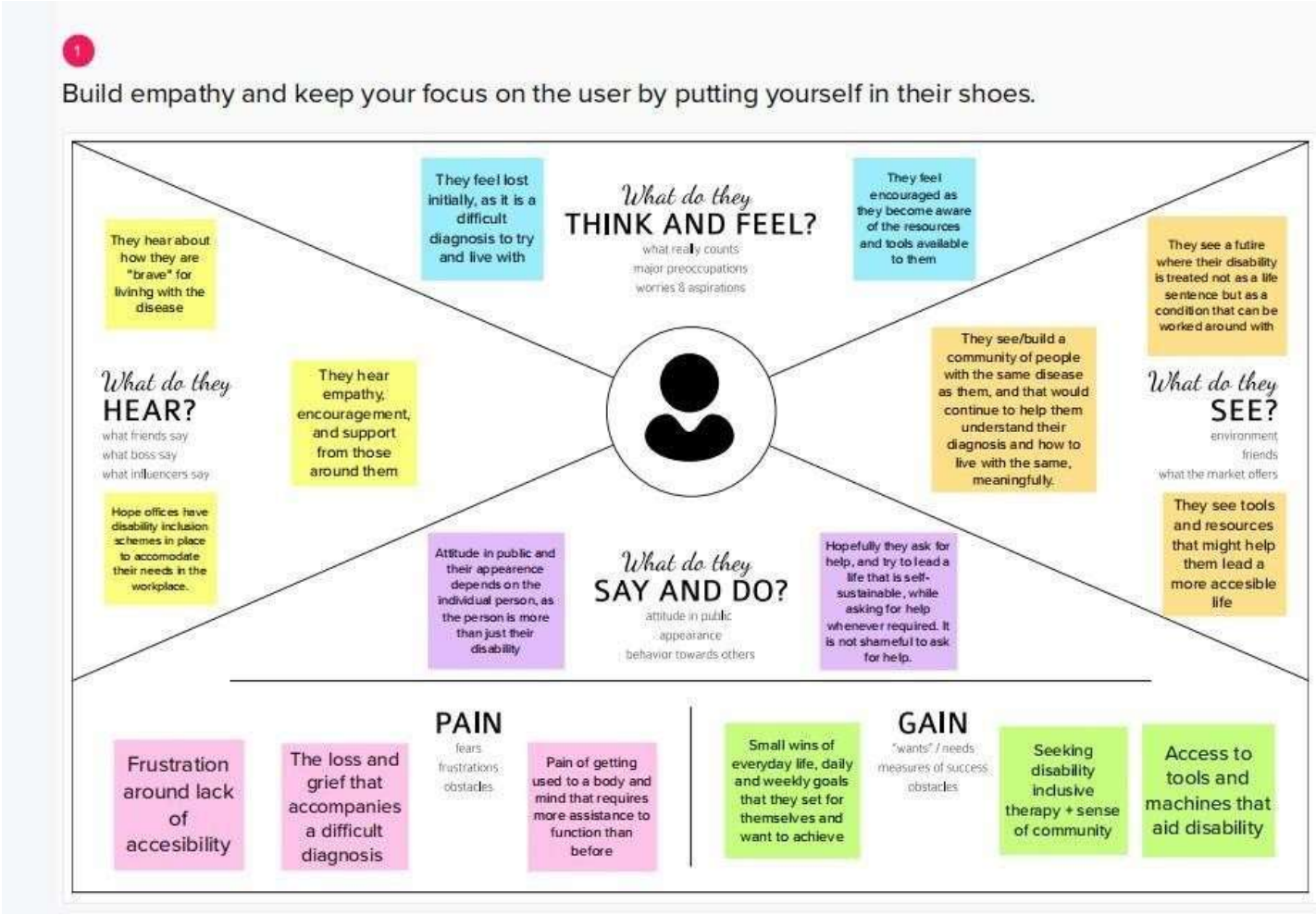
over 50. We further researched and analyzed the data that was gathered from all over the network for figuring out the accurate reason for why this disease majorly affects the agricultural life.

Disease identification application for disease prediction

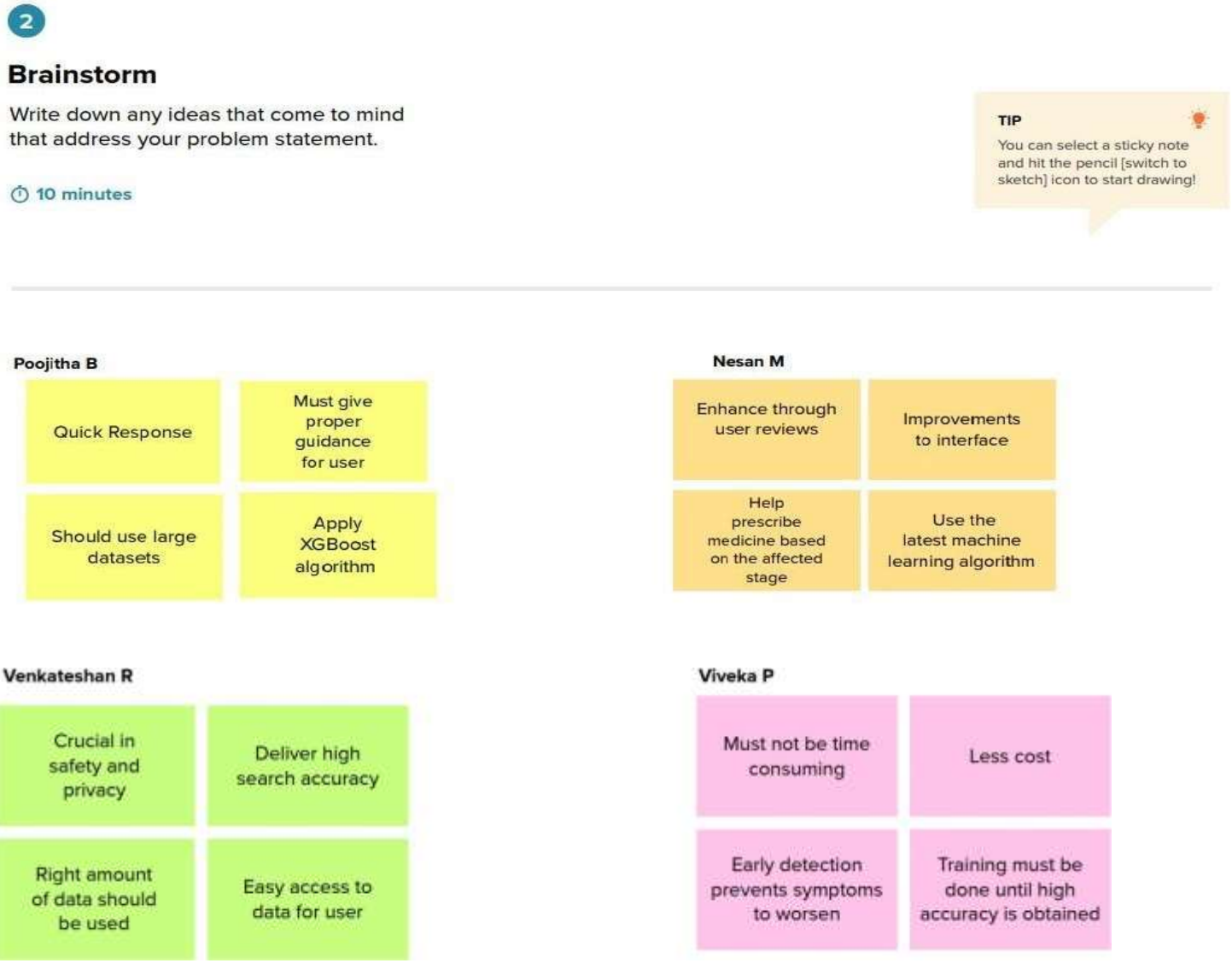
Who does the problem affect?	People who are men with minimization of nerve cells in primarily of village areas.
What are the boundaries of the problem?	People who are men with weak nerve cells and age over 50
What is the issue?	In real time life of human, if the person is affected by Parkinson disease then it produces the side effect problems like dry skin and dandruff which majorly affects the quality of the life. As the age gets progresses, it causes the people to face major problem with the nerve cells in the brain.
When does the issue occur?	During the age excess of over 50 as they will affect the people with loss of nerve cells in the brain.
Where is the issue coming?	It majorly occurs due to the age getting over 50 and as maximum in village areas.
Why is it important that we fix the problem?	It is very crucial to develop a application that detects the disease at good prediction rate so that it helps to get a clear line of disease symptoms during the times.
Which solution can be used to address this issue?	An machine learning powered web application model with the strong building of algorithm that helps to identify and predicts the disease with the identification of symptoms. It processes the breathing signals using a neural network that infers whether the person has Parkinson's disease, and if they are identified then it assesses the severity of their disease in accordance with the Movement Disorder Society Unified Parkinson's Disease using ML algorithms.
What methodology used to solve the issue?	Supervised and Un-supervised machine learning, Data mining , Computer vision with OpenCV, Python web application interface – Flask , IBM Cloud.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming



3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, 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 minut es

Detection

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aspect of the
condclon

Distorted
Handwritlng

Medical history. a
review d signs and
symptoms, and a
neurdogical and
phys lcal examina tion

Tran scripfed
and tabulated
voice test data
used to predlt\
the condition

Approach for Solution

Bowsetot
existing
solutions

Test both Voice and
Spiral Drawing
of affected
9eo@e

Provide dlffarenc
resuks for dlfterent
dataset

Doctor can
conclude normality or
abnonnNky and
rescrbe appropnate
rneBic ene

TIP

Add c w iomiza ble tags to sticky notes to moke it easyr to find. browse. organic e. ard

themes within your mural

difficulties

User
friendly
Website

Correlation
between
the

of lightweigt

SOTA models

Im port a rice

Identify
preliminary

Study suitable

models

loud
In adon

Participants can use thei
cursors to point at where
sticky notes should go on
the grid. The facilitator can
confirm the spot by using
the laser pointer holding the
H key on the keyboard.

3.3 Proposed Solution

Sno.	Parameter	Description
1.	**Problem Statement (Problem to be solved)**	Parkinson's disease is caused by the disruption of brain cells that produce a substance to allow brain cells to communicate with each other called dopamine. It is a progressive disorder of the central nervous system affecting movement and inducing tremors and stiffness. The symptoms usually emerge slowly, and as the disease worsens, nonmotor symptoms become more common. The most obvious early symptoms are tremor, rigidity, slowness of movement, and difficulty with walking.
2.	**Idea / Solution Description**	Early detection is necessary. As there is currently no cure. Thus ,by using this application, the disease can be detected early so that the patient can change their lifestyle to control the effects of the disease.
3.	**Novelty / Uniqueness**	The XGBoost algorithm used for detecting Parkinson's disease incorporates a sparsity-aware split finding algorithm to handle different types of sparsity patterns in the data. Out-of-core computing feature of the XGBoost algorithm optimizes the available disk space and maximizes its usage

4.	**Social Impact / Customer Satisfaction**	Helps in detecting the disease and is efficient in finding the disease, as well is cost efficient.

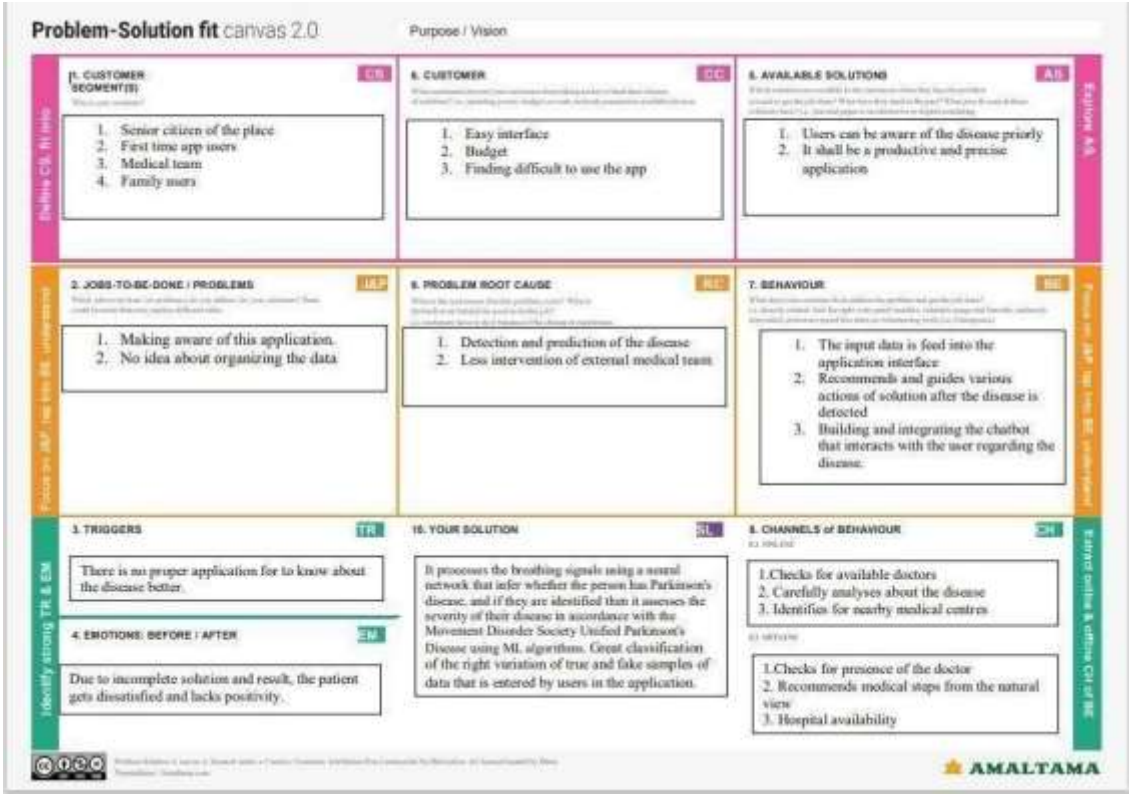
5.	**Business Model (Revenue Model)**	It is User-friendly. Anyone can use this application with ease.
6.	**Scalability of the Solution**	XGBooster with different calculations the exactness, accuracy, review, and so forth is extremely excellent.XGBooster is not only able to keep up with all those other algorithms but exceeds them in performance.XGBoost can solve real-world scale problems using a minimal amount of resources.

3.4 Problem Solution fit

Functional Requirements:

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-2	User Authorization	Verifying the user's account
FR-3	Data classification	Classification of the real data for the user
FR-4	Accuracy verification	Accuracy is determined in the application
FR-5	Time efficient usage	Interaction with the chatbot till the result gets generated for the user
FR-6	Medical recommendations	User receives the medical suggestions and assistance for to offer speed
FR-7	Data extraction	User gets their personal disease report data from the application



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

4.2 Non-Functional requirements

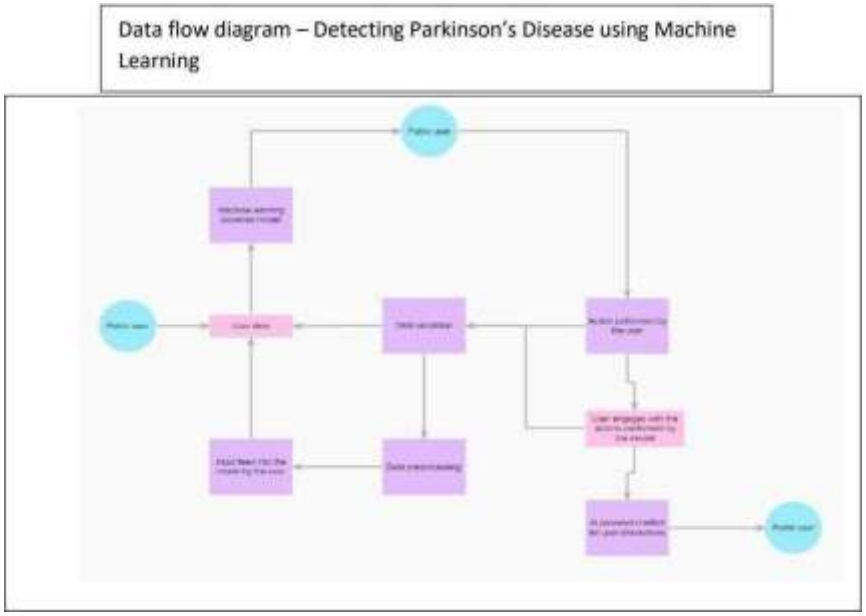
Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

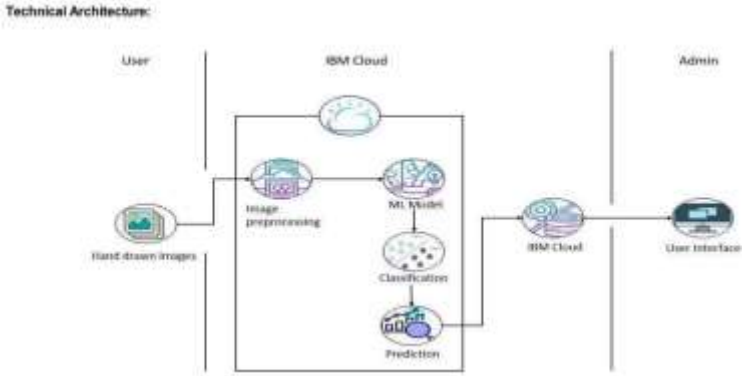
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The application can be used for accurate prediction and classifier of the true and fake input data sample
NFR-2	**Security**	User's data is well encrypted using stable machine learning algorithms
NFR-3	**Reliability**	The application is 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. While awaiting the prediction result, User can interact with the chatbot for to spend time in knowing important details. If the application doesn't respond for the user, then the automated chatbot will forward the issue to our server then it can be resolved at that instance.
NFR-6	**Scalability**	It does not request money or bank details to setup their account and download their final medical result from the application

5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture



5.3 User Stories

User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Public user)	Account creation	USN-1	As a user, I can connect my google into the application	I can access my account / application dashboard	High	Sprint-1
Input data	Adding data	USN-2	As a user, I can feed my data as the input into the application for it to classify the true fake data	I can cross verify the data that entered in the initial step	High	Sprint-1
Data validation	Checking accuracy	USN-3	As a user, I can check the ability and accuracy of the model in obtaining the required information	I can log into my account and check the capability of the model	Medium	Sprint-2
Classification	Data classification	USN-4	As a user, I can view the real data	I can verify my data with the real data	Medium	Sprint-2
App work	Work flow	USN-5	As a user, I can examine the working action of the application model	I can view how the application works and responds to the actions imposed	High	Sprint-2
Image classification	Checking for the disease	USN-6	As a user, I can verify with the application that the image is identified with the actual disease with the help of the trained and tested data's	I can confirm that the data shows the accurate result	Low	Sprint-3
User interaction	AI-powered chatbot	USN-7	As a user, I can interact with the automated chatbot to engage my time till the application processed the accurate result in a meanwhile	I can see the results from the interaction with the chatbot	Low	Sprint-3
Medical assistance	Medical suggestions	USN-8	As a user, I can get medical advises and recommendations for to boost the action of curing the disease	I can get enough assistance by getting the suggestions for curing the disease	High	Sprint-3
Data extraction	Obtaining the data	USN-9	As a user, I can retrieve the result data from the application for data storage for further medical research uses.	I can download the result in the form of data as a proof to show to medical teams	Medium	Sprint-4

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Public user)	Account creation	USN-1	As a user, I can connect my google into the application	I can access my account / application dashboard	High	Sprint-1
Input data	Adding data	USN-2	As a user, I can feed my data as the input into the application for it to classify the true fake data	I can cross verify the data that entered in the initial step	High	Sprint-1
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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	10	6 Days	24 Oct 2022	29 Oct 2022	10	29 Oct 2022

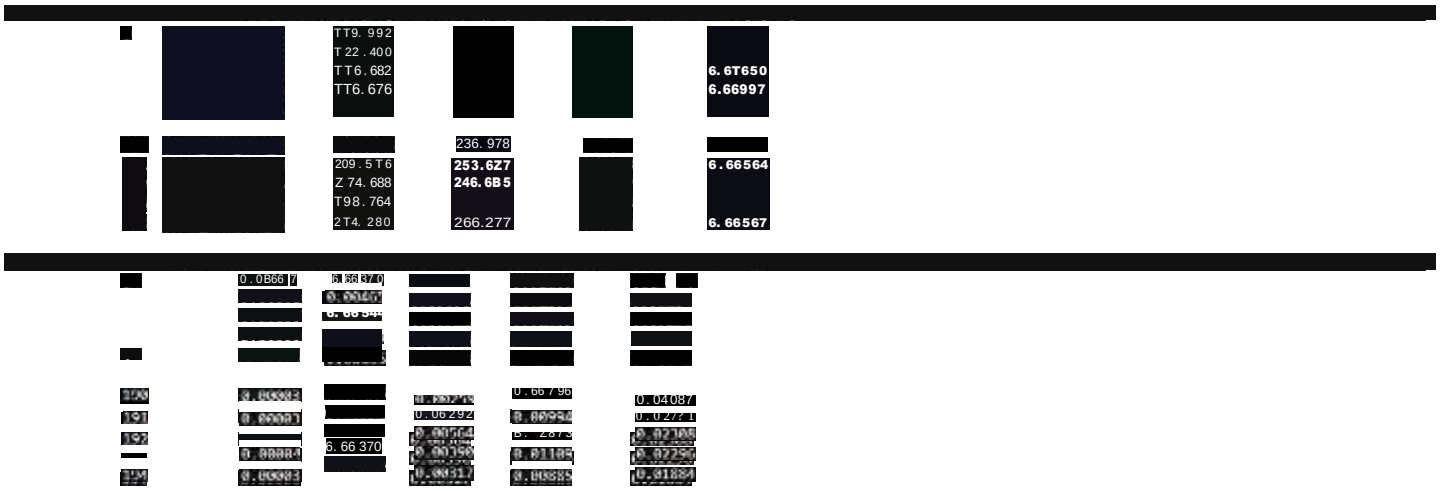
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022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

7. CODING & SOLUTIONING

7.1 Feature 1

Data preprocessing & Exploratory Data Analysis (EDA), Data visualization, Data mining (model building) and Performance metrics have been performed. Finally, the model is saved

Data preprocessing and Exploratory Data Analysis(EDA)



MDVH denotes Maximum or Minimum Vocal Fundamental Frequency

In [11]:
```
parkinson_data
```

```
Button(description='Toggle Pandas/Lux', layout=Layout(top='5px', width='140px'), style=ButtonStyle())
Output()
```

In [12]:
```
parkinson_data.head(n=20)
```

```
Button(description='Toggle Pandas/Lux', layout=Layout(top='5px', width='140px'), style=ButtonStyle())
Output()
```

In [14]:
```
parkinson_data.tail(50)
```

```
Button(description='Toggle Pandas/Lux', layout=Layout(top='5px', width='140px'), style=ButtonStyle())
Output()
```

In [15]:
```
parkinson_data.shape
#(rows,columns)
```

Out[15]: (195, 24)

In [17]:
```
#Capturing for null values if any of it is available
parkinson_data.isnull().sum()
```

```
Button(description='Toggle Pandas/Lux', layout=Layout(top='5px', width='140px'), style=ButtonStyle())
Output()
```

No null values are present in the data

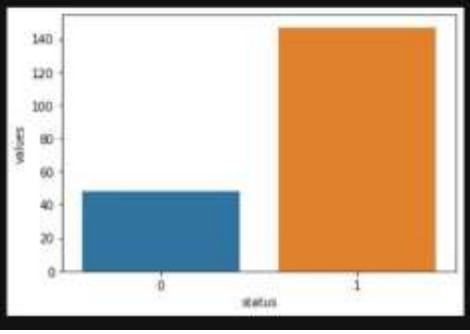
In [23]:
```
variable=parkinson_data['status'].value_counts()
variable_data=pd.DataFrame({'status':variable.index,'values':variable.values})
variable_data
```

```
Button(description='Toggle Pandas/Lux', layout=Layout(top='5px', width='140px'), style=ButtonStyle())
Output()
```

Data visualization

In [24]:
```
#Data visualization
import seaborn as sns
import matplotlib.pyplot as plt
variable = parkinson_data["status"].value_counts()
variable_data = pd.DataFrame({'status':variable.index,'values':variable.values})
sns.barplot(x='status',y='values',data=variable_data)
```

Out[24]:



In [30]:
```
#We are making the final changes in the data by dividing the data into independent as x and dependent variables as y and removing the ID column
x = parkinson_data.drop(["status","name"],axis=1)
y = parkinson_data["status"]
#It is done to integrate the two x and y variables into the model building steps
```

In [31]:
```
#After the changes,let's detect the label balance
from imblearn.over_sampling import RandomOverSampler
from imblearn.under_sampling import RandomUnderSampler
from collections import Counter #For prioritizing the importance to store elements as dictionary keys, and their counts as values.
print(Counter(y))
```

```
Counter({1: 147, 0: 48})
```

In [32]:
```
#Now,we are balancing the labels
ROS = RandomOverSampler() #To compensate the imbalance part present in the data
x_ROS,y_ROS = ROS.fit_resample(x, y)
print(Counter(y_ROS))
```

```
Counter({1: 147, 0: 147})
```

Scaling the data

In [33]:
```
#It is very much important to scale the data for the betterment of the model using such as Support Vector Machine and K Nearest Neighbor Algorithms
Scaler_data = MinMaxScaler((-1,1))
x = Scaler_data.fit_transform(x_ROS)
y = y_ROS
```

Model Building (Training and Testing)

Data mining and performance metrics

In [36]:
```
#We are going to import and use it for assessing the model using performance metrics from Classification process
from sklearn.metrics import confusion_matrix, accuracy_score, f1_score
List_metrics = []
List_accuracy = []

#Logistic Regression
from sklearn.linear_model import LogisticRegression
Classification_model = LogisticRegression(C=0.4,max_iter=1000,solver='liblinear')
Log_Regression = Classification_model.fit(x_train, y_train)
y_pred = Classification_model.predict(x_test)  #Prediction
Log_Regression_accuracy = accuracy_score(y_test, y_pred)  #Accuracy
print("The accuracy score with Logistic regression is:",Log_Regression_accuracy)

#Decision Tree Classification using supervised machine learning for classifying the data with confident accuracy
from sklearn.tree import DecisionTreeClassifier
Classification_tree = DecisionTreeClassifier(random_state=14)
Decision_tree = Classification_tree.fit(x_train, y_train)
y_pred2 = Classification_tree.predict(x_test) #Prediction
Dec_tree_accuracy = accuracy_score(y_test, y_pred2) #Accuracy
print("The accuracy score with Decision Tree Classifier is:",Dec_tree_accuracy)

#Random Forest Classifier is used for its high dimensionality and accuracy capabilities, here information gain is prioritized
from sklearn.ensemble import RandomForestClassifier
Classification_random = RandomForestClassifier(random_state=14)
RFE = Classification_random.fit(x_train, y_train)
y_pred3 = Classification_random.predict(x_test) #Prediction
Ran_For_accuracy = accuracy_score(y_test, y_pred3) #Accuracy
print("The accuracy score with Random Forest Classifier(Information gain) is:",Ran_For_accuracy)

#Random Forest Classifier with entropy condition
from sklearn.ensemble import RandomForestClassifier
Classification_entropy = RandomForestClassifier(criterion='entropy')
RFE = Classification_entropy.fit(x_train,y_train)
```

7.2 Feature 2

Application with home page

```
<!DOCTYPE html>
<!--
This is a starter template page. Use this page to start your new project from
scratch. This page gets rid of all links and provides the needed markup only.
-->
<html lang="en">
  <head>
    <meta charset="utf-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1" />
    <title>Parkinson Detection</title>

    <!-- Google Font: Source Sans Pro -->
    <link
      rel="stylesheet"
      href="https://fonts.googleapis.com/css?family=Source+Sans+Pro:300,400,400i,700&display=fallback"
    />
    <!-- Font Awesome Icons -->
    <link
      rel="stylesheet"
      href="../static/plugins/fontawesome-free/css/all.min.css"
    />
    <!-- Theme style -->
    <link rel="stylesheet" href="../static/dist/css/adminlte.min.css" />
    <link
      rel="stylesheet"
      href="https://cdn.jsdelivr.net/npm/admin-lte@3.1/dist/css/adminlte.min.css"
    />
  </head>
  <body
    class="hold-transition layout-top-nav layout-footer-fixed layout-navbar-fixed"
  >
    <div class="wrapper">
      <!-- Navbar -->
      <nav
```

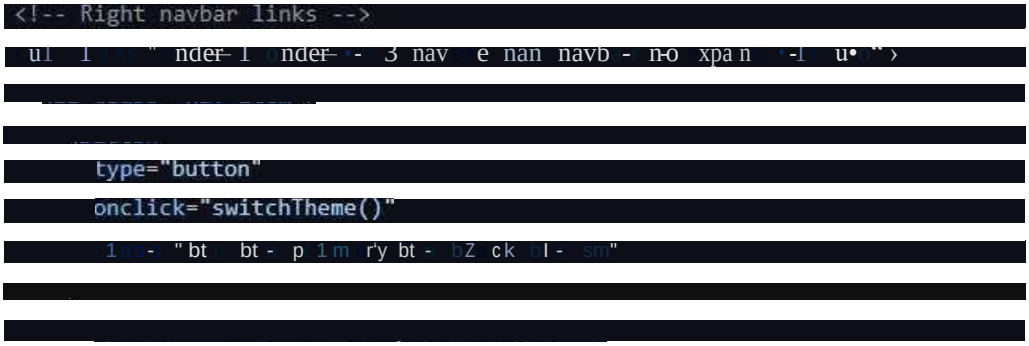

<script src="../static/dist/js/demo.js"></script>
<script src="https://cdn.jsdelivr.net/npm/admin-lte@3.1/dist/js/adminlte.min.js"></script>
<script>
var currentTheme = sessionStorage.getItem("theme");
if (currentTheme) {
if (currentTheme === "dark") {
if (!document.body.classList.contains("dark-mode")) {
if (mainHeader.classList.contains("navbar-light")) {
mainHeader.classList.remove("navbar-light");
toggleSwitch.checked = true;

```
<ther  c  e-  "  T-  ">
```

```
    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.2.2/dist/css/bootstrap.min.css" rel="stylesheet">
    <link href="https://getbootstrap.com/docs/5.2/assets/css/docs.css" rel="stylesheet">
    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.2.2/dist/js/bootstrap.bundle.min.js"></script>
</head>

<body style="background-color:rgb(205, 205, 205)">
    <div class="container-fluid" style=
                                "  -  cmo  :  b[41   41   4i};
                               border-radius: 1px;">
        <ul class="nav justify-content-end">
```

```
Value : <input type="radio" name="parkinsons.data" value="MDVP:Fo(Hz)" /> MDVP:Fo(Hz)
Value : <input type="radio" name="parkinsons.data" value="MDVP:Fhi(Hz)" /> MDVP:Fhi(Hz)
Value : <input type="radio" name="parkinsons.data" value="MDVP:Flo(Hz)" /> MDVP:Flo(Hz)
Value : <input type="radio" name="parkinsons.data" value="MDVP:Jitter(%)" /> MDVP:Jitter(%)
Value : <input type="radio" name="parkinsons.data" value="MDVP:Jitter(Abs)" /> MDVP:Jitter(Abs)
Value : <input type="radio" name="parkinsons.data" value="MDVP:RAP" /> MDVP:RAP
Value : <input type="radio" name="parkinsons.data" value="MDVP:PPQ" /> MDVP:PPQ
```

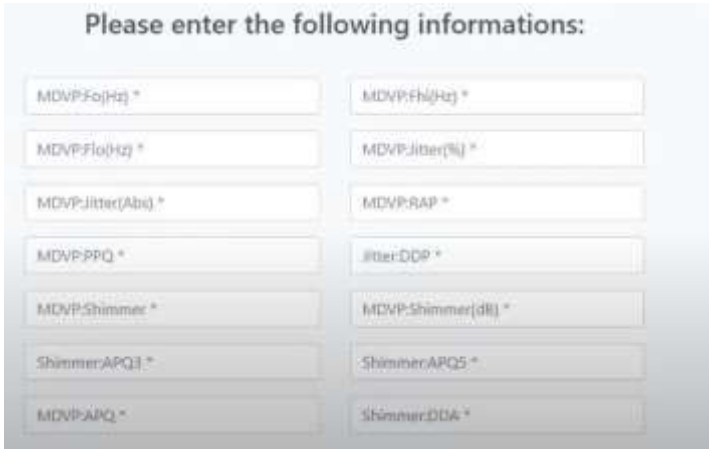
```
            <li class="nav-item">
              <a class="nav-link" href="{{url_for('Home_page')}}"><b>Home</b></a>
            </li>
            <li class="nav-item">
              <a class="nav-link" href="{{url_for('info_page')}}"><b>Info</b></a>
            </li>
            <li class="nav-item">
              <a class="nav-link" href="{{url_for('Predict_page')}}"><b>Predict</b></a>
            </li>
          </ul>
    </div>
Value : <input type=”radio” name=”parkinsons.data” value=”MDVP:Fo(Hz)” /> MDVP:Fo(Hz)
Value : <input type=”radio” name=”parkinsons.data” value=”MDVP:Fhi(Hz)” /> MDVP:Fhi(Hz)
Value : <input type=”radio” name=”parkinsons.data” value=”MDVP:Flo(Hz)” /> MDVP:Flo(Hz)
Value : <input type=”radio” name=”parkinsons.data” value=”MDVP:Jitter(%)” /> MDVP:Jitter(%)
Value : <input type=”radio” name=”parkinsons.data” value=”MDVP:Jitter(Abs)” /> MDVP:Jitter(Abs)
Value : <input type=”radio” name=”parkinsons.data” value=”MDVP:RAP” /> MDVP:RAP
Value : <input type=”radio” name=”parkinsons.data” value=”MDVP:PPQ” /> MDVP:PPQ
Value : <input type=”radio” name=”parkinsons.data” value=”Jitter:DDP” /> Jitter:DDP
Value : <input type=”radio” name=”parkinsons.data” value=”MDVP:Shimmer” /> MDVP:Shimmer
Value : <input type=”radio” name=”parkinsons.data” value=”MDVP:Shimmer(dB)” /> ”MDVP:Shimmer(dB)
Value : <input type=”radio” name=”parkinsons.data” value=”Shimmer:APQ3” /> Shimmer:APQ3
Value : <input type=”radio” name=”parkinsons.data” value=”Shimmer:APQ5” /> Shimmer:APQ5
Value : <input type=”radio” name=”parkinsons.data” value=”MDVP:APQ” /> MDVP:APQ
Value : <input type=”radio” name=”parkinsons.data” value=”Shimmer:DDA” /> Shimmer:DDA
Value : <input type=”radio” name=”parkinsons.data” value=”NHR” /> NHR
Value : <input type=”radio” name=”parkinsons.data” value=”HNR” /> HNR
Value : <input type=”radio” name=”parkinsons.data” value=”status” /> status
Value : <input type=”radio” name=”parkinsons.data” value=”RPDE” /> RPDE
Value : <input type=”radio” name=”parkinsons.data” value=”MDVP:Fo(Hz) /> MDVP:Fo(Hz)
Value : <input type=”radio” name=”parkinsons.data” value=”DFA” /> DFA
Value : <input type=”radio” name=”parkinsons.data” value=”spread1” /> spread1
Value : <input type=”radio” name=”parkinsons.data” value=”spread2” /> spread2
Value : <input type=”radio” name=”parkinsons.data” value=”D2” /> D2
Value : <input type=”radio” name=”parkinsons.data” value=”PPE” /> PPE
<button type="PREDICT">Send your prediction data</button>
```


<!-- Right navbar links -->
type="button"
onclick="switchTheme()"

```
var previewNode = document.querySelector("#template");
previewNode.id = "";
var previewTemplate = previewNode.parentNode.innerHTML;
previewNode.parentNode.removeChild(previewNode);


var myDropzone = new Dropzone(document.body, {
  // Make the whole body a dropzone
  url: "/predict", // Set the url
  thumbnailWidth: 80,
  thumbnailHeight: 80,
  parallelUploads: 20,
  previewTemplate: previewTemplate,
  autoQueue: false, // Make sure the files aren't queued until manually added
  previewsContainer: "#previews", // Define the container to display the previews
  clickable: ".fileinput-button", // Define the element that should be used as click trigger to select files.
  success: function (file, response) {
    if (response === "healthy") {
      $("#successModel").click();
    } else {
      $("#dangerModel").click();
    }
  },
});


  // Hookup the start button
  file.previewElement.querySelector(".start").onclick = function () {
    myDropzone.enqueueFile(file);
  };
});
```

```
    -  predict = ’trcticn(input)(
     i* (window.model) {
       windDn.mOdel.predict(}tf.tansor(input).reshape([1, 28, 28, 1])]).array().then(-:nztic’;(scores)(
         scDres   scores[G};
         predicted = scores.index0f(!lath.maK(...scores));
         $(’#number’).html(predicted);
       )):
     } else (

       setTimeout( !u;  io:•()(predict(input)},”52), ''     '




   $('#clear').clirk('ur.ct%nn(}{
     context.clearRect(0, 0, canvas.viJrh, canvas.height);
     $('#number').html('');

   </scripts
  </bodys
</html>

! p:ip install tensorflowjs
!tensorflowjs converter --input format keras
    ’/content/Parkinson_lJLmodel.sav'  ’/’content/standardScaler.saw''
```

Disease input data by registering in this Page:



Predict result side:

8. TESTING

8.1 Test cases

				Date	17-Nov-22
				Team ID	PNT2022TMID28255
				Project Name	Project - Detecting Parkinson's
				Maximum Marks	4 marks
Test case ID	**Feature Type**	**Component**	**Test Scenario**	**Pre-Requisite**	**Steps To Execute**
TC_001	Functional	Home Page	Verify user is able to visit home	PC or Laptop & URL	1. Login and enter the input data
TC_002	Functional	Home Page	Verify user is able to enter the input	PC or Laptop, URL & Hand-	1. Enter the input data and click
TC_003	Functional	Home page	Verify user is able to get the result	PC or Laptop, URL & Hand-	1. Enter input data 2. Click the get
TC_004	UI	Home page	Verify user is able to identify	PC or Laptop & URL	1.Enter input data and click go
TC_005	UI	Home page	Verify user is able to see the get the	PC or Laptop, URL & Hand-	1. Know about the disease in the

Expected Result	Actual Result	Status	Commnets	TC for Automation(Y/N)	Executed By
User able to visit home page	Working as	Pass	Easy to access	N	Kamalesh S
User is able to enter the input data	Working as	Pass	Less time taken	N	RajaRajan R
Verify user is able to get the result	Working as	Pass	Accurate result	N	Maanesh S
User is able to identify the correct	Working as	Pass	Easy to identify the upload	N	KrupaKaran R
User is able to see the get the correct	Working as	Pass	Easy to identify the get result	N	All team members

8.2 User Acceptance

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the Detecting Parkinson's Disease using Machine Learning project at the time of the release to User Acceptance Testing (UAT).

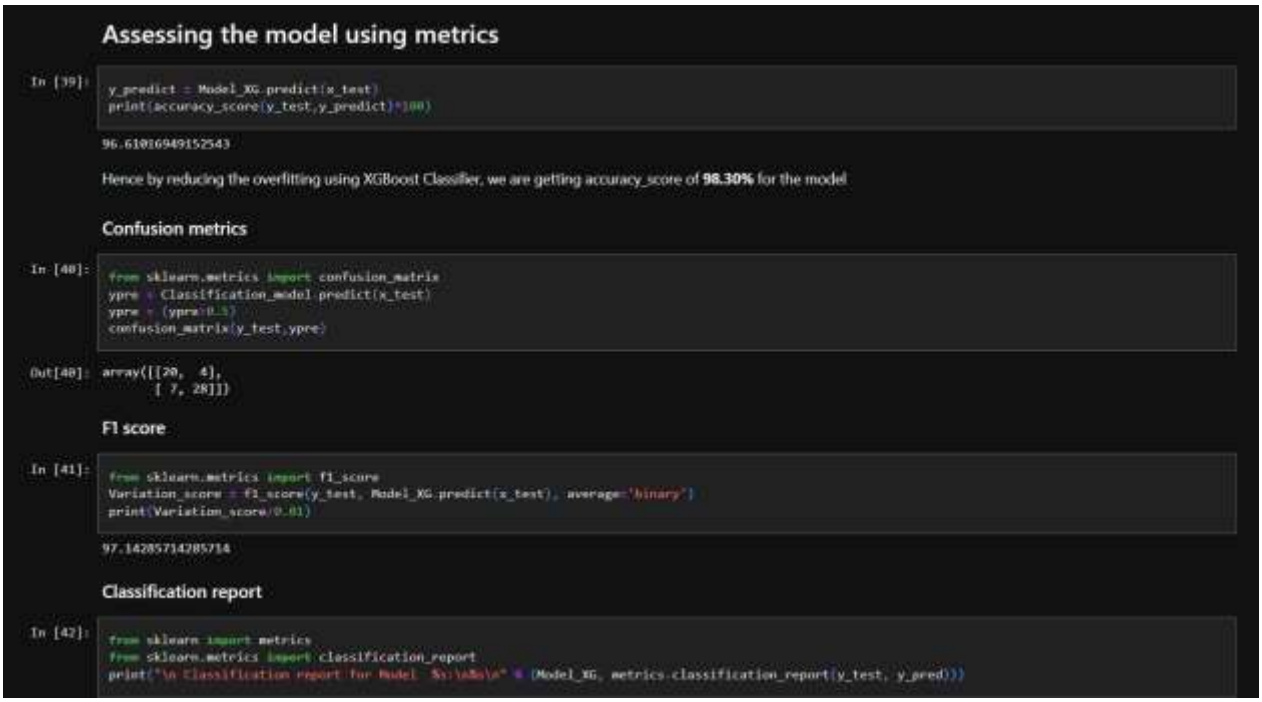
This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Login/Register Page	8	0	0	8
Home Page	1	0	0	1
Logout Page	2	0	1	1
Prediction	10	0	0	10
Version Control	2	0	0	2

9. RESULTS

9.1 Performance Metrics

* **Classification Model: Confusion Matrix, Accuracy Score & Classification Report**



10. ADVANTAGES & DISADVANTAGES

10.1 Advantages

- We developed a model using the XG Boost Classifier using sklearn module of python to detect if an individual has Parkinson's Disease or not. We got the machine learning model with 96.61% accuracy, which is good as our dataset contains good labels and values.
- More accuracy in the model
- The data of any person can be entered in db to check whether the person is affected by Parkinson's disease or not.

10.2 Disadvantages

- Packages to be installed
- It produces fake results if the input data is entered wrong

11. CONCLUSION

It is possible to detect Parkinson`s disease using the drawings alone instead of measuring the speed and pressure of the pen on paper. Here, we presented included studies in a high-level summary, providing access to information including machine learning methods that have been used in the diagnosis of PD and associated outcomes, types of clinical, behavioral, and biometric data that could be used for rendering more accurate diagnoses, potential biomarkers for assisting clinical decision making, and other highly relevant information, including databases that could be used to enlarge and enrich smaller datasets. In summary, realization of machine learning-assisted diagnosis of PD yields high potential for a more systematic clinical decision-making system, while adaptation of novel biomarkers may give rise to easier access to PD diagnosis at an earlier stage.

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12. FUTURE SCOPE

Following years of minimal progress in the treatment of Parkinson's disease, pioneering pipeline therapies such as those previously discussed offer hope to those affected by this devastating condition.

13. APPENDIX

13.1 Github Link

Repository link: https://github.com/IBM-EPBL/IBM-Project-37595-1660312933.git