Early Detection Of Chronic Kidney Disease Using Machine learning

A Project Report Submitted by,

Atchaya A

Shabanabegam A

Mahalakshmi P

Nathiya S

For the course of,

HX8001-Professional Readiness for Innovation, Employability and Entrepreneurship

In

Electronics and Communication Engineering,

University College of Engineering, Arni

1.INTRODUCTION

1.1 Project Overview

Chronic Kidney Disease prediction is one of the most important issues health care analytics. Chronic Kidney Disease is nothing but a disease that lasts over a long period time which requires proper medical attention. In this study, we propose a machine learning methodology for diagnosing Chronic Kidney Disease.

1.2 Purpose

The main aim of this project is to predict whether the patients have chronic kidney disease or not in more accurate and faster way.

2. LITERATURE SURVEY

2.1 Existing problem

Chronic Kidney Disease can be cured if treated in the early stages.10% of the population worldwide is affected by Chronic Kidney Disease (CKD),and millions die each year because they do not have access to affordable treatment. The challenging task in day-to-day life is prediction in medical field.

2.2 Reference

1	**Paper Title**	Machine learning algorithm for early detection of end-stage renal disease
	Problem Definition	End stage renal disease (ESRD) describes the most severe stage of chronic kidney disease (CKD), when patients need dialysis or renal transplant. There is often a delay in recognizing, diagnosing, and treating the various etiologies of CKD.
	Methodology/Algorithm	Gradient boosting tree,word2vec algorithm

	Advantages	This model gives better results in all tested metrics
	Disadvantages	It has some potential limitations.

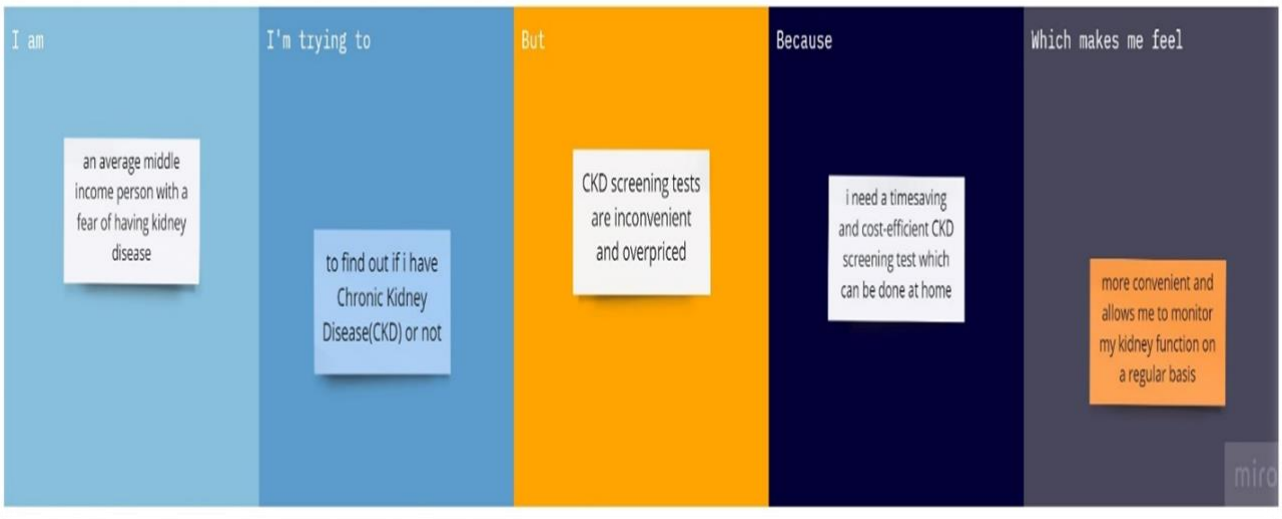
2	**Paper Title**	A Machine Learning Methodology for Diagnosing Chronic Kidney Disease
	Problem Definition	Chronic kidney disease (CKD) is a global health problem with high morbidity and mortality rate, and it induces other diseases. Since there are no obvious symptoms during the early stages of CKD, patients often fail to notice the disease. Early detection of CKD enables patients to receive timely treatment to ameliorate the progression of this disease
	Methodology/Algorithm	Euclidean distance formula is used to evaluate the similarity between samples, and KNN imputation is used to fill in the missing values in the dataset.
	Advantages	This CKD diagnostic methodology is feasible in terms of data imputation and samples diagnosis.
	Disadvantages	The generalization performance of the model might be limited due to there are only two categories (ckd and notckd) of data samples in the data set, the model can not diagnose the severity of CKD.

3	**Paper Title**	Early Detection of Kidney Disease Using ECG Signals Through Machine Learning Based Modelling
	Problem Definition	A leading daily reported that, one out every seven people suffer from kidney problems and 3.24% of the population death can be traced back to kidney disease . If these deaths are further traced down, it was found that the majority of these deaths were due to a sudden cardiac arrest. Studies have since shown that, amongst the CKD patients' death, 60% of the deaths are Sudden Cardiac Deaths (SCD) whereas the rest 40% are other cardiovascular mortalities
	Methodology/Algorithm	Under supervised machine learning, SVM was used.

	Advantages	It provides a safe non-invasive way for patients to determine the state of their kidneys
	Disadvantages	The accuracy of the model is bit low.

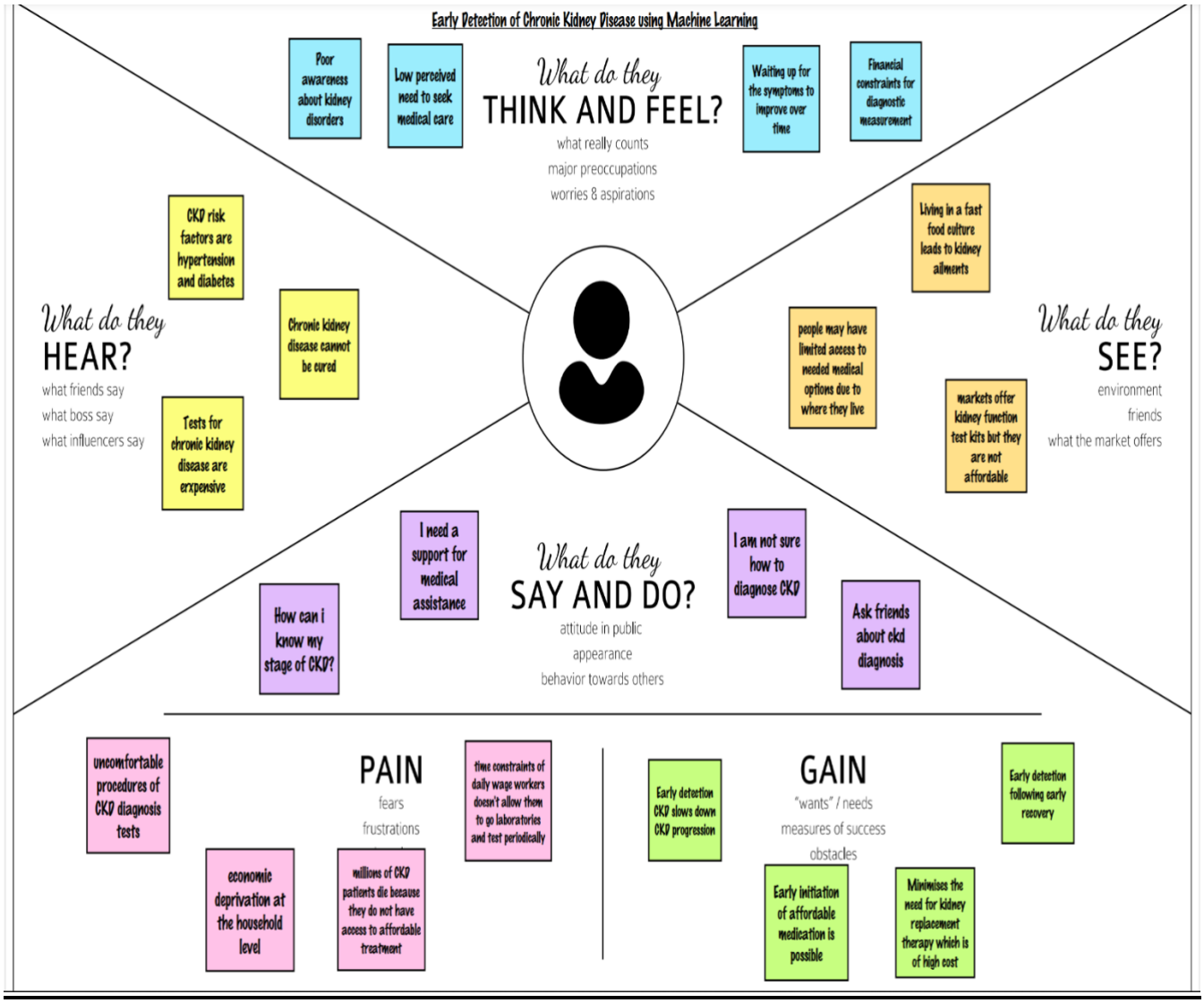
Problem Statement (PS)	**I am (Customer)**	**I'm trying to**	**But**	**Because**	**Which makes me feel**
PS-1	Daily Wage Worker	To diagnose whether I have a kidney disease	The Screening Tests are not affordable	I need a cost efficient test	Affordable and convenient
PS-2	Busy Manager	To monitor my kidney function	I don't have time to spend a day on testing my kidney function	I need a time saving simple kidney function test	Easy and comfortable
PS-3	Disabled person	To detect if have chronic kidney disease or not	I am unable to go to test centres frequently	I need a mobile app to monitor my kidney function	Very helpful

2.3 Problem Statement

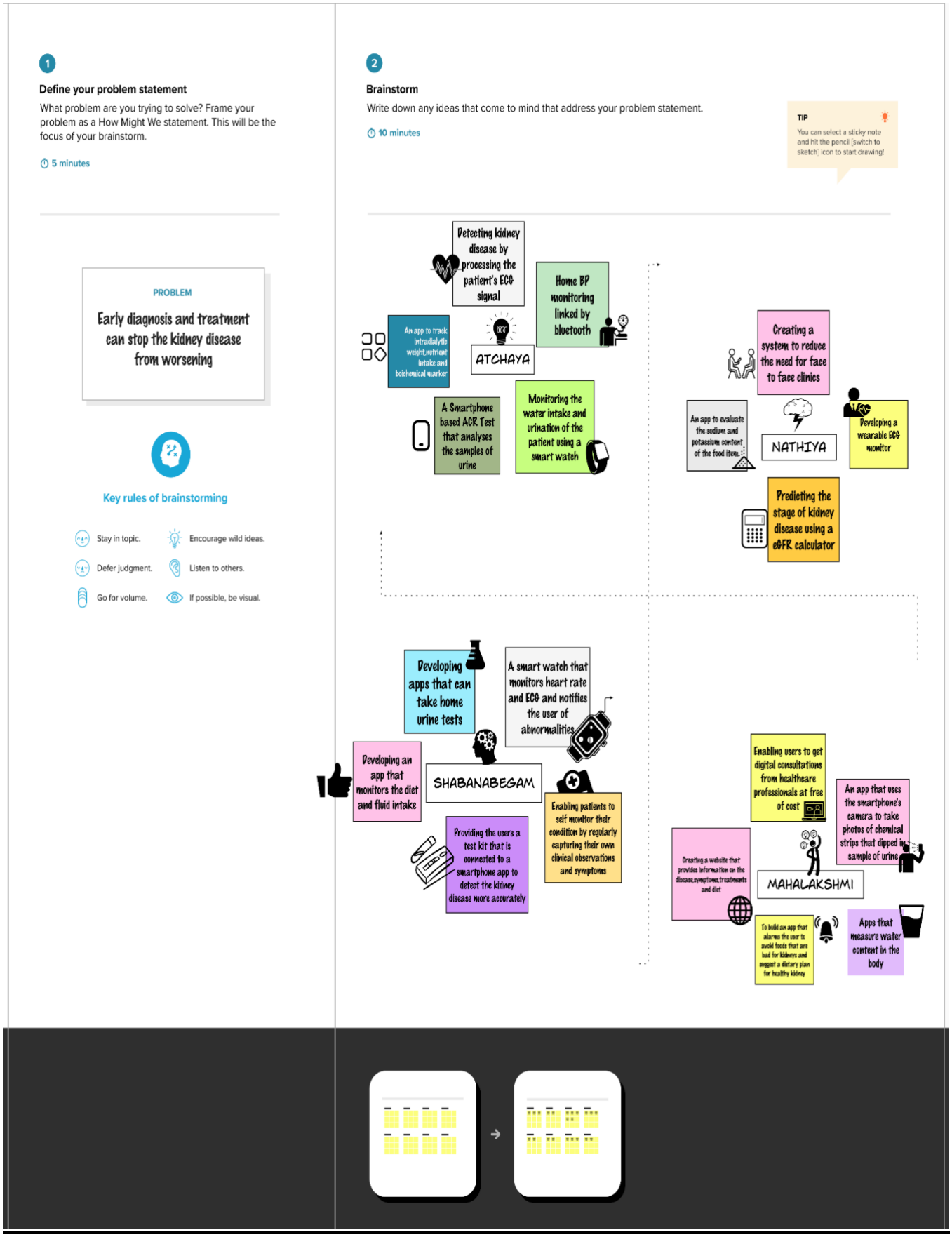


3.IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming



Determine a kidney disease patient's risk by his ECG report

TIP

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

Developing a wearable ECG monitor

A smart watch that monitors heart rate and ECG and notifies the user of abnormalities

Detecting kidney disease by processing the patient's ECG signal

An app to support and assist kidney patient's daily routine

Home kidney tests to monitor kidney function continuously rather than visiting hospitals

Creating a system to reduce the need for face to face clinics

Providing the users a test kit that is connected to a smartphone app to detect the kidney disease more accurately

An app that uses the smartphone's camera to take photos of chemical strips that dipped in sample of urine

A Smartphone based ACR Test that analyses the samples of urine

To build an app that allows the user to avoid foods that are bad for kidneys and suggest a dietary plan for healthy kidney

Monitoring the water intake and urination of the patient using a smart watch

Developing an app that monitors the diet and fluid intake

Importance

If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

Providing the users a test kit that is connected to a smartphone app to detect the kidney disease more accurately

Detecting kidney disease by processing the patient's ECG signal

An app that uses the smartphone's camera to take photos of chemical strips that dipped in sample of urine

Predicting the stage of kidney disease using a eGFR calculator

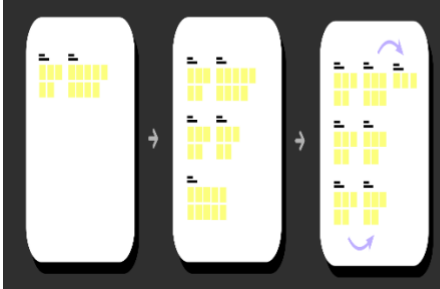
Developing apps that can take home urine tests

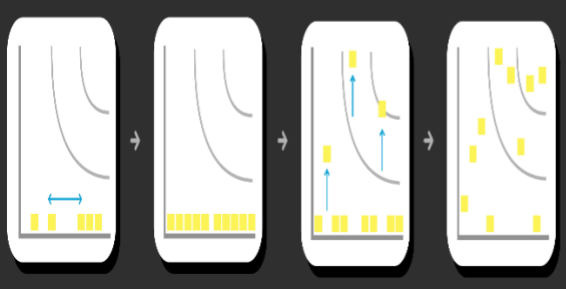
TIP

Participants can use their 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.

Feasibility

Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity etc.)



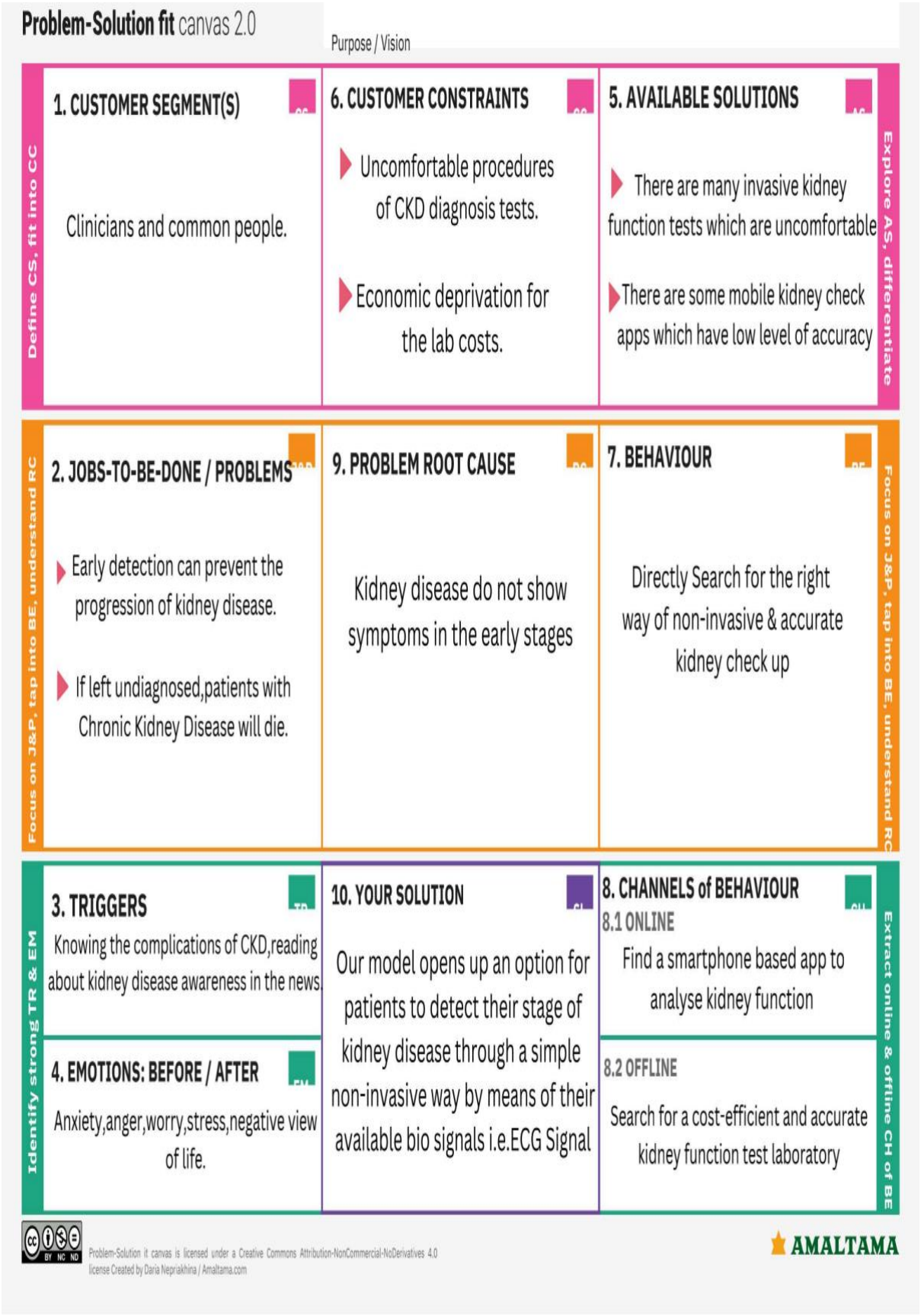


3.3 Proposed Solution

S/No	Parameter	Description
1.	Problem Statement (Problem to be solved)	• Chronic kidney disease prediction is one of the most important issues in healthcare analytics. • 10% of the population worldwide is affected by chronic kidney disease (CKD),and millions die each year because they do not have access to affordable treatment. • The most Interesting and challenging tasks in day-to-day life is prediction in medical field. • Chronic kidney Disease can be cured, if treated in the early stages.
2.	Idea / Solution description	• The idea is detecting the presence of kidney disease through machine learning based classification modelling, by processing the patient's ECG signal • Recent studies and ongoing researches have showed that patients undergoing kidney problems start developing cardiac problems-scientifically known as the Cardio Renal Syndrome (CRS). • Since cardio-vascular diseases and the chronic kidney disease is inter-related, this model can also be used for patients undergoing cardio-vascular problems to determine wether their kidneys have been effected or not.

3.	Novelty / Uniqueness	• Compare to other kidney function test, the ECG test is of low cost and very accurate. • Ours would be the first app to detect Chronic kidney disease using the ECG report uploaded by the user.
4.	Social Impact / Customer Satisfaction	• The primary advantage of this model is the fact that it provides a safe non-invasive way for patients to determine the state of their kidneys in a simple way.
5.	Business Model (Revenue Model)	• Can collaborate with health care sectors and generate revenue from their customers. • Can generate revenue through direct customers.
6.	Scalability of the Solution	• The design will be portable and scalable Chronic kidney Disease detecting phenotype to facilitate early disease recognition.
		• The solution is we develop a app that asks basic questions about the user's kidney function and asks to upload his ECG report.

3.4 Problem Solution Fit



4.REQUIREMENT ANALYSIS

4.1 Functional Requirements

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Single and Multi-factor Authentication	Single and Multi-factor authentication services for user sign-up/sign-in
FR-4	Ask for User Data	Get user's Name Get user's Age Get user's BP Level Get user's Sugar Level Get user's height & weight Get user's eGFR rate Get user's Albumin level
FR-5	Navigation	Allows users to navigate across, into and back out from the pieces of content within the app
FR-6	Media Access	Allows user to share previous medical records and ECG Report [Not a Mandatory Field]
FR-7	Display Results	The summary result indicates the percentage of risk factor for Chronic Kidney Disease
FR-8	Sending Test Results via Email	A copy of the user's responses will be emailed to the email address provided.
FR-8	Chat integration	Integrate In-app Chat API & SDK and a fully managed chat platform on the backend into the application to build a better customer support experience

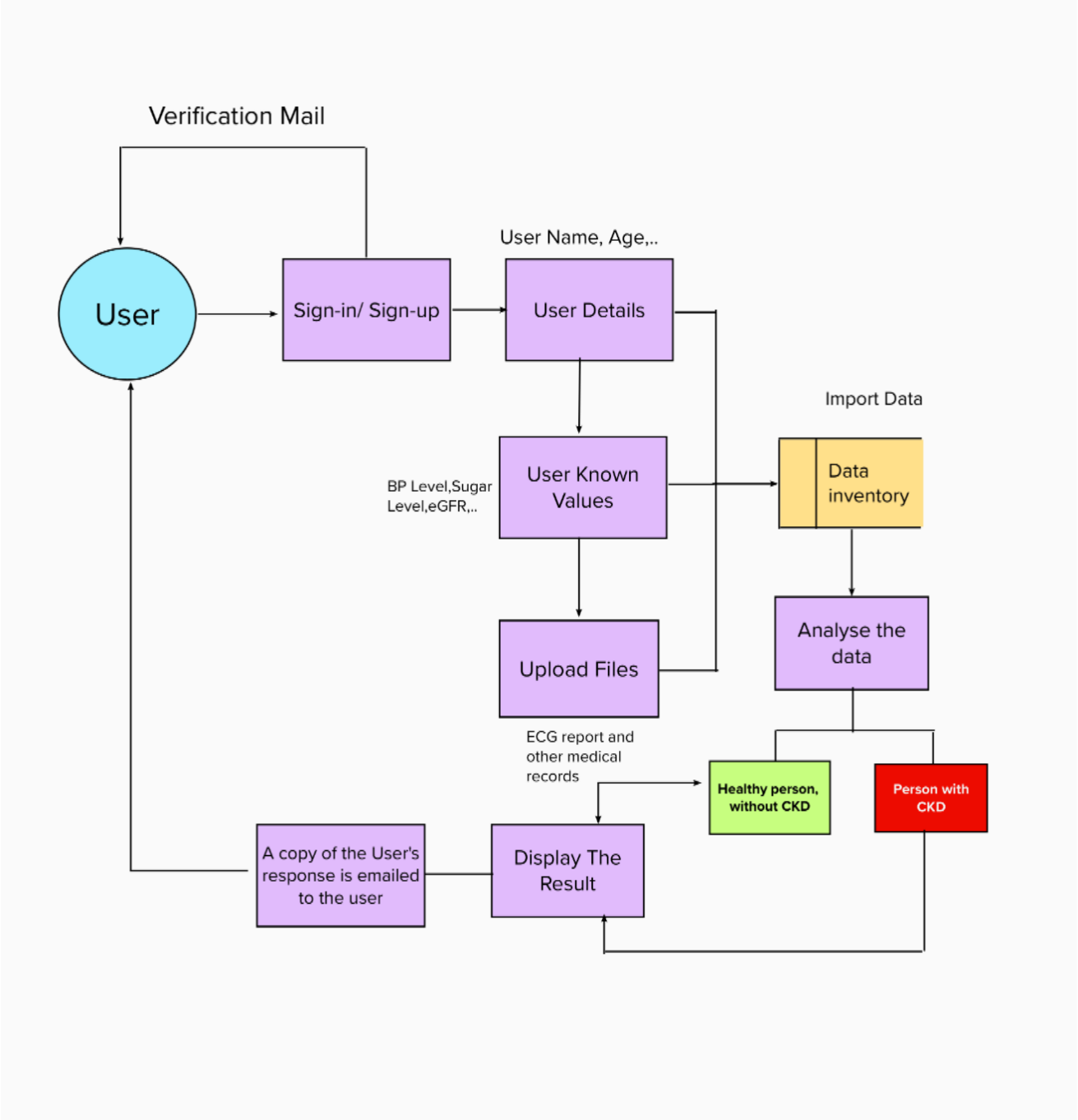
4.2 Non-Functional Requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Ease of use and user-friendly interface, that allow users to seamlessly interact with the app.
NFR-2	**Security**	The app uses HTTPS protocol and includes additional authentication for API access. The app operation includes private data processing, and external attack risk reduction which increases customer engagement and loyalty.
NFR-3	**Reliability**	The app completely detects the presence of Chronic Kidney Disease at free of cost, does not create downtime, and perform correctly in every scenario
NFR-4	**Performance**	Response time is faster. System can service multiple users simultaneously. It is capable of handling the load and perform well even when usage spikes.
NFR-5	**Availability**	The infrastructure, system, or solution remains operational 24/7 in order to serve its intended purpose. The customer is able to get their issue resolved no matter what day or time it is.
NFR-6	**Scalability**	The applications' infrastructure is able to support a large number of requests per minute(RPM).It is able to handle a growing user base without affecting the user experience and the app's performance.

5.PROJECT DESIGN

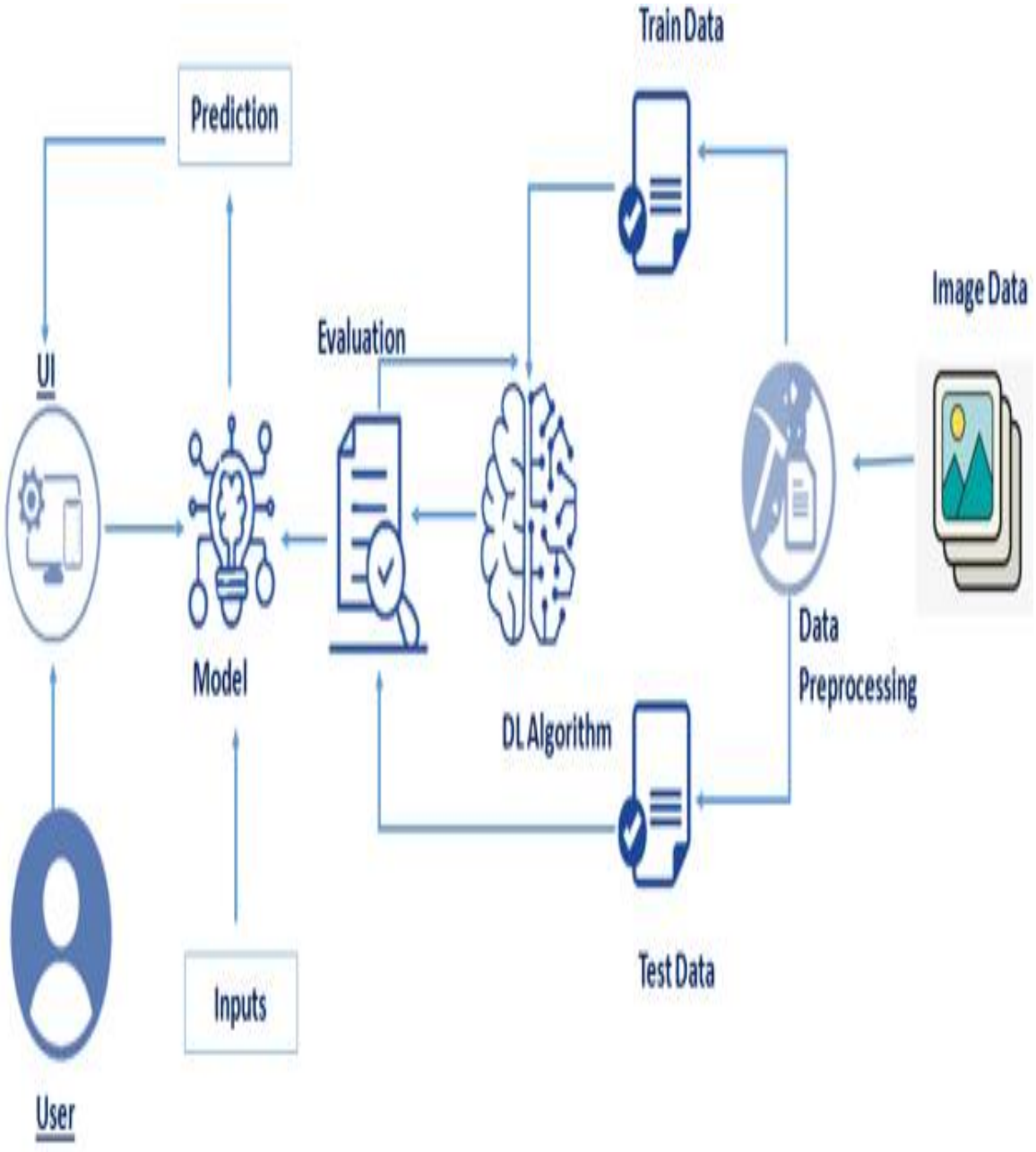
5.1 Data Flow Diagram

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

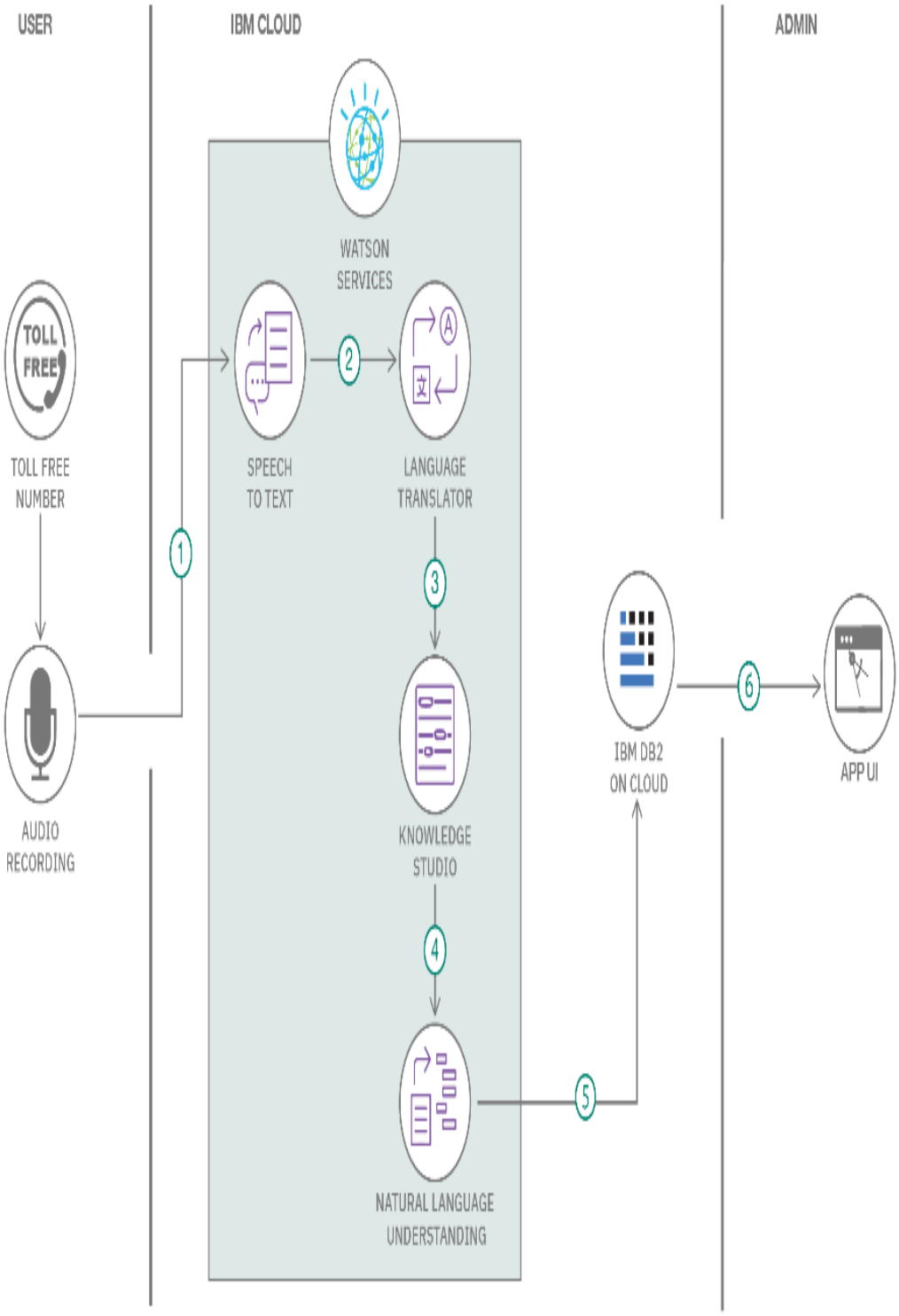


5.2 Solution and Technical Architecture

Solution Architecture Diagram:



Technical Architecture Diagram:



5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can get mail verification	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can login successfully	High	Sprint-1
	Dashboard	USN-6	As a user, I can enter my known values	I can fill the required fields	High	Sprint-1
		USN-7	As a user, I can select an option from a dropdown list.	I can access the page and submit the input	High	Sprint-1
		USN-8	As a user, I can use voice control to dictate text	I can enter the input through voice	Low	Sprint-2
		USN-9	As a user, I can upload files in the dashboard	I can submit my medical reports	High	Sprint-1
Customer Care Executive		USN-10	As a customer care executive, I can respond to the user queries	The user gets clarified	Medium	Sprint-2
Administrator	Analytics for tracking User engagement	USN-11	As a administrator, I analyse the time that our app screen was in foreground or in focus to figure out user engagement	Admin can analyse user activity	Medium	Sprint-2

6.PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

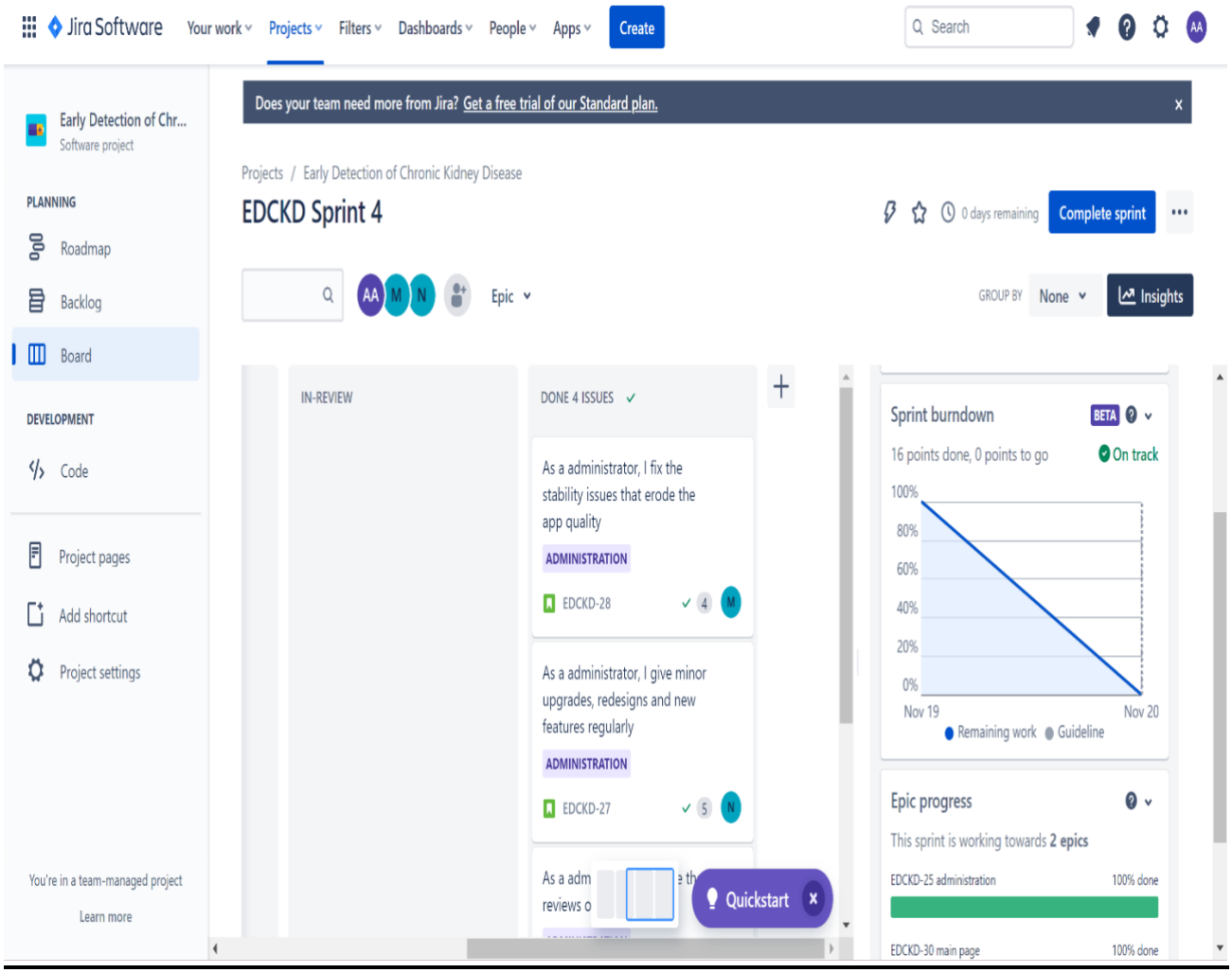
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Atchaya A
Sprint-1	Registration	USN-2	As a user, I will receive confirmation email once I have registered for the application	4	Medium	Nathiya S
Sprint-1	Login	USN-3	As a user, I can register for the application through Facebook	4	Low	Nathiya S
Sprint-1	Registration	USN-4	As a user, I can register for the application through Gmail	3	Medium	Shabanabegam A
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	3	High	Mahalakshmi P
Sprint-2	Dashboard	USN-6	As a user, I can enter my known values	3	High	Mahalakshmi P
Sprint-2	Dashboard	USN-7	As a user, I can select an option from a dropdown list.	3	High	Shabanabegam A

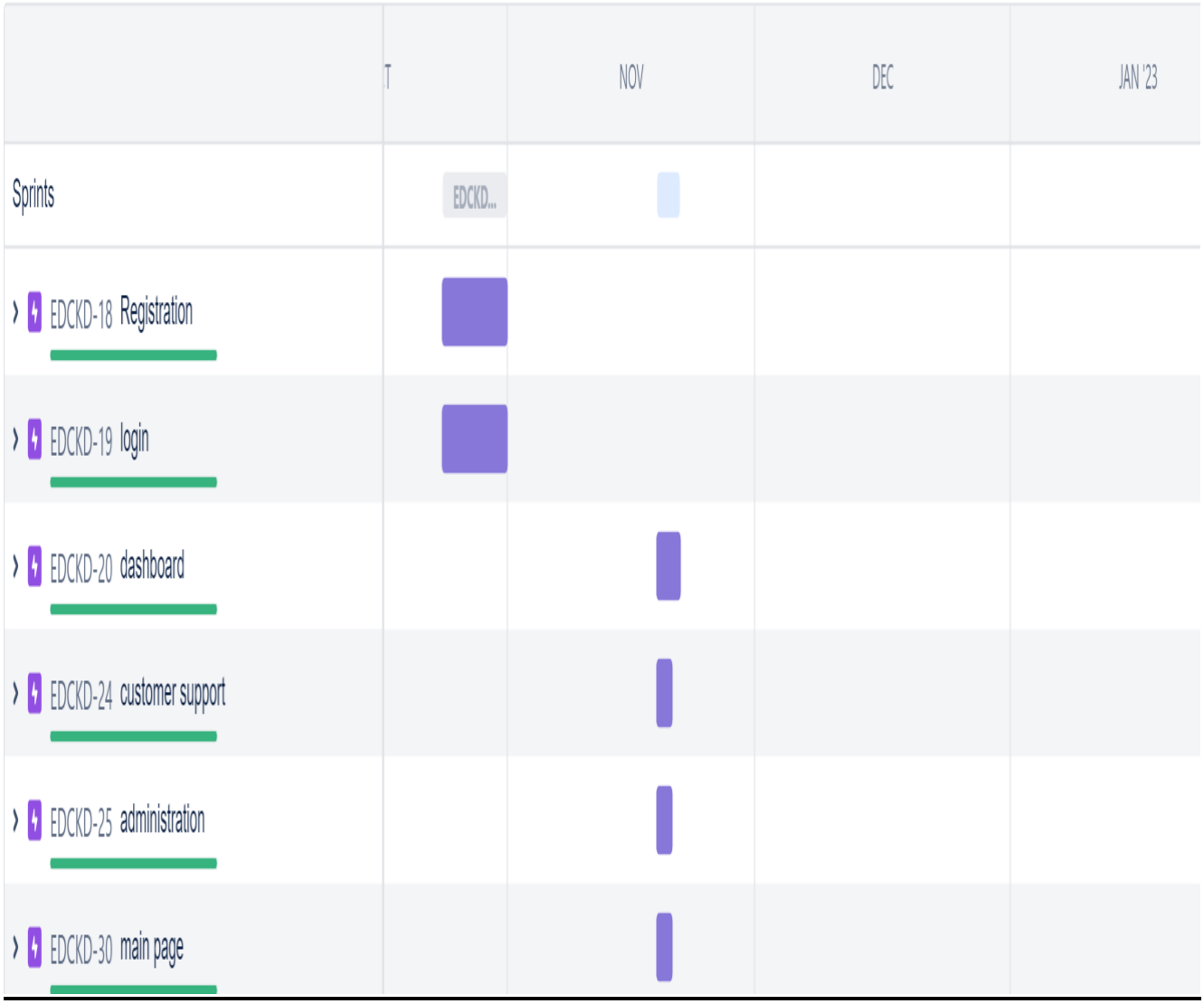
Sprint -2	Dashboard	USN-8	As a user, I can use voice control to dictate text	5	Low	Atchaya A
Sprint -2	Dashboard	USN-9	As a user, I can upload files in the dashboard	5	High	Atchaya A
Sprint -3	Customer Support	USN-10	As a customer care executive, I can respond to the user queries	4	Mediu m	Shabanabega m A
Sprint -3	Customer Support	USN-11	As a customer care executive, I can give contact support	4	Mediu m	Mahalakshmi P
Sprint-3	Main Page	USN-12	Results will be displayed with accuracy	3	High	Nathiya S
Sprint-3	Administration	USN-13	As a administrator, I analyse the time that our app screen was in foreground or in focus to figure out user engagement	5	Low	Shabanabegam A
Sprint-4	Main Page	USN-14	The user gets a copy of response through email	4	Low	Atchaya A
Sprint-4	Administration	USN-15	As a administrator, I notice the reviews of the user	3	High	Atchaya A
Sprint-4	Administration	USN-16	As a administrator, I give minor upgrades, redesigns and new features regularly.	5	Mediu m	Nathiya S
Sprint-4	Administration	USN-17	As a administrator, I fix the stability issues that erode the app quality	4	Mediu m	Mahalakshmi P

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	16	6 Days	24 Oct 2022	29 oct 2022	16	31 Oct 2022
Sprint-2	16	6 Days	29 Oct 2022	05 Nov 2022	15	07 Nov 2022
Sprint-3	16	6 Days	05 Nov 2022	12 Nov 2022	14	14 Nov 2022
Sprint-4	16	6 Days	12 Nov 2022	19 Nov 2022	16	21 Nov 2022

6.3 Reports from JIRA





7.CODING & SOLUTIONING

7.1 Feature 1-Home Page

```
<html lang="en">


<head>
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>chronic</title>
    <link rel="stylesheet" href="static/style.css">
</head>
```

```
<body bgcolor="black">
     

   <div class="d1" align="right">
     <a href="/"> HOME </a>
        
     <a href="/index">PREDICTION</a>
       
   </div>

   <div class="glow" align="center">
      <h2>
      CHRONIC KIDNEY DISEASE
      PREDICTION
   </h2>
   </div>
</body>
</html>
```

7.2 Feature 2- Prediction Page

```
<html lang="en">
<head>
   <meta name="viewport" content="width=device-width, initial-scale=1.0">
   <title>prediction</title>
   <link rel="stylesheet" href="../static/style.css">
   <link rel="stylesheet" href="../static/indexStyle.css">
   <script >
     function check() {
```

```
        document.getElementById('prediction').innerHTML='';
       }
    </script>
</head>
<body>   
    <div class="d1" align="right">
        <a href="/"> HOME </a>
           
        <a href="/index">PREDICTION</a>
          
     </div>

    <h2> Enter the mentioned values</h2>

    <form class="container" action="/predict" method="post">
        <div class="tab" align="center">
        <table>
        <tr></tr><tr></tr><tr></tr><tr></tr><tr>
        <tr><td>
        <label for="age">Age : </label></td><td>
        <input id="age" type="number" name="age" required></td></tr>
        <tr></tr><tr></tr><tr></tr><tr></tr>
        <tr><td>
        <label for="blood_Urea">Blood Urea : </label></td><td>
        <input id="blood_Urea" type="number" name="blood_Urea"
required></td></tr>
        <tr></tr><tr></tr><tr></tr><tr></tr>
        <tr><td>
```

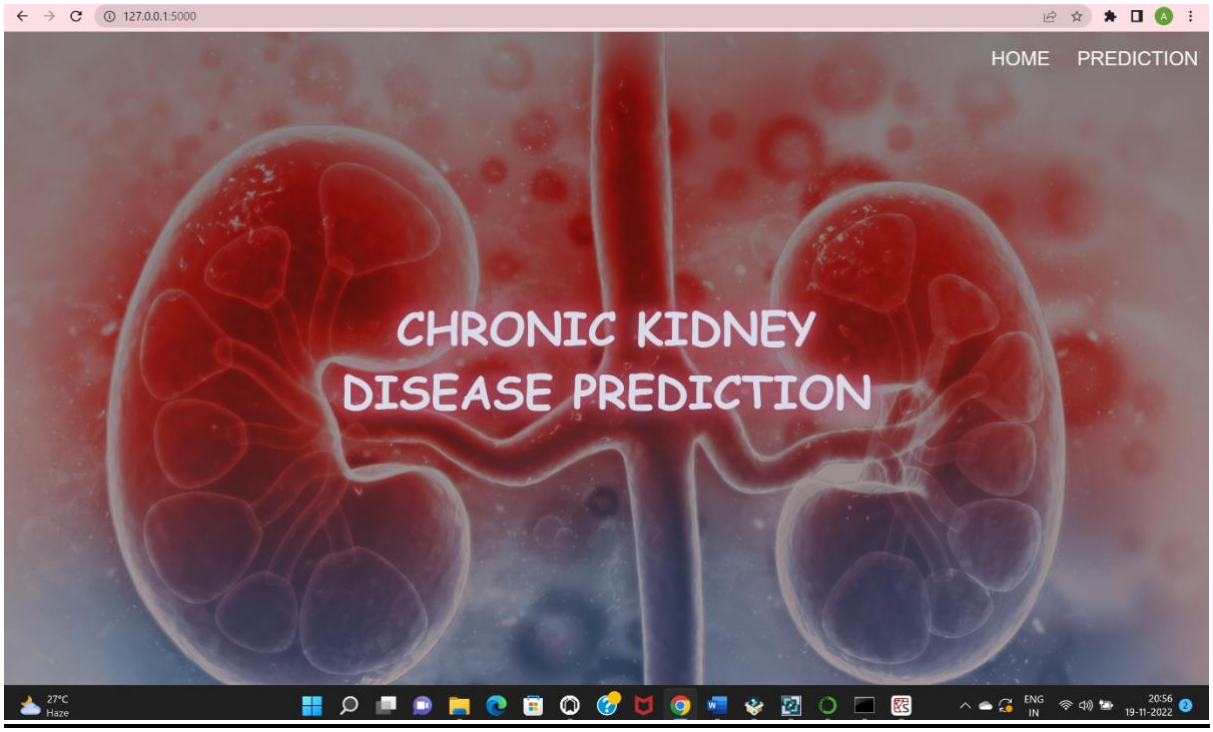
```
<label for="BGR">Blood Glucose Random : </label></td><td>
<input id="BGR" type="number" name="BGR" required> </td></tr>
<tr></tr><tr></tr><tr></tr><tr></tr><tr><td>
<label>Are you Affected by Coronary Artery Disease : </label></td><td>
<select name="CRD" id="CRD">
   <option for ="CRD" value="1">YES
   <option for ="CRD" value="0">NO
</select></td></tr>
<tr></tr><tr></tr><tr></tr><tr></tr><tr><td>
   <label>Do you have Anemia : </label></td><td>
      <select name="anemia" id="anemia">
         <option for="anemia" value="1">YES
         <option for="anemia" value="0">NO
      </select>
</td></tr>
<tr></tr><tr></tr><tr></tr><tr></tr><tr><td>
   <label>Pus cell : </label></td><td>
      <select name="pus_cell" id="pus_cell">
         <option for="pus_cell" value="1">NORMAL
         <option for="pus_cell" value="0">ABNORMAL
      </select>
</td></tr>
<tr></tr><tr></tr><tr></tr><tr></tr><tr><td>
   <label>Red Blood Cell : </label></td><td>
      <select name="RBC" id="RBC">
         <option for="RBC" value="1">NORMAL
         <option for="RBC" value="0">ABNORMAL
```

```
            </select>
        </td></tr>
        <tr></tr><tr></tr><tr></tr><tr></tr><tr><td>
            <label>Diabetesmellitus : </label></td><td>
                <select name="Diabete" id="Diabete">
                    <option for="Diabete" value="1">YES
                    <option for="Diabete" value="0">NO
                </select>
        </td></tr>
        <tr></tr><tr></tr><tr></tr><tr></tr><tr><td>
            <label>Pedal Edema : </label></td><td>
                <select name="P_edema" id="P_edema">
                    <option for="P_edema" value="1">YES
                    <option for="P_edema" value="0">NO
                </select>
        </td></tr>
        <tr></tr><tr></tr><tr></tr><tr></tr><tr><td>
        <input type="submit" value="submit"></td><td>
        <input type="reset" value="clear" onclick="check()">
        </td></tr>
        <tr></tr><tr></tr><tr></tr><tr></tr><tr></tr>
        </table>
         </div>
           </form>
       <div align="center" class="hidden">
        <h2 id="prediction">{{pred}}</h2>
    </div></body></html>
```

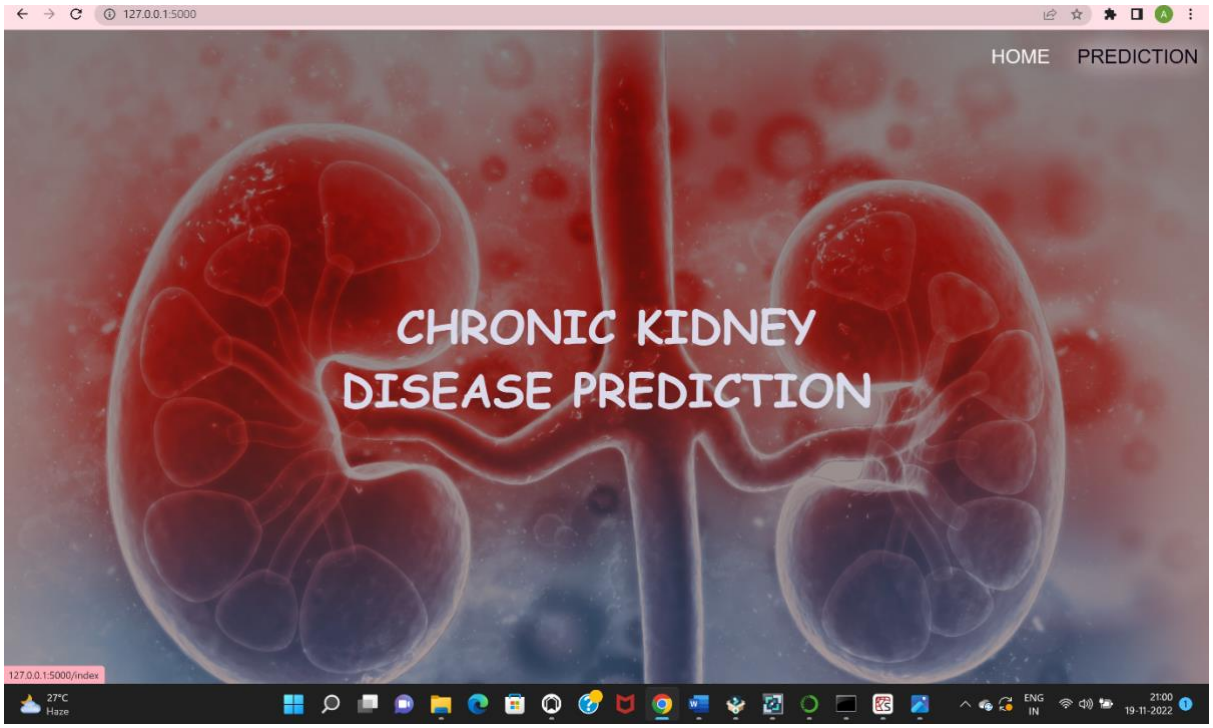
8.TESTING

8.1 Test Cases

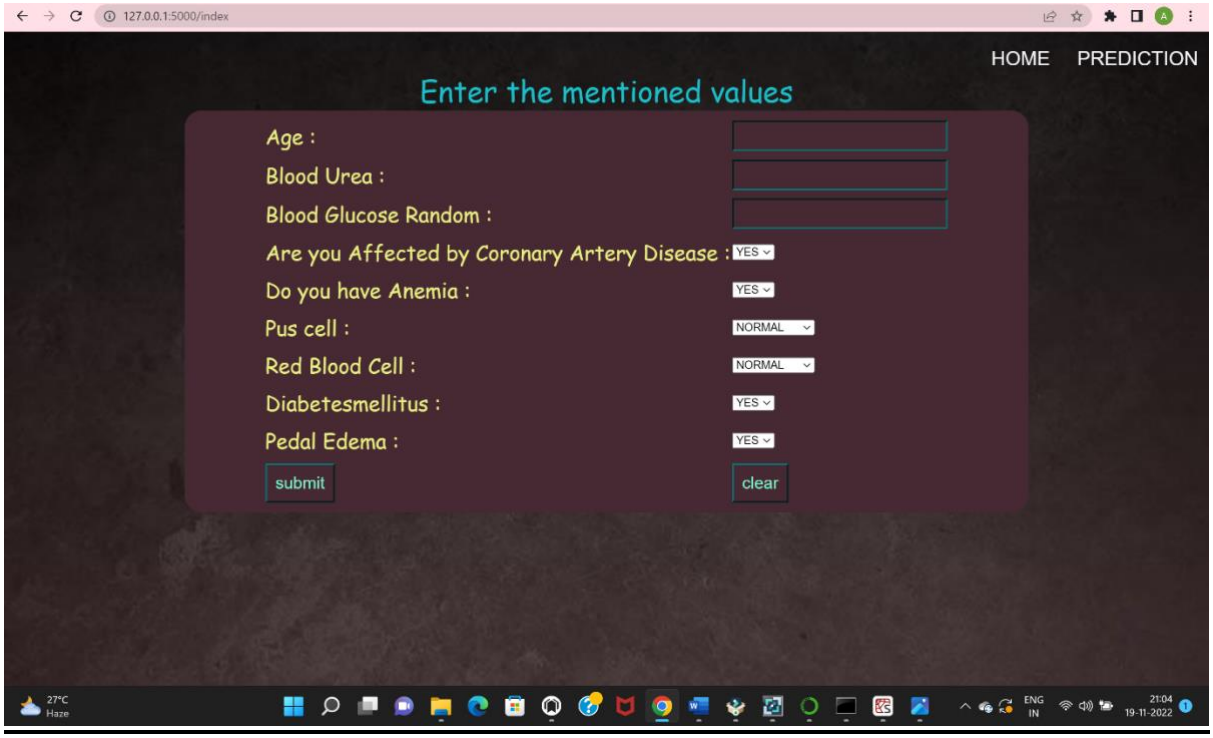
TEST CASE 1: When the website is deployed it is expected to display the home page with the background image team logo and a prediction button.



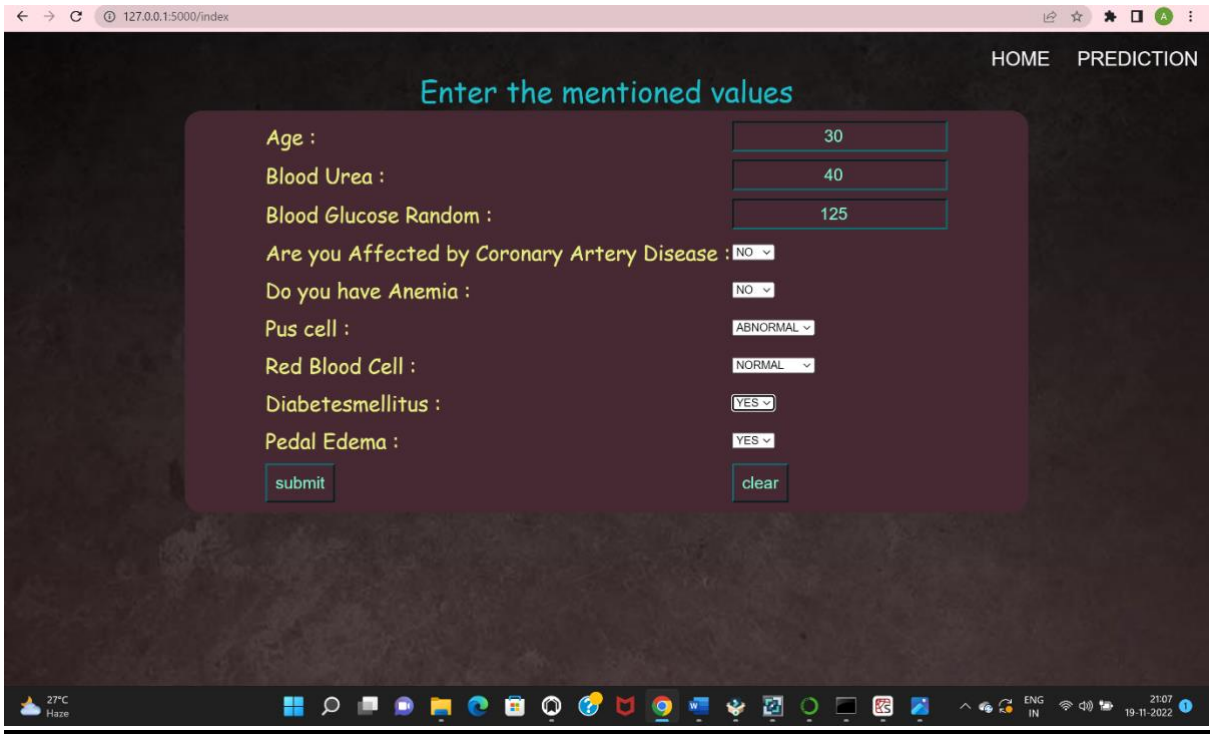
TEST CASE 2: The function of the prediction button is expected to move to the prediction page

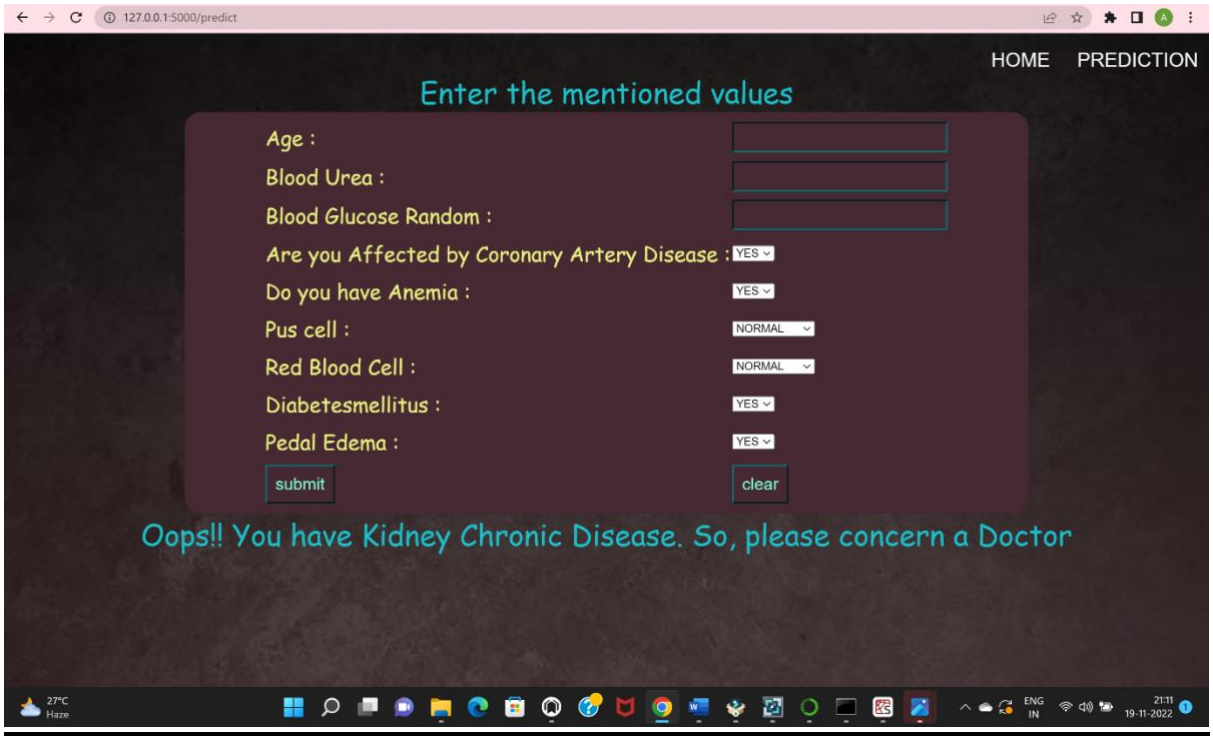


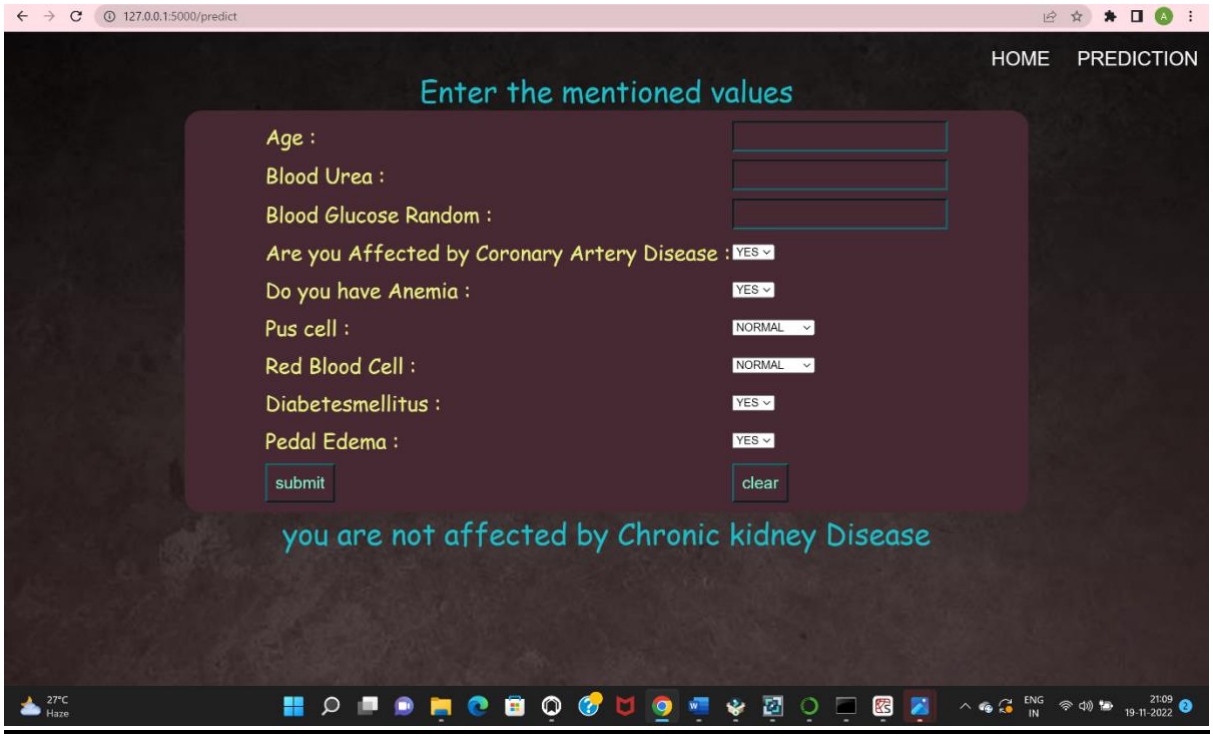
TEST CASE 3: The prediction page is expected to show 8 features where user can enter their health parameter values.



TEST CASE 4: When the user enters the values the page is excepted to the result as the lower chance or higher chance of getting chronic kidney disease.

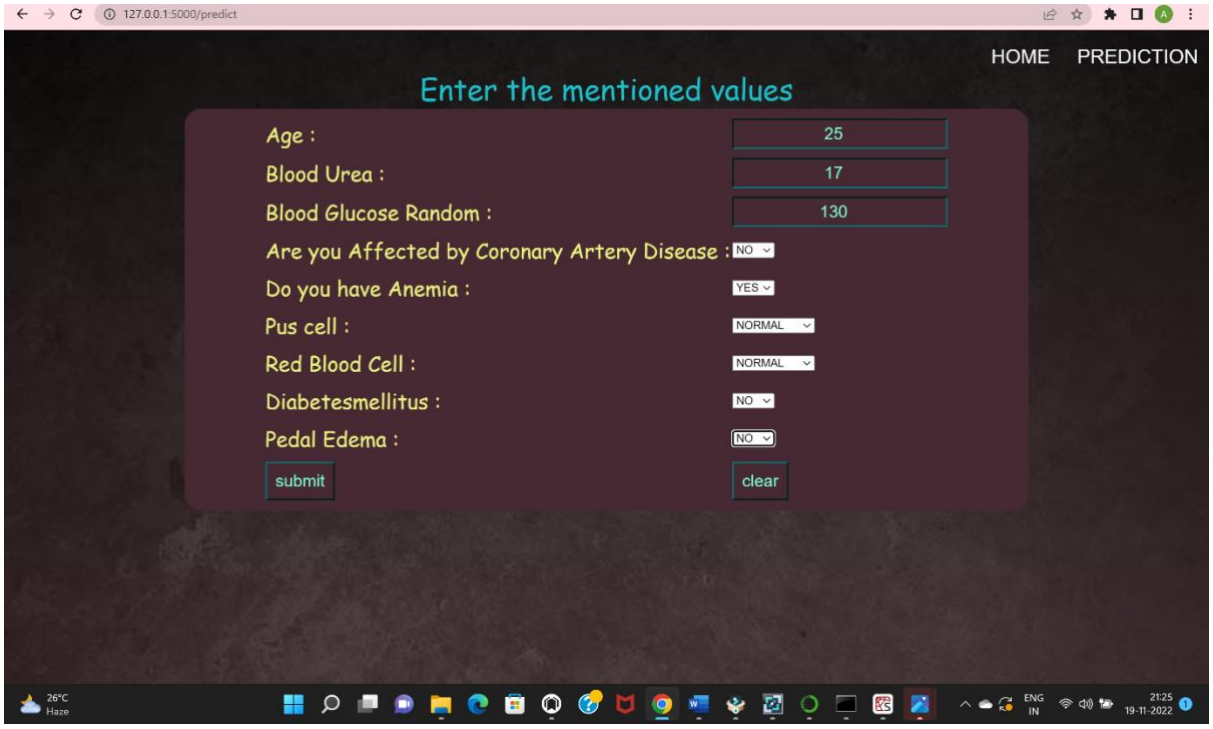


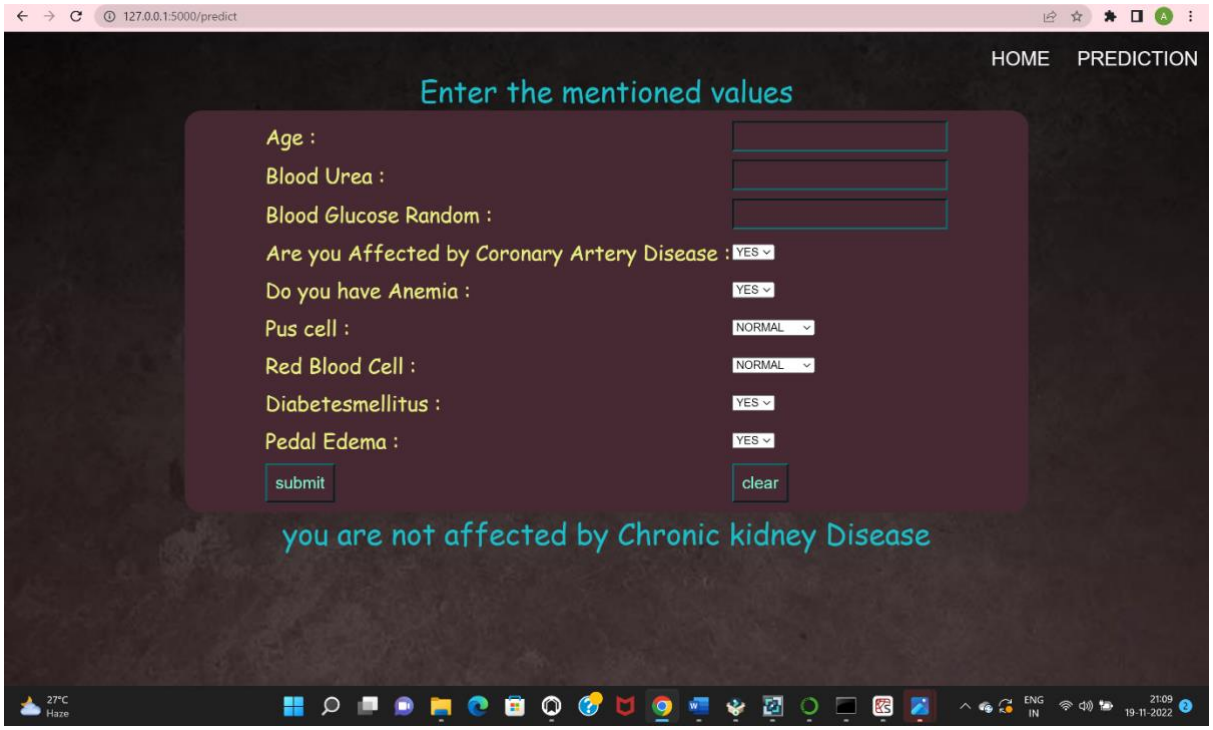

127.0.0.1:5000/predict
HOME
PREDICTION
Enter the mentioned values
Age :
Blood Urea :
Blood Glucose Random :
Are you Affected by Coronary Artery Disease : YES
Do you have Anemia : YES
Pus cell : NORMAL
Red Blood Cell : NORMAL
Diabetesmellitus : YES
Pedal Edema : YES
submit
clear
Oops!! You have Kidney Chronic Disease. So, please concern a Doctor


127.0.0.1:5000/predict
HOME
PREDICTION
Enter the mentioned values
Age :
Blood Urea :
Blood Glucose Random :
Are you Affected by Coronary Artery Disease : YES
Do you have Anemia : YES
Pus cell : NORMAL
Red Blood Cell : NORMAL
Diabetesmellitus : YES
Pedal Edema : YES
submit
clear
you are not affected by Chronic kidney Disease

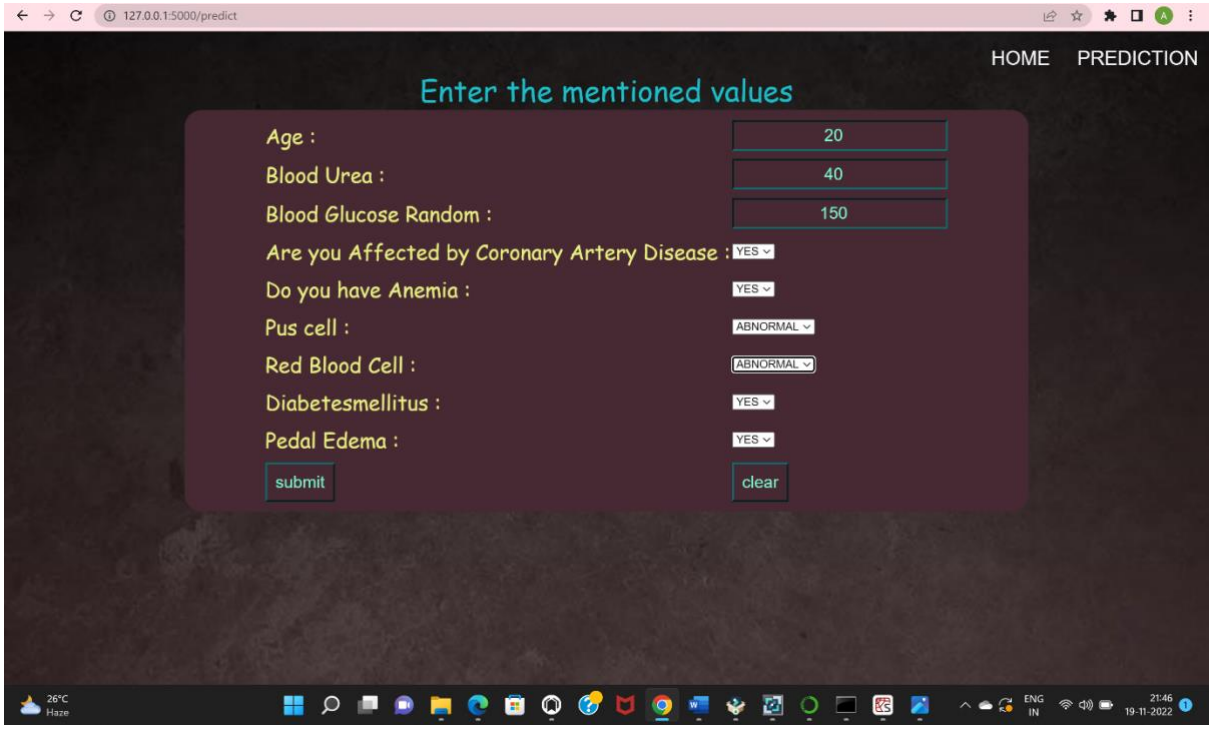
8.2 User Acceptance Testing

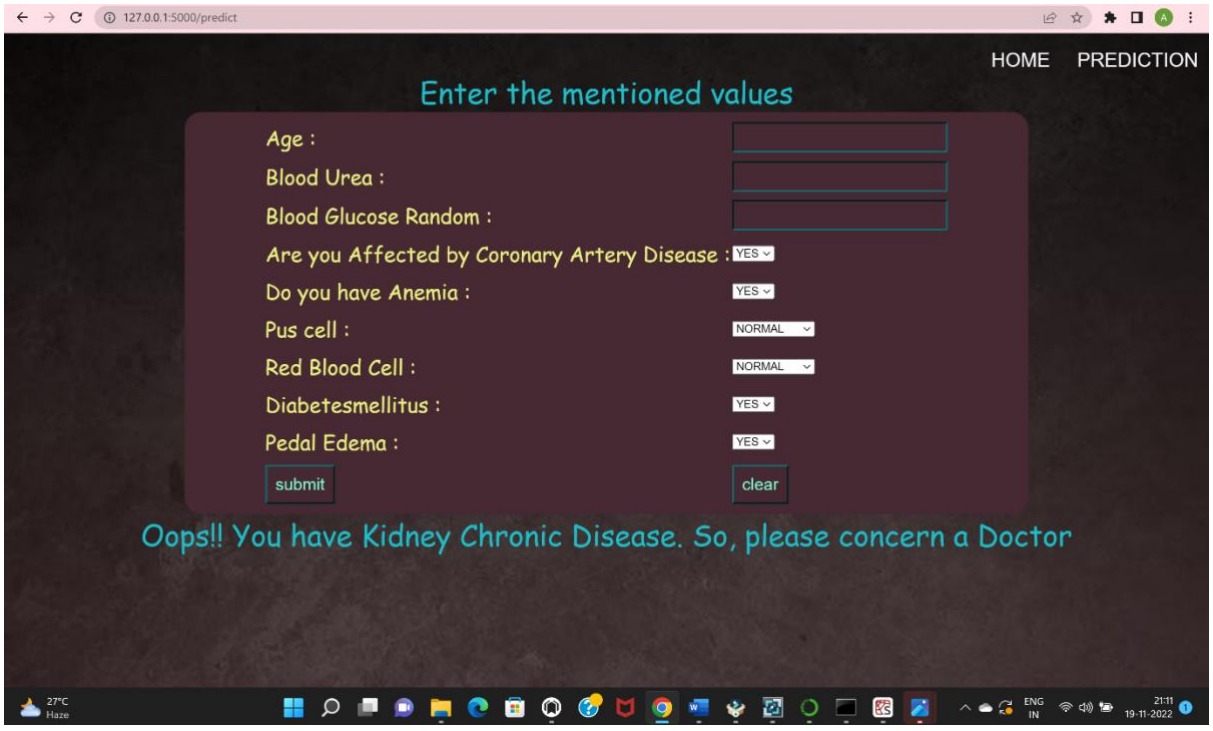
CASE 1: The user enters the parameters asked in the prediction page. If it is normal the user can see the display of the result which shows the user as "you are not affected by Chronic kidney Disease"





CASE2: The user enters the parameters asked in the prediction page. If it is abnormal, the
user can see the display of the result which shows that "Oops!! You have Kidney Chronic Disease. So, please concern a Doctor"





9.RESULTS

9.1 Performance Metrics

i) Logistic Regression

Using LogisticRegression

In [24]:
```
from sklearn.linear_model import LogisticRegression
model=LogisticRegression(solver ='lbfgs',max_iter=500)
print('LogisticRegression\n')
model.fit(x_train.values,y_train.values.ravel())
prediction = model.predict(x_test)
from sklearn.metrics import confusion_matrix
print('confusion_matrix')
print(confusion_matrix(prediction,y_test))
print('\n')
print('accuracy_score')
print(accuracy_score(prediction,y_test))
print('\n')
```

```
LogisticRegression

confusion_matrix
[[49  0]
 [ 5 26]]


accuracy_score
0.9375
```

---

ii) Random Forest Classifier

Using RandomForestClassifier

In [25]:
```
from sklearn.ensemble import RandomForestClassifier
model = RandomForestClassifier()
model.fit(x_train , y_train)
prediction = model.predict(x_test)
from sklearn.metrics import confusion_matrix
print('RandomForest\n')
print('confusion_matrix')
print(confusion_matrix(prediction,y_test))
print('\n')
print('accuracy_score')
print(accuracy_score(prediction,y_test))
print('\n')
```

```
C:\Users\home\AppData\Local\Temp\ipykernel_15608\2865502932.py:3: DataConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the shape of y to (n_samples,), for example using ravel().
  model.fit(x_train , y_train)
```

```
RandomForest

confusion_matrix
[[52  1]
 [ 2 25]]


accuracy_score
0.9625
```

---

iii) Decision Tree Classifier

Using DecisionTreeClassifier

In [26]:
```
from sklearn.tree import DecisionTreeClassifier
model = DecisionTreeClassifier()
print('Decision tree\n')
model.fit(x_train , y_train)
prediction = model.predict(x_test)
from sklearn.metrics import confusion_matrix
print('confusion_matrix')
print(confusion_matrix(prediction,y_test))
print('\n')
print('accuracy_score')
print(accuracy_score(prediction,y_test))
print('\n')
```

```
Decision tree

confusion_matrix
[[50  2]
 [ 4 24]]


accuracy_score
0.925
```

10. ADVANTAGES & DISADVANTAGES

ADVANTAGES

- Users itself can have a idea about the health of the kidney.
- It shows the result instantly.
- It makes the user stress free.
- The accuracy of the result is 96.25%.
- The result will show the level of possibility.
- If the result is of lower possibility the user can take preventive measures.
- If the result is of higher possibility the user can take correct treatment.

DISADVANTAGES

- The accuracy can be made even more better.
- The result is based on user information.

11.CONCLUSION

The proposed CKD diagnostic methodology is feasible in terms of data imputation and samples diagnosis. After unsupervised imputation of missing values in the data set by using KNN imputation, the integrated model could achieve a satisfactory accuracy. Hence, we speculate that applying this methodology to the practical diagnosis of CKD would achieve a desirable effect. In addition, this methodology might be applicable to the clinical data of the other diseases in actual medical diagnosis.

12.FUTURE SCOPE

In the process of establishing the model, due to the limitations of the conditions, the available data samples are relatively small, including only400 samples Therefore, the generalization performance of the model might be limited. In addition, due to there are only two categories (ckd and notckd) of data samples in the data set, the model can not diagnose the severity of CKD. In the future, a large number of more complex and representative data will be collected to train the model to improve the generalization performance while enabling it to detect the severity of the disease. We believe that this model will be more and more perfect by the increase of size and quality of the data.

13.APPENDIX

SOURCE CODE:

app.py:

```
import numpy as np
import pandas as pd
from flask import Flask, request, render_template
import pickle as p
app=Flask(__name__)


import requests


# NOTE: you must manually set API_KEY below using information retrieved from your IBM Cloud account.
API_KEY = "EjnR5QWRh_9zPFHorolJcaYJCPzfYS3xGZeFJlhbtkTS"
token_response = requests.post('https://iam.cloud.ibm.com/identity/token', data={"apikey":
 API_KEY, "grant_type": 'urn:ibm:params:oauth:grant-type:apikey'})
mltoken = token_response.json()["access_token"]


header = {'Content-Type': 'application/json', 'Authorization': 'Bearer ' + mltoken}


@app.route('/')
```

```
def HOME():
    return render_template('home.html')

@app.route('/index')
def index():
    return render_template('index.html')

@app.route('/predict',methods=['POST'])
def prediction():
    form_value=request.form.values()
    data=[]
    for x in form_value:
        data.append(pd.to_numeric(x).astype(float))

    features_name=['age','blood_urea','blood glucose random','coronary_artery_disease',

'anemia','pus_cell','red_blood_cell','diabetesmellitus','pedal_edema']

    payload_scoring = {"input_data": [{"fields": features_name, "values": [data]}]}
```

```
    response_scoring = requests.post('https://us-south.ml.cloud.ibm.com/ml/v4/deployments/a0aba0b4-0d49-4acc-afd3-19c16a042590/predictions?version=2022-11-10', json=payload_scoring,
    headers={'Authorization': 'Bearer ' + mltoken})
    print("Scoring response")
    prediction=response_scoring.json()
    print(prediction)
    output=prediction['predictions'][0]['values'][0][0]



    if(output==0):
        return render_template('index.html' , pred='Oops!! You have Kidney Chronic Disease. So, please concern a Doctor')
    else:
        return render_template('index.html' , pred='you are not affected by Chronic kidney Disease')


if __name__=='__main__':
    app.run(debug=True)
```

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-48248-1660805998

PROJECT DEMO LINK:

https://drive.google.com/folderview?id=1Osz-7Zfw_Tpeop2Q9PomBtynJfuXSpVc