Early Detection of Chronic Kidney Disease using Machine Learning

A PROJECT REPORT

TEAM ID - PNT2022TMID01412

Submitted by

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in partial fulfilment for the award of the

degree of

BACHELOR OF TECHNOLOGY

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TABLE OF FIGURES

Early Detection of Chronic Kidney Disease using Machine Learning

ABSTRACT

Chronic Kidney Disease prediction is one of the most important issues in healthcare analytics. The most interesting and challenging tasks in day to day life is prediction in medical field. In this project, the dataset is collected from UCI machine learning repository as the input for prediction. The dataset consists of attributes and values. This paper aims at predicting the early detection of chronic kidney disease also known as chronic renal disease for diabetic patients With the help of Machine Learning.

1. INTRODUCTION :

Simple blood and urine tests are the only way to determine if someone has CKD. To determine how well the kidneys function, a blood test measures the level of creatinine, a byproduct of muscular activity. An examination of the urine looks for proteins, which could reveal kidney disease.

In many instances, CKD is only identified after a routine blood or urine test you receive for another issue reveals that your kidneys might not be functioning normally.

1.1 PROJECT OVERVIEW :

Your kidneys are harmed and unable to properly filter blood if you have chronic kidney disease (CKD). Your body may accumulate waste as a result of this harm. It may also result in additional issues that are harmful to your health. The most frequent causes of CKD are diabetes and high blood pressure.

The most frequent causes of chronic kidney disease are diabetes and high blood pressure (CKD). In order to determine the cause of your kidney disease, your doctor will examine your medical history and perhaps do certain tests.

1.1 PURPOSE :

This model's goal is to create and validate predictive models for chronic kidney disease. The primary goal will be to determine whether kidney failure necessitates dialysis or a kidney transplant.

2. LITERATURE SURVEY:

2.1 EXISTING PROBLEM:

CKD is a condition in which the kidneys are damaged and cannot filter blood as well as they should. As a result, excess fluid and waste from the blood remain in the body, potentially causing other health issues such as heart disease and stroke. CKD is a condition in which the kidneys are damaged and cannot filter blood as well as they should. As a result, excess fluid and waste from the blood remain in the body, potentially causing other health issues such as heart disease and stroke.

2.2 References:

1) Course of Chronic Kidney Disease in Children Wong CS, Warady BA. YEAR: 2015

2) Impact of obesity on kidney function and blood pressure in children
   Ding W, Cheung WW, Mak RH.   YEAR:2015
3) Predictive Analytics for Chronic Kidney Disease using Machine Tearing
   Techniques Anusorn Charleonnan, Thipwan Fufaung, Tippawan
   Niyomwong, Wandee Chokchueypattanakit, Sathit Suwannawach, Nitat
   Ninchawee.   YEAR: 2016
4) Applying Machine Learning Techniques for Predicting The Risk of
   Chronic Kidney Disease K. R. Anantha Padmanaban and G. Parthiban
   YEAR:2016
5) Heart Disease Prediction Using Machine learning and Data Mining
   Technique Jaymin Patel, Prof.Tejal Upadhyay, Dr. Samir Patel.
   YEAR:2016

2.3 Problem Statement Definition :

A reduction in the burden of kidney disease.People with CKD

will live longer and have a higher quality of life.Early avoidanceDeath cases must be
indicated early. Disease staging using data analytics methods.

3. IDEATION & PROPOSED SOLUTION :

3.1 Empathy Map Canvas :

3.2 Ideation & Brainstorming:
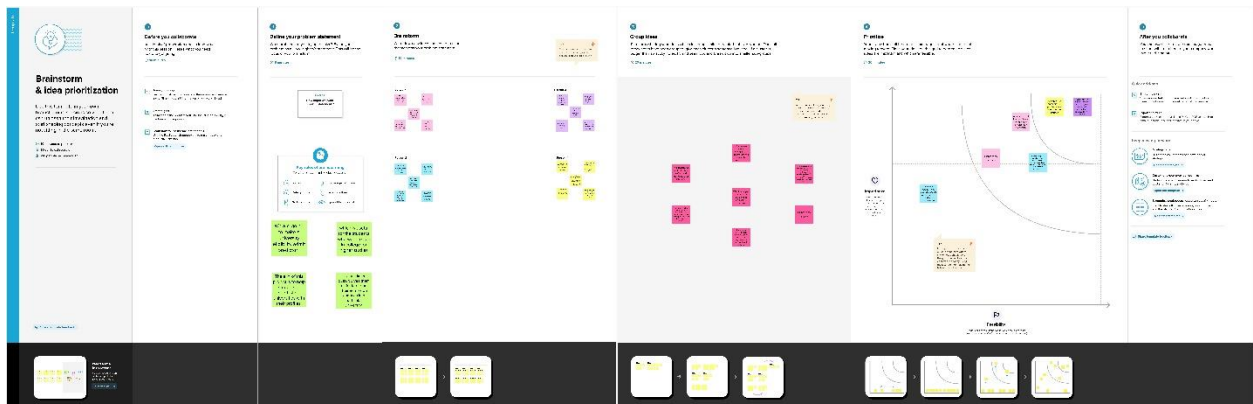
3.3 Proposed Solution:

S.No.	Parameter	Description
1.	Problem Statement (Problem to besolved)	Patients who suffer from chronic kidney diseases need a way to control its progression to an advanced state with early detection and

		appropriate treatment. Machine learning has advanced to the point that it is now possible tolook through patient medical information and identify chronic kidney disease in its early stages.
2.	Idea / Solution description	Since certain data are missing, the initial step is to perform pre-processing by cleaning the dataset, along with scaling and normalisation ofvalues. The next step is to use dimensionality reduction to identify the key features in the dataset and to remove any irrelevant ones. To accomplish early detection of chronic kidney disease utilising the indicated key traits, a decision tree model must be fitted.
3.	Novelty / Uniqueness	• An indicator of how well the kidneys isworking is the amount of a waste product called creatinine in the blood.By examining this data, early kidney disease can be identified by detecting deviations from the norm. • In the case of healthcare managementproducts, it is especially important to have a UI that is very user-friendly andopen to everyone.
4.	Social Impact / Customer Satisfaction	The primary goal of this application is early prediction, and appropriate treatments may beable to prevent or delay the disease's progression to an advanced state.
5.	Business Model (Revenue Model)	• The suggested strategy has the potential to generate income from direct patients as payment for the development of immediate outcomes. • It can also collaborate with the healthcare sector to generate revenuefrom patients who come in for kidney disease diagnosis.

3.4 Problem Solution fit:

Lean Canvas

Define CS, fit into CC	**1. CUSTOMER SEGMENT(S)** `CS` Patients that face mild to severe symptoms ranging from unusual fatigue, high blood pressure, malaise to insufficient urine production, high levels of creatinine, kidney failure; that maybe an indication of a serious health issue like chronic kidney disease prediction.	**6. CUSTOMER CONSTRAINTS** `CC` i. Although free, the web program works on computers, smartphones, and other electronic gadgets, which may be out of reach for the less fortunate members of the society. ii. Requires recent blood/urine test results, making this a requirement for the machine learning model before it can offer a forecast.	**5. AVAILABLE SOLUTIONS** `AS` The primary treatments are lifestyle modifications to keep you as healthy as possible, medication to manage related issues like high blood pressure and high cholesterol, and dialysis. None of these options focuses on early kidney disease detection using data from specific human body testing. All primary therapies may be avoided by quickly completing an early diagnostic.

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC	**2. JOBS-TO-BE-DONE / PROBLEMS** `J&P` The following jobs are to be done: i. Identify the most important diagnostic data that can cause chronic kidney disease ii. Create an ML model that can predict the presence of chronic kidney disease iii. Design an interactive, simple and freely available UI for communicating with the patients.	**9. PROBLEM ROOT CAUSE** `RC` Kidney disease is most frequently brought on by diabetes. However, obesity and heart disease can also contribute to the harm that results in renal failure. Long-term functional decline can also be brought on by problems with the urinary system and inflammation in various kidney regions.	**7. BEHAVIOUR** `BE` First, it is assumed that the patient would undergo a few tests and provide the required results as input to the frontend of the created system. Based on this data, the machine learning model predicts the future. The fact that the application is free to use makes it incredibly beneficial to users.

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM	**3. TRIGGERS** `TR` Patients are encouraged to get a kidney function test if they experience symptoms that point to potential renal issues. These signs and symptoms may include: unusual nausea and vomiting; blood in urine (hematuria) and painful urination (dysuria). **4. EMOTIONS: BEFORE / AFTER** `EM` Patients experience a rush of terror prior to interacting with the suggested system. They will feel relieved and acquire a diagnosis after seeing the results.	**10. YOUR SOLUTION** `SL` Patients with chronic kidney disease require a means to prevent its development into a severe condition by early detection and effective treatment. With the advancement of machine learning, it is now able to search through patient medical records and spot chronic kidney disease in its early stages. The system successfully resolves the aforementioned issue without charging a fee by combining the machine learning model with an intuitive UI.	**8. CHANNELS of BEHAVIOUR** `CH` 8.1. ONLINE In order for the machine learning model to produce predictions, the patients are required to provide the appropriate health check test results into the online application. 8.2. OFFLINE In order to complete the required health examination, patients must visit laboratories or hospitals, from which the information can be entered into the web application.

Identify strong TR & EM

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4. REQUIREMENT ANALYSIS:

4.1 Functional requirement:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Home Page	• Chronic Kidney disease description • Information about Test Vitals required for prediction • If new User , **REGISTER** • If Already exist, **SIGN IN**
FR-2	User Registration	• Enters Mail ID and other personal details required for Registering.

FR-3	User Login	• Uses Mail ID and Password for login
FR-4	Test Vitals Form	• Test Vitals should be entered for prediction
FR-5	Result	• If Positive – Test Result along with the Information about what is to be done next will be displayed. • If Negative – Test result along with preventive measures to prevent themselves from getting Chronic Kidney disease will be displayed.

4.2 Non-functional Requirements:

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Even Illiterates and people with no understanding of computer/mobile should be able to use the product.
NFR-2	**Security**	Access permission for particular system information may be changed by systems data administration.
NFR-3	**Reliability**	The database update process must roll back all related updates when any updates fails.
NFR-4	**Performance**	The Home-page load time must be no more than 2 seconds for users that access the website using an LTE mobile connection.
NFR-5	**Availability**	New Model Deployment must not impact Home page ,test page and result page availability and must not take longer than 1 hour.

NFR-6	Scalability	The website Traffic limit must be scalable enough to support 2000,000 users at a time.

5. PROJECT DESIGN :

5.1 Data Flow Diagrams:
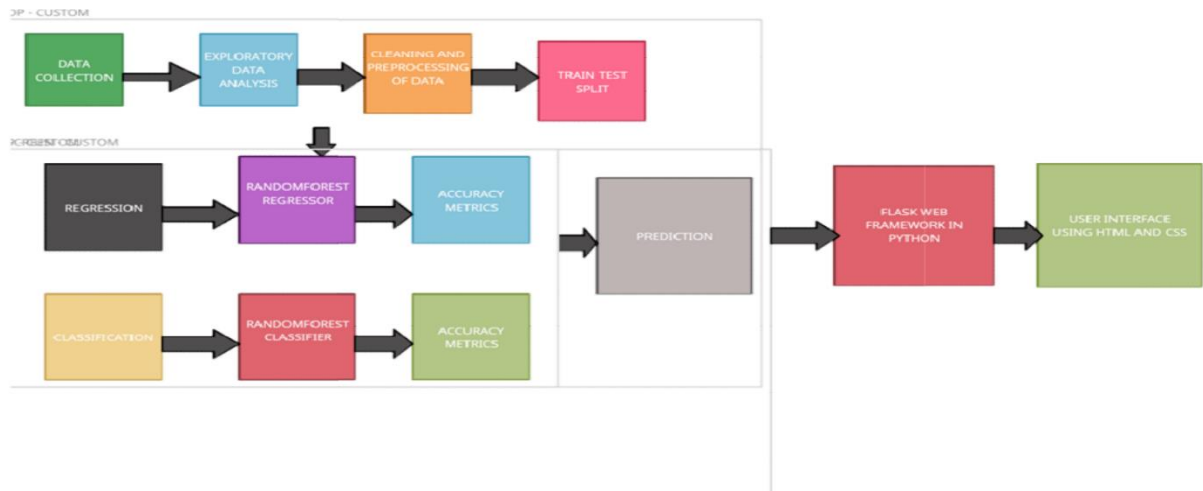
Data Flow of Chronic Disease Prediction

5.2 Solution & Technical Architecture:
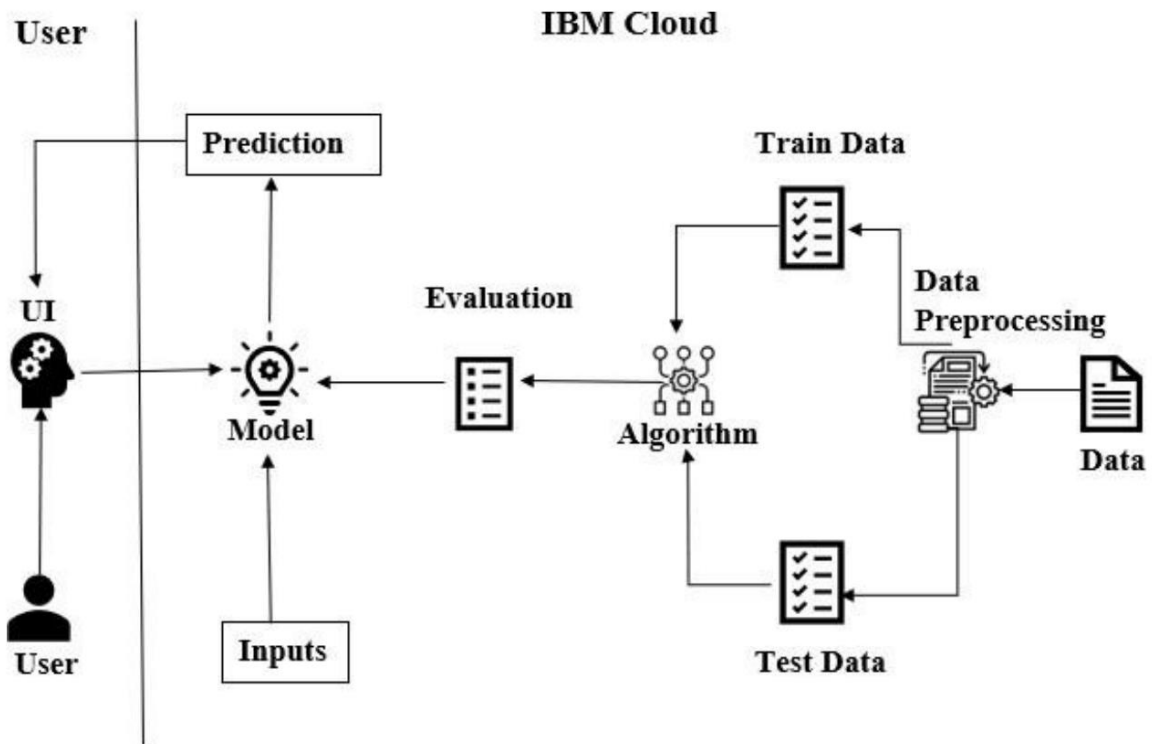
5.3 User Stories:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web 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
	Verification	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
	Login	USN-3	As a user, I can log into the application by entering email & password	Check whether password and email is correct	High	Sprint-1
	Dashboard	USN-4	If the email id and password is correct, the user can log in to application otherwise it shows 'incorrect password or Id'.	View the dashboard of user who is log in	High	Sprint-1
Customer Care Executive	Help	USN-5	If the user faces any issues, he/she an report it to our mail id.	Report option will be available in web app	High	Sprint-2
Administrator	Verification	USN-6	Administrator also has unique Id and password to login. He has additional users to organize the users of this web app	Check whether password and email is correct	High	Sprint-3

6. PROJECT PLANNING & SCHEDULING:

6.1 Sprint Planning & Estimation:

TITLE	DESCRIPTION	DATE
Literature Survey & Information Gathering	Literature survey on the selected project & gathering information by referring the technical papers, research publications , journals etc.	1 SEPTEMBER 2022
Prepare Empathy Map	Prepare Empathy Map Canvas to capture the user Pains & Gains, Prepare list of problem Statements that are to be solved by this project.	8 SEPTEMBER 2022
Ideation	List the ideas by organizing a brainstorming session and prioritize the top 3 ideas based on the feasibility & importance.	15 SEPTEMBER 2022
Proposed Solution	Prepare the proposed solution document, which includes novelty, feasibility of idea, revenue model, social impact, scalability of solution, etc.	21 SEPTEMBER 2022
Problem Solution Fit	Prepare problem - solution fit document.	30 SEPTEMBER 2022
Solution Architecture	Prepare solution architecture document.	28 SEPTEMBER 2022
Customer Journey	Prepare the customer journey maps to understand the user interactions & experiences with the application (entry to exit).	5 OCTOBER 2022
Functional Requirement	Prepare the functional requirement document.	12 OCTOBER 2022

Data Flow Diagrams	Draw the data flow diagrams and submit for review.	12 OCTOBER 2022
Technology Architecture	Prepare the technology architecture diagram.	13 OCTOBER 2022
Prepare Milestone & Activity List	Prepare the milestones & activity list of the project.	22 OCTOBER 2022
Project Development - Delivery of Sprint-1, 2, 3 & 4	Develop & submit the developed code by testing it.	IN PROGRESS..

6.2 Sprint Delivery Schedule:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web 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
	Verification	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
	Login	USN-3	As a user, I can log into the application by entering email & password	Check whether password and email is correct	High	Sprint-1
	Dashboard	USN-4	If the email id and password is correct, the user can log in to application otherwise it shows 'incorrect password or Id'.	View the dashboard of user who is log in	High	Sprint-1
Customer Care Executive	Help	USN-5	If the user faces any issues, he/she an report it to our mail id.	Report option will be available in web app	High	Sprint-2
Administrator	Verification	USN-6	Administrator also has unique Id and password to login. He has additional users to organize the users of this web app	Check whether password and email is correct	High	Sprint-3

7. CODING & SOLUTIONING:

INDEX.HTML:

```html
<html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Early Detection of Chronic Kidney Disease using Machine Learning</title>
<link rel="stylesheet" href="static/style.css">
<link
```

```html
href="https://fonts.googleapis.com/css?family=Poppins:100,200,300,400,600,700
&display=swap" rel="stylesheet">
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">
</head>
<body>
    <section class="header">

        <nav>
            <a href="/"><img src="static/images/images.png"></a>
            <div class="nav-links" id="navLinks">
                <i class="fa fa-close" onclick="hideMenu()"></i>
                <ul>
                    <li><a href="/">HOME</a></li>
                    <li><a href="/about">ABOUT</a></li>
                    <li><a href="/Prediction">PREDICTION</a></li>
                    <li><a href="/result">RESULT</a></li>
                    <li><a href="/contact">CONTACT</a></li>
                </ul>
            </div>
            <i class="fa fa-bars" onclick="showMenu()"></i>
        </nav>

        <div class="text-box">
            <h1>An Early Detection Can Save Many Lives</h1>
            <p>Early Detection of Chronic Kidney Disease using Machine
earning</p>
            <a href="/contact" class="hero-btn">Visit Us to Know More</a>
        </div>
    </section>




<!---------- Symptoms ---------->

    <section class="facility">
        <h1>Symptoms</h1>
        <p>Generally symptoms are not shown explicitly. Some of them are,</p>
            <div class="row">
                <div class="facility-col">
                    <img src="static/images/bp.png">
                    <h3>High BP and Chest pain</h3>
                    <p>High blood pressure is the major symptom of kidney
disease</p>
                </div>
                <div class="facility-col">
                    <img src="static/images/swe.png">
                    <h3>Swelling of legs and ankels</h3>
                    <p>Swelling of legs occurs because of Diabetes
mellitus</p>
                </div>
                <div class="facility-col">
                    <img src="static/images/creatinine.png">
                    <h3>Urinating more or less</h3>
                    <p>The presence of creatinine in blood sample indicates
the CKD</p>
```

```html
                </div>
            </div>
    </section>


<!---------- causes ----------->


    <section class="course">
        <h1>Causes of Chronic Kidney Disease</h1>
        <p></p>
        <div class="row">
            <div class="course-col">
                <h3>Type 1 or type 2 diabetes</h3>
                <p>Diabetes is the leading cause of kidney failure</p>
            </div>
            <div class="course-col">
                <h3>Glomerulonephritis</h3>
                <p>An inflammation of the kidney's filtering units</p>
            </div>
            <div class="course-col">
                <h3>Vesicoureteral</h3>
                <p>A condition that causes urine to back up into your
kidneys</p>
            </div>
        </div>
    </section>



<!-------- footer ---------->

<section class="footer">
        <h4>About Us</h4>
        <p>The only way to find out if people have CKD is through simple
blood and urine tests.
            The blood test checks for the level of creatinine, a waste
product produced by muscles, to see how well the kidneys work. The urine test
checks for protein, which may indicate kidney damage.</p>

        <a href="https://www.sk2bt.com" class="footer-link"><p>Made with <i
class="fa fa-heart-o"></i> by PNT2022TMID01412</p></a>
</section>


<!----JavaScript for toggle menu---->
<script>
    var navLinks = document.getElementById("navLinks");

    function showMenu() {
        navLinks.style.right = "0";
    }

    function hideMenu() {
        navLinks.style.right = "-200px";
    }
</script>
```

```html
</body>
</html>
```

ABOUT.HTML:

```html
<html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Early Detection of Chronic Kidney Disease using Machine
Learning</title>
<link rel="stylesheet" href="static/style.css">
<link
href="https://fonts.googleapis.com/css?family=Poppins:100,200,300,400,600,700
&display=swap" rel="stylesheet">
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">
</head>
<body>
    <section class="sub-header">
        <nav>
            <a href="/"><img src="static/images/images.png"></a>
            <div class="nav-links" id="navLinks">
                <i class="fa fa-close" onclick="hideMenu()"></i>
                <ul>
                    <li><a href="/">HOME</a></li>
                    <li><a href="/about">ABOUT</a></li>
                    <li><a href="/Prediction">PREDICTION</a></li>
                    <li><a href="/result">RESULT</a></li>
                    <li><a href="/contact">CONTACT</a></li>
                </ul>
            </div>
            <i class="fa fa-bars" onclick="showMenu()"></i>
        </nav>
            <h1>About Us</h1>
    </section>


<!------- about us content -------->

<section class="about-us">
    <div class="row">
        <div class="about-col">
            <h1>Chronic Kidney Disease using Machine Learning</h1>
            <p>The only way to find out if people have CKD is through simple
blood and urine tests. The blood test checks for the level of creatinine, a
waste product produced by muscles,
                to see how well the kidneys work. The urine test checks for
protein, which may indicate kidney damage.</p>
            <a
href="https://www.youtube.com/c/EasyTutorialsVideo?sub_confirmation=1"
```

```html
class="hero-btn red-btn">EXPOLER NOW</a>
        </div>
        <div class="about-col">
            <img src="static/images/about1.jpg">
        </div>
    </div>
</section>


<!-------- footer ---------->

<section class="footer">
        <h4>About Us</h4>
    <p>The only way to find out if people have CKD is through simple blood
and urine tests. The blood test checks for the level of creatinine,</p>
        <p> a waste product produced by muscles, to see how well the
kidneys work. The urine test checks for protein, which may indicate kidney
damage.</p>
        <div class="icons">
            <i class="fa fa-facebook"></i>
            <i class="fa fa-twitter"></i>
            <i class="fa fa-instagram"></i>
            <i class="fa fa-linkedin"></i>
        </div>
        <p>Made with <i class="fa fa-heart-o"></i> by PNT2022TMID01412</p>
</section>


<!----JavaScript for toggle menu---->
<script>
    var navLinks = document.getElementById("navLinks");

    function showMenu() {
        navLinks.style.right = "0";
    }

    function hideMenu() {
        navLinks.style.right = "-200px";
    }
</script>

</body>
</html>
```

PREDICATION.HTML:

```html
                <html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Early Detection of Chronic Kidney Disease using Machine
Learning</title>
<link rel="stylesheet" href="static/style.css">
<link
href="https://fonts.googleapis.com/css?family=Poppins:100,200,300,400,600,700
&display=swap" rel="stylesheet">
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">
```

```html
</head>
<body>
    <section class="sub-header">
        <nav>
            <a href="/"><img src="static/images/images.png"></a>
            <div class="nav-links" id="navLinks">
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                <ul>
                    <li><a href="/">HOME</a></li>
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                    <li><a href="/Prediction">PREDICTION</a></li>
                    <li><a href="/result">RESULT</a></li>
                    <li><a href="/contact">CONTACT</a></li>
                </ul>
            </div>
            <i class="fa fa-bars" onclick="showMenu()"></i>
        </nav>

    </section>

<!---------- Blog Page Content ---------->

    <section class="blog-content">
    <div class="row">
    <div class="blog-left">
        <img src="static/images/prediction.jpg">
        <h2>Early Detection of Chronic Kidney Disease</h2>

        <p>Living with diabetes is difficult, thinking about what you eat.
But controlling the sugar levels are really important for helping kidney
function and specifically slowing down any damage to the kidneys. Newer drugs
that have come out in the last couple years can help with this, as well as
working with your primary care physician or endocrinologist with your current
therapies to get better sugar control.

We really want to help your health and so losing weight can be a key
component to reducing your risk of progressing with kidney disease. Reducing
calorie intake, which is either smaller portions, less snacking in between
meals, and then thinking about burning calories with increasing your
exercise, are great steps forward in starting that journey towards weight
loss.

We look to get blood pressure less than 130 systolic, that's the top number.
And less than 80 diastolic, that's the bottom number, on blood pressure
readings. There are a number of different drugs that we can use to do this.
And this will help both with your cardiovascular health, but slowing down any
kidney disease progression over time as well.</p>
        <br>


    <div class="blog-right">


            <h3>CKD Categories</h3>
            <div>
                <span>Stage 1 Normal</span>
```

```html
            <span>GFR>90mL/min</span>
        </div>
        <div>
            <span>Stage 2 Mild CKD</span>
            <span>GFR=60-89mL/min</span>
        </div>
        <div>
            <span>Stage 3A Moderate CKD</span>
            <span>GFR=45-59mL/min</span>
        </div>
        <div>
            <span>Stage 3B Moderate CKD</span>
            <span>GFR=30-44mL/min</span>
        </div>
        <div>
            <span>Stage 4 Severe CKD</span>
            <span>GFR=15-29mL/min</span>
        </div>
        <div>
            <span>Stage 5 End Stage CKD</span>
            <span>GFR<15mL/min</span>
        </div>

    </div>

  </div>
  </section>


<form action="{{url_for('predict')}}" method="POST">

 <section >
                <div class="row">
                        <form id="appointment-form" role="form"
method="post" action="#">



                        <div style="background-color:pink;text-align:
center;">
                                <h1><strong>Chronic Kidney
Disease</strong></h1><h3>Machine Learning </h3>
                        </div>
                <br/>
                <br/>
                        <div>
                        <div class="col-md-6 col-sm-6">
                                <label for="name">Blood Urea</label>
                                <input type="number" class="form-
control" id="name" name="blood_urea" placeholder="Blood Urea Level">
                        </div>

                        <div class="col-md-6 col-sm-6">
                                <label for="name">Blood Glucose
Random</label>
                                <input type="number" class="form-
control" id="name1" name="blood_glucose_random" placeholder="Blood Glucose
```

```html
Level Random">
                                          </div>

                                          <div class="col-md-6 col-sm-6">
                                                <label for="select">Select
Anemia</label>

                                                <select name = "Anemia">
                                                      <option value = "yes">
yes</option>

                                                      <option value = "no">no
</option>

                                                </select>
                                          </div>

                                          <div class="col-md-6 col-sm-6">
                                                <label for="select">Select Coronary
Artery Disease</label>

                                                <select name =
"coronary_artery_disease">

                                                      <option value = "yes">
yes</option>

                                                      <option value = "no">no
</option>

                                                </select>
                                          </div>

                                          <div class="col-md-6 col-sm-6">
                                                <label for="select">Select Pus
Cell</label>

                                                <select name = "pus_cell">
                                                      <option value = "yes">
yes</option>

                                                      <option value = "no">no
</option>

                                                </select>
                                          </div>

                                          <div class="col-md-6 col-sm-6">
                                                <label for="select">Select Red Blood
Cell</label>

                                                <select name = "red_blood_cell">
                                                      <option value = "yes">
yes</option>

                                                      <option value = "no">no
</option>

                                                </select>
                                          </div>

                            <div class="col-md-6 col-sm-6">
                                                <label for="select">Select Diabetics
Mellitus</label>

                                                <select name = "diabetics_mellitus">
                                                      <option value = "yes">
yes</option>

                                                      <option value = "no">no
</option>

                                                </select>
```

```html
                                          </div>

                                          <div class="col-md-6 col-sm-6">
                                              <label for="select">Select Pedal
Edema</label>

                                              <select name = "pedal_edema">
                                                  <option value = "yes">
yes</option>

                                                  <option value = "no">no
</option>

                                              </select>
                                          </div>
                                          <div class="col-md-12 col-sm-12">
                                              <button type="submit" class="form-
control" id="cf-submit" name="submit">predict</button>

                                          </div>
                                      </div>
                  </form>

              </div>
          </section>

<!-------- footer ---------->

<section class="footer">
        <h4>About Us</h4>
        <p>The only way to find out if people have CKD is through simple
blood and urine tests. The blood test checks for the level of creatinine, a
waste product produced by muscles, to see how well the kidneys work. The
urine test checks for protein, which may indicate kidney damage.</p>
        <div class="icons">
            <i class="fa fa-facebook"></i>
            <i class="fa fa-twitter"></i>
            <i class="fa fa-instagram"></i>
            <i class="fa fa-linkedin"></i>
        </div>
        <p>made with <i class="fa fa-heart-o"></i> by PNT2022TMID01412</p>
</section>


<!----JavaScript for toggle menu---->
<script>
    var navLinks = document.getElementById("navLinks");

    function showMenu() {
        navLinks.style.right = "0";
    }

    function hideMenu() {
        navLinks.style.right = "-200px";
    }
</script>

</body>
</html>
```

RESULT.HTML:

```html
        <html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Early Detection of Chronic Kidney Disease using Machine
Learning</title>
<link rel="stylesheet" href="static/style.css">
<link
href="https://fonts.googleapis.com/css?family=Poppins:100,200,300,400,600,700
&display=swap" rel="stylesheet">
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">
</head>
<body id="top">
    <section class="sub-header">
        <nav>
            <a href="/"><img src="static/images/images.png"></a>
            <div class="nav-links" id="navLinks">
                <i class="fa fa-close" onclick="hideMenu()"></i>
                <ul>
                    <li><a href="/">HOME</a></li>
                    <li><a href="/about">ABOUT</a></li>
                    <li><a href="/Prediction">PREDICTION</a></li>
                    <li><a href="/result">RESULT</a></li>
                    <li><a href="/contact">CONTACT</a></li>
                </ul>
            </div>
            <i class="fa fa-bars" onclick="showMenu()"></i>
        </nav>
            <h1>Prediction Result</h1>
    </section>


<section>
        <div class="container">
            <div class="row">

            <div style="background-color:pink;text-align: center;">
                    <h1>Chronic Kidney Disease</h1><h3>Machine Learning
Web Application</h3>
                </div>
            <br/>
            <br/>

                <div class="col-md-8 col-sm-7">
                    {{prediction_text}}
                    {% if prediction_text==1%}

                     <div >
                        <h2>Medical Result</h2>
                        <p>Your Condition is normal.</p>
                        <blockquote>You are not having chronic kidney
disease.</blockquote>
                        <img src="static\images\result2.jpg" width="300"
height="300"/>
```

```html
                <p></p>

          </div>
        {%else%}
        <div >
                <h2>Medical Result</h2>
                <p>Your Condition is abnormal.</p>
                <blockquote>You are having chronic kidney
disease.</blockquote>

                <img src="static\images\result1.jpg"
width="300" height="300"/>

                <p></p>

          </div>
        {% endif %}

      </div>

      <div class="col-md-4 col-sm-5">
            <div class="news-sidebar">

            </div>
      </div>

        </div>
      </div>
  </section>


<!-------- footer ---------->

<section class="footer">
      <h4>About Us</h4>
      <p>The only way to find out if people have CKD is through simple
blood and urine tests. The blood test checks for the level of creatinine, a
waste product produced by muscles, to see how well the kidneys work. The
urine test checks for protein, which may indicate kidney damage.</p>
      <div class="icons">
          <i class="fa fa-facebook"></i>
          <i class="fa fa-twitter"></i>
          <i class="fa fa-instagram"></i>
          <i class="fa fa-linkedin"></i>
      </div>
      <p>made with <i class="fa fa-heart-o"></i> by PNT2022TMID01412</p>
</section>


<!----JavaScript for toggle menu---->
<script>
    var navLinks = document.getElementById("navLinks");

    function showMenu() {
        navLinks.style.right = "0";
    }

    function hideMenu() {
        navLinks.style.right = "-200px";
    }
```

```
</script>

</body>
</html>
```

CONTACT.HTML:

```html
                    <html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Early Detection of Chronic Kidney Disease using Machine
Learning</title>
<link rel="stylesheet" href="style.css">
<link
href="https://fonts.googleapis.com/css?family=Poppins:100,200,300,400,600,700
&display=swap" rel="stylesheet">
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">
</head>
<body>
    <section class="sub-header">
        <nav>
            <a href="/"><img src="static/images/images.png"></a>
            <div class="nav-links" id="navLinks">
                <i class="fa fa-close" onclick="hideMenu()"></i>
                <ul>
                    <li><a href="/">HOME</a></li>
                    <li><a href="/about">ABOUT</a></li>
                    <li><a href="/Prediction">PREDICTION</a></li>
                    <li><a href="/result">RESULT</a></li>
                    <li><a href="/contact">CONTACT</a></li>
                </ul>
            </div>
            <i class="fa fa-bars" onclick="showMenu()"></i>
        </nav>
            <h1>Contact Us</h1>
    </section>


<!------- Contact Us ------->


    <section class="location">
            <iframe
src="https://www.google.com/maps/embed?pb=!1m18!1m12!1m3!1d3887.368144678623!
2d77.55384341419037!3d13.012212417508028!2m3!1f0!2f0!3f0!3m2!1i1024!2i768!4f1
3.1!3m3!1m2!1s0x3bae3d7f3535d71b%3A0x660d25b66e9fb25c!2sWorld+Trade+Centre!5e
0!3m2!1sen!2sin!4v1565255080367!5m2!1sen!2sin" width="720" height="445"
frameborder="0" style="border:0" allowfullscreen></iframe>
    </section>

    <section class="contact-us">
            <div class="row">
                <div class="contact-col">
                    <div>
```

```html
                    <i class="fa fa-home"></i>
                    <span>
                        <h5> Panimalar Engineering College</h5>
                        <p>Chennai,TamilNadu,India</p>
                    </span>
                </div>
                <div>
                    <i class="fa fa-phone"></i>
                    <span>
                        <h5>+1 0123456789</h5>
                        <p>Monday to Saturday 10 Am to 6 Pm</p>
                    </span>
                </div>
                <div>
                    <i class="fa fa-envelope-o"></i>
                    <span>
                        <h5>info@pnt2022tmid01412.com</h5>
                        <p>Email us your query</p>
                    </span>
                </div>
            </div>
            <div class="contact-col">
                <form method="post" action="contact-form-handler.php">
                <input type="text" name="name" placeholder="Enter your
name" required>
                <input type="email" name="email" placeholder="Enter email
address" required>
                <input type="text" name="subject" placeholder="Enter your
subject" required>
                <textarea rows="8" name="message" placeholder="Message"
required></textarea>
                <button type="submit" class="hero-btn red-btn">Send
Message</button>
                </form>
            </div>
        </div>
    </section>

<!-------- footer ---------->

<section class="footer">
    <h4>About Us</h4>
    <p>The only way to find out if people have CKD is through simple
blood and urine tests. The blood test checks for the level of creatinine, a
waste product
        produced by muscles, to see how well the kidneys work. The urine
test checks for protein, which may indicate kidney damage.</p>
    <div class="icons">
        <i class="fa fa-facebook"></i>
        <i class="fa fa-twitter"></i>
        <i class="fa fa-instagram"></i>
        <i class="fa fa-linkedin"></i>
    </div>
    <p>made with <i class="fa fa-heart-o"></i> by PNT2022TMID01412</p>
</section>
```

```html
<!----JavaScript for toggle menu---->
<script>
    var navLinks = document.getElementById("navLinks");

    function showMenu() {
        navLinks.style.right = "0";
    }

    function hideMenu() {
        navLinks.style.right = "-200px";
    }
</script>

</body>
</html>
```

APP.PY:

```python
        import numpy as np
import pandas as pd
import sklearn
from flask import Flask, request, render_template
import pickle5 as pickle


app = Flask(__name__)
model = pickle.load(open('Models/modeling.pkl', 'rb'))


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


@app.route('/Prediction', methods=['POST', 'GET'])
def prediction():
    return render_template('prediction.html')


@app.route('/Home', methods=['POST', 'GET'])
def my_home():
    return render_template('index.html')

@app.route('/result', methods=['POST', 'GET'])
def result():
    return render_template('result.html')

@app.route('/predict', methods=['POST'])
def predict():
    x=input()
    input_features = ([int(x) for x in request.form.values()])
    blood_urea = request.form["blood_urea"]
    blood_glucose_random = request.form["blood_glucose_random"]
    anemia = request.form["Anemia"]
    if (anemia == "no"):
```

```python
        anemia = 0
    if (anemia == "yes"):
        anemia = 1
    coronary_artery_disease = request.form["coronary_artery_disease"]
    if (coronary_artery_disease == "no"):
        coronary_artery_disease = 0
    if(coronary_artery_disease == "yes"):
        coronary_artery_disease = 1

    pus_cell = request.form["pus_cell"]
    if (pus_cell == "no"):
        pus_cell = 0
    if (pus_cell == "yes"):
        pus_cell = 1

    red_blood_cell = request.form["red_blood_cell"]
    if (red_blood_cell == "no"):
        red_blood_cell = 0
    if (red_blood_cell == "yes"):
        red_blood_cell = 1

    diabetics_mellitus = request.form["diabetics_mellitus"]
    if (diabetics_mellitus == "no"):
        diabetics_mellitus = 0
    if (diabetics_mellitus == "yes"):
        diabetics_mellitus = 1

    pedal_edema = request.form["pedal_edema"]
    if (pedal_edema == "no"):
        pedal_edema = 0
    if (pedal_edema == "yes"):
        pedal_edema = 1

    input_features =
[int(blood_urea),int(blood_glucose_random),int(anemia),int(coronary_artery_di
sease),int(pus_cell),int(red_blood_cell),int(diabetics_mellitus),int(pedal_ed
ema)]
    input_features =
[int(red_blood_cell),int(pus_cell),int(blood_glucose_random),int(blood_urea),
int(pedal_edema),int(anemia),int(diabetics_mellitus),int(coronary_artery_dise
ase)]
    print(input_features)
    features_value = [np.array(input_features)]


    features_name = ['red_blood_cells','pus_cell','blood glucose
random','blood_urea','pedal_edema','anemia','diabetesmellitus','coronary_arte
ry_disease']
    features_name = ['blood_urea','blood glucose
random','anemia','coronary_artery_disease','pus_cell','red_blood_cells','diab
etesmellitus','pedal_edema' ]
    df = pd.DataFrame(features_value, columns=features_name)
    output = model.predict(df)
    return render_template('result.html', prediction_text=output)

@app.route('/about')
def about():
```

```python
        return render_template('about.html')

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

# Press the green button in the gutter to run the script.
if __name__ == '__main__':
        app.run(host='localhost', debug=True)
```

STYLE.CSS:

```css
                *{
    margin: 0;
    padding: 0;
    font-family: 'Poppins', sans-serif;
}
.header{
    min-height: 100vh;
    width: 100%;
    background-image: linear-
gradient(rgba(4,9,30,0.7),rgba(4,9,30,0.7)),url(images/about1.png);
    background-position: center;
    background-size: cover;
    position: relative;
    overflow: hidden;
}

nav{
    display: flex;
    padding: 2% 4%;
    justify-content: space-between;
    align-items: center;
}
nav img{
    width: 135px;
}
.nav-links{
    flex: 1;
    text-align: right;
}
.nav-links ul li{
    list-style: none;
    display: inline-block;
    padding: 8px 12px;
    position: relative;
}
.nav-links ul li a{
    color: #fff;
    text-decoration: none;
    font-size: 13px;
}
.nav-links ul li::after{
    content: '';
    width: 0%;
```

```css
        height: 2px;
        background: #f44336;
        display: block;
        margin: auto;
        transition: .5s;
}
.nav-links ul li:hover::after{
        width: 100%;
}
nav .fa{
        display: none;
}

.text-box{
        width: 90%;
        color: #fff;
        position: absolute;
        top: 50%;
        left: 50%;
        transform: translate(-50%, -50%);
        text-align: center;
}
.text-box h1{
        font-size: 62px;
}
.text-box p{
        margin: 20px 0 40px;
        font-size: 14px;
        color: #fff;
}
.hero-btn {
        display: inline-block;
        text-decoration: none;
        color: #fff;
        border: 1px solid #fff;
        padding: 12px 34px;
        font-size: 13px;
        background: transparent;
        position: relative;
        cursor: pointer;
        transition: 1s;
}

.hero-btn:hover{
        border: 1px solid #f44336;
        background: #f44336;
}


@media(max-width: 700px)
{
    .nav-links ul li
    {
        display: block;
    }
    .nav-links
    {
```

```css
        position: fixed;
        background: #f44336;
        height: 100vh;
        width: 200px;
        top: 0;
        right: -200px;
        text-align: left;
        z-index: 2;
        transition: 0.5s;
    }
    .nav-links ul{
        padding: 30px;
    }
    nav .fa{
        display: block;
        color: #fff;
        margin: 10px;
        font-size: 22px;
        cursor: pointer;
    }
    .text-box h1{
        font-size: 20px;
    }
}

/*---------- course --------*/

.course{
    width: 80%;
    margin: auto;
    text-align: center;
    padding-top: 100px;
}
h1{
    font-size: 36px;
    font-weight: 600;
}
p{
    color: #777;
    font-size: 14px;
    font-weight: 300;
    line-height: 22px;
    padding: 10px;
}
.row{
    margin-top: 5%;
    display: flex;
    justify-content: space-between;
}

.course-col{
    flex-basis: 31%;
    background: #fff3f3;
    border-radius: 10px;
    margin-bottom: 5%;
    padding: 20px 12px;
    box-sizing: border-box;
```

```css
        transition: .5s;
    }
    h3{
        text-align: center;
        font-weight: 600;
        margin: 10px 0;
    }
    .course-col:hover{
        box-shadow: 0 0 20px 0px rgba(0, 0, 0, 0.2);
    }

    @media (max-width:700px){
        .row{
            flex-direction: column;
        }
    }

    /*---------------- campus ----------------*/

    .campus{
        width: 80%;
        margin: auto;
        text-align: center;
        padding-top: 50px;
    }
    .campus-col{
        flex-basis: 32%;
        border-radius: 10px;
        margin-bottom: 30px;
        position: relative;
        overflow: hidden;
    }
    .campus-col img{
        width: 100%;
    }

    .layer{
        background: transparent;
        height: 100%;
        width: 100%;
        top: 0;
        left: 0;
        position: absolute;
        transition: .5s;
    }
    .layer:hover{
        background: rgba(226, 0, 0, 0.7);
    }
    .layer h3{
        width: 100%;
        font-weight: 500;
        color: #fff;
        font-size: 26px;
        bottom: 0;
        left: 50%;
        transform: translateX(-50%);
        position: absolute;
    }
```

```css
        opacity: 0;
        transition: .5s;
    }
    .layer:hover h3{
        bottom: 49%;
        opacity: 1;
    }

    /*-------------- Facilities ----------------*/

    .facility{
        width: 80%;
        margin: auto;
        text-align: center;
        padding-top: 100px;
    }
    .facility-col{
        flex-basis: 31%;
        border-radius: 10px;
        margin-bottom: 5%;
        text-align: left;
    }
    .facility-col img{
        width: 100%;
        border-radius: 10px;
    }
    .facility-col p{
        padding: 0;
    }
    .facility-col h3{
        margin-top: 16px;
        margin-bottom: 15px;
        text-align: left;
    }

    /*--------------- testimonials -----------------*/

    .testimonials{
        width: 80%;
        margin: auto;
        padding-top: 100px;
        text-align: center;
    }

    .testimonial-col{
        flex-basis: 44%;
        border-radius: 10px;
        margin-bottom: 5%;
        text-align: left;
        background: #fff3f3;
        padding: 25px;
        cursor: pointer;
        display: flex;
    }
    .testimonial-col img{
        height: 40px;
        margin-left: 5px;
```

```css
    margin-right: 30px;
    border-radius: 50%;
}
.testimonial-col p{
    padding: 0;
}
.testimonial-col h3{
    margin-top: 15px;
    text-align: left;
}
.testimonial-col .fa{
    color: #f44336;
}

@media(max-width:700px){
    .testimonial-col img{
        margin-left: 0px;
        margin-right: 15px;
    }
}

/*-------- Call To Action ----------*/


.cta{
    margin: 100px auto;
    width: 80%;
    background-image: linear-
gradient(rgba(0,0,0,0.7),rgba(0,0,0,0.7)),url(images/banner2.jpg);
    background-position: center;
    background-size: cover;
    border-radius: 10px;
    text-align: center;
    padding: 100px 0;
}
.cta h1{
    color: #fff;
    margin-bottom: 40px;
    padding: 0;
}

@media(max-width:700px){
    .cta h1{
        font-size: 24px;
    }
}

/*-------------Footer--------------*/

.footer{
    width: 100%;
    text-align: center;
    padding: 30px 0;
}
.footer h4{
    margin-bottom: 25px;
    margin-top: 20px;
```

```css
        font-weight: 600;
}

.icons .fa{
        color: #f44336;
        margin: 0 13px;
        cursor: pointer;
        padding: 18px 0;
}
.fa-heart-o{
        color: #f44336;
}


/*--------------- About Us Page --------------*/


.sub-header{
        height: 50vh;
        width: 100%;
        background-image: linear-
gradient(rgba(4,9,30,0.7),rgba(4,9,30,0.7)),url(images/background.jpg);
        background-position: center;
        background-size: cover;
        text-align: center;
        color: #fff;
}
.sub-header h1{
        margin-top: 100px;
}
.about-us{
        width: 80%;
        margin: auto;
        padding-top: 80px;
        padding-bottom: 50px;
}

.about-col{
        flex-basis: 48%;
        padding: 30px 2px;
}
.about-col h1{
        padding-top: 0;
}
.about-col p{
        padding: 15px 0 25px;
}

.hero-btn.red-btn{
        border: 1px solid #f44336;
        background: transparent;
        color: #f44336;
}
.hero-btn.red-btn:hover{
        border: 1px solid #f44336;
        background: #f44336;
        color: #fff;
```

```css
}
.hero-btn.red-btn::after{
    background: #f44336;
}
.hero-btn.red-btn::before{
    background: #f44336;
}
.content-image{
    flex-basis: 50%;
}
.about-col img{
    width: 100%;
}

/*---------- Blog Page ------------*/

.blog-content{
    width: 80%;
    margin: auto;
    padding: 60px 0;
}
.blog-left{
    flex-basis: 65%;
}
.blog-right{
    flex-basis: 32%;
}
.blog-left img{
    width: 100%;
}
.blog-left h2{
    color: #222;
    font-weight: 600;
    margin: 30px 0;
}
.blog-left p{
    color: #999;
    padding: 0;
}

.blog-right h3{
    background: #f44336;
    color: #fff;
    padding: 7px 0;
    font-size: 16px;
    margin-bottom: 20px;
}
.blog-right div{
    display: flex;
    align-items: center;
    justify-content: space-between;
    color: #555;
    padding: 8px;
    box-sizing: border-box;
}

.comment-box{
```

```css
        border: 1px solid #ccc;
        margin: 50px 0;
        padding: 10px 20px;
    }

    .comment-box h3{
        text-align: left;
    }
    .comment-form input, .comment-form textarea{
        width: 100%;
        padding: 10px;
        margin: 15px 0;
        box-sizing: border-box;
        border: none;
        outline: none;
        background: #f0f0f0;
    }
    .comment-form button{
        margin: 10px 0;
    }


    @media (max-width:700px){
        .sub-header h1{
            font-size: 24px;
        }
    }


    /*------- Contact Us Page ------------*/

    .location{
        width: 80%;
        margin: auto;
        padding: 80px 0;
    }
    .location iframe{
        width: 100%;
    }

    .contact-us{
        width: 80%;
        margin: auto;
    }
    .contact-col{
        flex-basis: 48%;
        margin-bottom: 30px;
    }

    .contact-col div{
        display: flex;
        align-items: center;
        margin-bottom: 40px;
    }

    .contact-col div .fa{
        font-size: 28px;
```

```
    color: #f44336;
    margin: 10px;
    margin-right: 30px;
}

.contact-col div p{
    padding: 0;
}
.contact-col div h5{
    font-size: 20px;
    margin-bottom: 5px;
    color: #555;
    font-weight: 400;

}
.contact-col input, .contact-col textarea{
    width: 100%;
    padding: 15px;
    margin-bottom: 17px;
    outline: none;
    border: 1px solid #ccc;
}

.footer-link{
    text-decoration: none;
    color: #777;
}
```

8. TESTING:

8.1 Test Cases:

A test case has components that describe input, action and an expected response, in order to determine if a feature of an application is working correctly. A test case is a set of instructions on "HOW" to validate a user input is correct or check their crtiriea match our database or not.

8.2 User Acceptance testing:

Users, clients, or other authorized organizations conduct this type of testing to determine the specifications and operational practices of an application or piece of software. Acceptance testing is the most important testing phase since it establishes whether or not the customer will accept the application or software. It could involve the user interface, functionality, usability, and usefulness of the application. It is also known as operational acceptance testing, user acceptability testing, and end-user testing (UAT).

9. RESULTS:
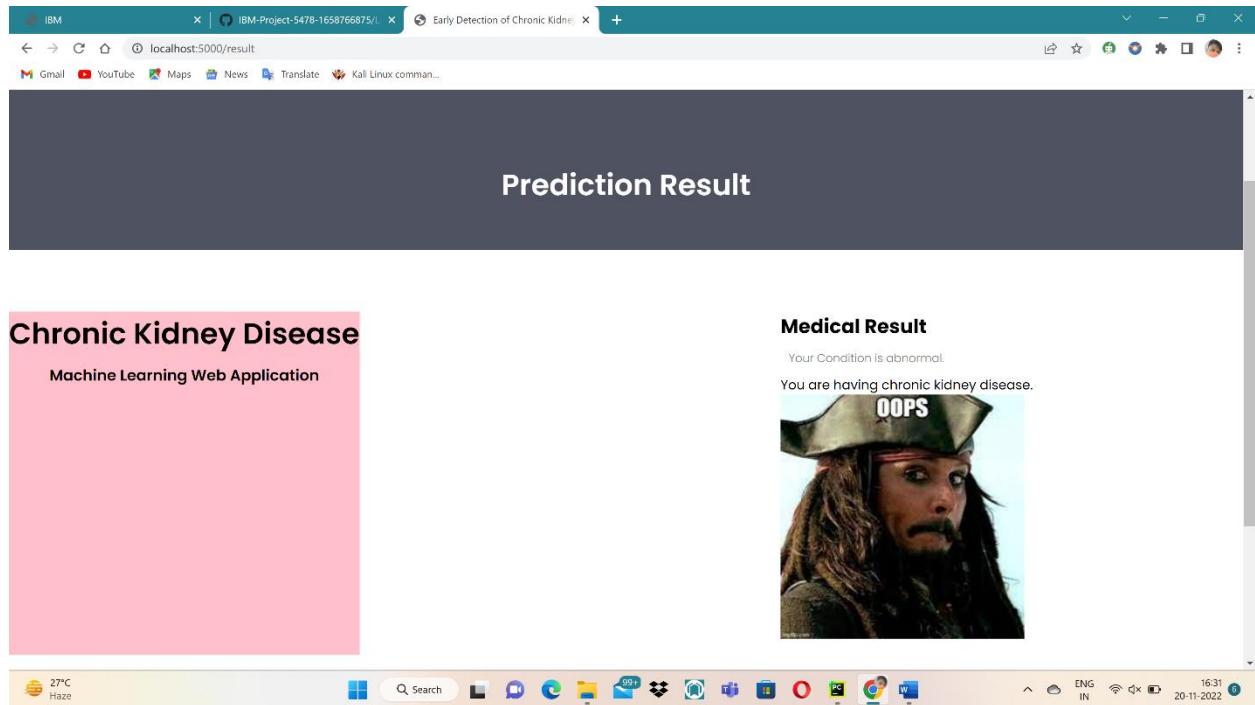
10. ADVANTAGE AND DISADVANTAGE :

- This software has several advantages, including the ability to serve as an expert guide to doctors in the early detection of chronic kidney disease. It is also seen in performance metrics that it has an accuracy of 95%, giving users confidence.

- Machine Learning is self-sufficient, but it is prone to errors. Assume you train an algorithm with data sets that are too small to be inclusive. As a result of a biassed training set, you get biassed predictions.

11. CONCLUSION :

- This project has guided team members in understanding various concepts of machine learning, Flask file, IBM cloud, and Python notebook.
- Therefore this project can be scaled for use in the prediction of other chronic diseases, which will help doctors in the diagnosis of disease at an early stage, thereby aiding in the early detection of various diseases.

12. FUTURE SCOPE :

By modifying the dataset and user inputs, this technology can be used to detect a wide range of other chronic diseases. To improve accuracy, the model can be further trained with huge amounts of data.

13. APPENDIX

Source Code:

FRONT-END:

INDEX.HTML:

```html
<html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Early Detection of Chronic Kidney Disease using Machine
Learning</title>
<link rel="stylesheet" href="static/style.css">
<link
href="https://fonts.googleapis.com/css?family=Poppins:100,200,300,400,600,700
&display=swap" rel="stylesheet">
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">
</head>
<body>
    <section class="header">

        <nav>
            <a href="/"><img src="static/images/images.png"></a>
            <div class="nav-links" id="navLinks">
                <i class="fa fa-close" onclick="hideMenu()"></i>
                <ul>
                    <li><a href="/">HOME</a></li>
                    <li><a href="/about">ABOUT</a></li>
                    <li><a href="/Prediction">PREDICTION</a></li>
                    <li><a href="/result">RESULT</a></li>
                    <li><a href="/contact">CONTACT</a></li>
                </ul>
            </div>
            <i class="fa fa-bars" onclick="showMenu()"></i>
        </nav>

        <div class="text-box">
            <h1>An Early Detection Can Save Many Lives</h1>
            <p>Early Detection of Chronic Kidney Disease using Machine
earning</p>
            <a href="/contact" class="hero-btn">Visit Us to Know More</a>
        </div>
    </section>
```

```html
<!---------- Symptoms ---------->

    <section class="facility">
        <h1>Symptoms</h1>
        <p>Generally symptoms are not shown explicitly. Some of them are,</p>
            <div class="row">
                <div class="facility-col">
                    <img src="static/images/bp.png">
                    <h3>High BP and Chest pain</h3>
                    <p>High blood pressure is the major symptom of kidney
disease</p>
                </div>
                <div class="facility-col">
                    <img src="static/images/swe.png">
                    <h3>Swelling of legs and ankels</h3>
                    <p>Swelling of legs occurs because of Diabetes
mellitus</p>
                </div>
                <div class="facility-col">
                    <img src="static/images/creatinine.png">
                    <h3>Urinating more or less</h3>
                    <p>The presence of creatinine in blood sample indicates
the CKD</p>
                </div>
            </div>
    </section>


<!---------- causes ---------->

    <section class="course">
        <h1>Causes of Chronic Kidney Disease</h1>
        <p></p>
        <div class="row">
            <div class="course-col">
                <h3>Type 1 or type 2 diabetes</h3>
                <p>Diabetes is the leading cause of kidney failure</p>
            </div>
            <div class="course-col">
                <h3>Glomerulonephritis</h3>
                <p>An inflammation of the kidney's filtering units</p>
            </div>
            <div class="course-col">
                <h3>Vesicoureteral</h3>
                <p>A condition that causes urine to back up into your
kidneys</p>
            </div>
        </div>
    </section>



<!-------- footer ---------->

<section class="footer">
        <h4>About Us</h4>
        <p>The only way to find out if people have CKD is through simple
```

blood and urine tests.
The blood test checks for the level of creatinine, a waste
product produced by muscles, to see how well the kidneys work. The urine test
checks for protein, which may indicate kidney damage.</p>

```html
        <a href="https://www.sk2bt.com" class="footer-link"><p>Made with <i
class="fa fa-heart-o"></i> by PNT2022TMID01412</p></a>
</section>


<!----JavaScript for toggle menu---->
<script>
    var navLinks = document.getElementById("navLinks");

    function showMenu() {
        navLinks.style.right = "0";
    }

    function hideMenu() {
        navLinks.style.right = "-200px";
    }
</script>

</body>
</html>
```

ABOUT.HTML:

```html
                <html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Early Detection of Chronic Kidney Disease using Machine
Learning</title>
<link rel="stylesheet" href="static/style.css">
<link
href="https://fonts.googleapis.com/css?family=Poppins:100,200,300,400,600,700
&display=swap" rel="stylesheet">
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">
</head>
<body>
    <section class="sub-header">
        <nav>
            <a href="/"><img src="static/images/images.png"></a>
            <div class="nav-links" id="navLinks">
                <i class="fa fa-close" onclick="hideMenu()"></i>
                <ul>
                    <li><a href="/">HOME</a></li>
                    <li><a href="/about">ABOUT</a></li>
                    <li><a href="/Prediction">PREDICTION</a></li>
```

```html
                <li><a href="/result">RESULT</a></li>
                <li><a href="/contact">CONTACT</a></li>
            </ul>
        </div>
        <i class="fa fa-bars" onclick="showMenu()"></i>
    </nav>
        <h1>About Us</h1>
    </section>


<!------- about us content -------->

<section class="about-us">
    <div class="row">
        <div class="about-col">
            <h1>Chronic Kidney Disease using Machine Learning</h1>
            <p>The only way to find out if people have CKD is through simple
blood and urine tests. The blood test checks for the level of creatinine, a
waste product produced by muscles,
                to see how well the kidneys work. The urine test checks for
protein, which may indicate kidney damage.</p>
            <a
href="https://www.youtube.com/c/EasyTutorialsVideo?sub_confirmation=1"
class="hero-btn red-btn">EXPOLER NOW</a>
        </div>
        <div class="about-col">
            <img src="static/images/about1.jpg">
        </div>
    </div>
</section>

<!-------- footer ---------->

<section class="footer">
        <h4>About Us</h4>
    <p>The only way to find out if people have CKD is through simple blood
and urine tests. The blood test checks for the level of creatinine,</p>
        <p> a waste product produced by muscles, to see how well the
kidneys work. The urine test checks for protein, which may indicate kidney
damage.</p>
        <div class="icons">
            <i class="fa fa-facebook"></i>
            <i class="fa fa-twitter"></i>
            <i class="fa fa-instagram"></i>
            <i class="fa fa-linkedin"></i>
        </div>
        <p>Made with <i class="fa fa-heart-o"></i> by PNT2022TMID01412</p>
</section>


<!----JavaScript for toggle menu---->
<script>
    var navLinks = document.getElementById("navLinks");

    function showMenu() {
        navLinks.style.right = "0";
    }
```

```
        function hideMenu() {
            navLinks.style.right = "-200px";
        }
</script>

</body>
</html>
```

PREDICATION.HTML:

```html
                    <html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Early Detection of Chronic Kidney Disease using Machine
Learning</title>
<link rel="stylesheet" href="static/style.css">
<link
href="https://fonts.googleapis.com/css?family=Poppins:100,200,300,400,600,700
&display=swap" rel="stylesheet">
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">
</head>
<body>
    <section class="sub-header">
        <nav>
            <a href="/"><img src="static/images/images.png"></a>
            <div class="nav-links" id="navLinks">
                <i class="fa fa-close" onclick="hideMenu()"></i>
                <ul>
                    <li><a href="/">HOME</a></li>
                    <li><a href="/about">ABOUT</a></li>
                    <li><a href="/Prediction">PREDICTION</a></li>
                    <li><a href="/result">RESULT</a></li>
                    <li><a href="/contact">CONTACT</a></li>
                </ul>
            </div>
            <i class="fa fa-bars" onclick="showMenu()"></i>
        </nav>

    </section>

<!---------- Blog Page Content ---------->

    <section class="blog-content">
    <div class="row">
    <div class="blog-left">
        <img src="static/images/prediction.jpg">
        <h2>Early Detection of Chronic Kidney Disease</h2>

        <p>Living with diabetes is difficult, thinking about what you eat.
But controlling the sugar levels are really important for helping kidney
function and specifically slowing down any damage to the kidneys. Newer drugs
that have come out in the last couple years can help with this, as well as
working with your primary care physician or endocrinologist with your current
therapies to get better sugar control.
```

We really want to help your health and so losing weight can be a key
component to reducing your risk of progressing with kidney disease. Reducing
calorie intake, which is either smaller portions, less snacking in between
meals, and then thinking about burning calories with increasing your
exercise, are great steps forward in starting that journey towards weight
loss.

We look to get blood pressure less than 130 systolic, that's the top number.
And less than 80 diastolic, that's the bottom number, on blood pressure
readings. There are a number of different drugs that we can use to do this.
And this will help both with your cardiovascular health, but slowing down any
kidney disease progression over time as well.</p>

    <div class="blog-right">

            <h3>CKD Categories</h3>
            <div>
                Stage 1 Normal
                GFR>90mL/min
            </div>
            <div>
                Stage 2 Mild CKD
                GFR=60-89mL/min
            </div>
            <div>
                Stage 3A Moderate CKD
                GFR=45-59mL/min
            </div>
            <div>
                Stage 3B Moderate CKD
                GFR=30-44mL/min
            </div>
            <div>
                Stage 4 Severe CKD
                GFR=15-29mL/min
            </div>
            <div>
                Stage 5 End Stage CKD
                GFR<15mL/min
            </div>

        </div>

    </div>
    </section>

<form action="{{url_for('predict')}}" method="POST">

 <section >
                <div class="row">

```html
<form id="appointment-form" role="form" method="post" action="#">


                    <div style="background-color:pink;text-align:
center;">
                        <h1><strong>Chronic Kidney
Disease</strong></h1><h3>Machine Learning </h3>
                    </div>
            <br/>
            <br/>
                    <div>
                        <div class="col-md-6 col-sm-6">
                            <label for="name">Blood Urea</label>
                            <input type="number" class="form-
control" id="name" name="blood_urea" placeholder="Blood Urea Level">
                        </div>

                        <div class="col-md-6 col-sm-6">
                            <label for="name">Blood Glucose
Random</label>
                            <input type="number" class="form-
control" id="name1" name="blood_glucose_random" placeholder="Blood Glucose
Level Random">
                        </div>

                        <div class="col-md-6 col-sm-6">
                            <label for="select">Select
Anemia</label>

                            <select name = "Anemia">
                                <option value = "yes">
yes</option>

                                <option value = "no">no
</option>
                            </select>
                        </div>

                        <div class="col-md-6 col-sm-6">
                            <label for="select">Select Coronary
Artery Disease</label>

                            <select name =
"coronary_artery_disease">

                                <option value = "yes">
yes</option>

                                <option value = "no">no
</option>
                            </select>
                        </div>

                        <div class="col-md-6 col-sm-6">
                            <label for="select">Select Pus
Cell</label>

                            <select name = "pus_cell">
                                <option value = "yes">
yes</option>

                                <option value = "no">no
</option>
```

```html
				</select>
			</div>

			<div class="col-md-6 col-sm-6">
				<label for="select">Select Red Blood
Cell</label>
					<select name = "red_blood_cell">
						<option value = "yes">
yes</option>
						<option value = "no">no
</option>
					</select>
			</div>

		<div class="col-md-6 col-sm-6">
				<label for="select">Select Diabetics
Mellitus</label>
					<select name = "diabetics_mellitus">
						<option value = "yes">
yes</option>
						<option value = "no">no
</option>
					</select>
			</div>

			<div class="col-md-6 col-sm-6">
				<label for="select">Select Pedal
Edema</label>
					<select name = "pedal_edema">
						<option value = "yes">
yes</option>
						<option value = "no">no
</option>
					</select>
			</div>
			<div class="col-md-12 col-sm-12">
				<button type="submit" class="form-
control" id="cf-submit" name="submit">predict</button>

			</div>
		</div>
	</form>

		</div>
	</section>

<!------- footer ---------->

<section class="footer">
	<h4>About Us</h4>
	<p>The only way to find out if people have CKD is through simple
blood and urine tests. The blood test checks for the level of creatinine, a
waste product produced by muscles, to see how well the kidneys work. The
urine test checks for protein, which may indicate kidney damage.</p>
	<div class="icons">
		<i class="fa fa-facebook"></i>
		<i class="fa fa-twitter"></i>
```

```html
            <i class="fa fa-instagram"></i>
            <i class="fa fa-linkedin"></i>
        </div>
        <p>made with <i class="fa fa-heart-o"></i> by PNT2022TMID01412</p>
</section>


<!----JavaScript for toggle menu---->
<script>
    var navLinks = document.getElementById("navLinks");

    function showMenu() {
        navLinks.style.right = "0";
    }

    function hideMenu() {
        navLinks.style.right = "-200px";
    }
</script>

</body>
</html>
```

RESULT.HTML:

```html
        <html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Early Detection of Chronic Kidney Disease using Machine
Learning</title>
<link rel="stylesheet" href="static/style.css">
<link
href="https://fonts.googleapis.com/css?family=Poppins:100,200,300,400,600,700
&display=swap" rel="stylesheet">
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">
</head>
<body id="top">
    <section class="sub-header">
        <nav>
            <a href="/"><img src="static/images/images.png"></a>
            <div class="nav-links" id="navLinks">
                <i class="fa fa-close" onclick="hideMenu()"></i>
                <ul>
                    <li><a href="/">HOME</a></li>
                    <li><a href="/about">ABOUT</a></li>
                    <li><a href="/Prediction">PREDICTION</a></li>
                    <li><a href="/result">RESULT</a></li>
                    <li><a href="/contact">CONTACT</a></li>
                </ul>
            </div>
            <i class="fa fa-bars" onclick="showMenu()"></i>
        </nav>
            <h1>Prediction Result</h1>
    </section>
```

```html
<section>
        <div class="container">
            <div class="row">

            <div style="background-color:pink;text-align: center;">
                    <h1>Chronic Kidney Disease</h1><h3>Machine Learning
Web Application</h3>
                </div>
            <br/>
            <br/>

                <div class="col-md-8 col-sm-7">
                    {{prediction_text}}
                    {% if prediction_text==1%}

                     <div >
                        <h2>Medical Result</h2>
                        <p>Your Condition is normal.</p>
                        <blockquote>You are not having chronic kidney
disease.</blockquote>
                            <img src="static\images\result2.jpg" width="300"
height="300"/>

                        <p></p>

                     </div>
                    {%else%}
                    <div >
                        <h2>Medical Result</h2>
                        <p>Your Condition is abnormal.</p>
                        <blockquote>You are having chronic kidney
disease.</blockquote>
                            <img src="static\images\result1.jpg"
width="300" height="300"/>

                        <p></p>

                     </div>
                    {% endif %}

                </div>

                <div class="col-md-4 col-sm-5">
                    <div class="news-sidebar">

                    </div>
                </div>

            </div>
        </div>
    </section>

<!-------- footer ---------->

<section class="footer">
        <h4>About Us</h4>
        <p>The only way to find out if people have CKD is through simple
```

blood and urine tests. The blood test checks for the level of creatinine, a
waste product produced by muscles, to see how well the kidneys work. The
urine test checks for protein, which may indicate kidney damage.</p>
        <div class="icons">
            <i class="fa fa-facebook"></i>
            <i class="fa fa-twitter"></i>
            <i class="fa fa-instagram"></i>
            <i class="fa fa-linkedin"></i>
        </div>
        <p>made with <i class="fa fa-heart-o"></i> by PNT2022TMID01412</p>
</section>

<!----JavaScript for toggle menu---->
<script>
    var navLinks = document.getElementById("navLinks");

    function showMenu() {
        navLinks.style.right = "0";
    }

    function hideMenu() {
        navLinks.style.right = "-200px";
    }
</script>

</body>
</html>

CONTACT.HTML:

```
                <html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Early Detection of Chronic Kidney Disease using Machine
Learning</title>
<link rel="stylesheet" href="style.css">
<link
href="https://fonts.googleapis.com/css?family=Poppins:100,200,300,400,600,700
&display=swap" rel="stylesheet">
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">
</head>
<body>
    <section class="sub-header">
        <nav>
            <a href="/"><img src="static/images/images.png"></a>
            <div class="nav-links" id="navLinks">
                <i class="fa fa-close" onclick="hideMenu()"></i>
                <ul>
                    <li><a href="/">HOME</a></li>
                    <li><a href="/about">ABOUT</a></li>
                    <li><a href="/Prediction">PREDICTION</a></li>
                    <li><a href="/result">RESULT</a></li>
                    <li><a href="/contact">CONTACT</a></li>
```

```html
                    </ul>
                </div>
                <i class="fa fa-bars" onclick="showMenu()"></i>
            </nav>
                <h1>Contact Us</h1>
        </section>


<!------- Contact Us ------->


    <section class="location">
            <iframe
src="https://www.google.com/maps/embed?pb=!1m18!1m12!1m3!1d3887.368144678623!
2d77.55384341419037!3d13.012212417508028!2m3!1f0!2f0!3f0!3m2!1i1024!2i768!4f1
3.1!3m3!1m2!1s0x3bae3d7f3535d71b%3A0x660d25b66e9fb25c!2sWorld+Trade+Centre!5e
0!3m2!1sen!2sin!4v1565255080367!5m2!1sen!2sin" width="720" height="445"
frameborder="0" style="border:0" allowfullscreen></iframe>
    </section>

    <section class="contact-us">
            <div class="row">
                <div class="contact-col">
                    <div>
                        <i class="fa fa-home"></i>
                        <span>
                            <h5> Panimalar Engineering College</h5>
                            <p>Chennai,TamilNadu,India</p>
                        </span>
                    </div>
                    <div>
                        <i class="fa fa-phone"></i>
                        <span>
                            <h5>+1 0123456789</h5>
                            <p>Monday to Saturday 10 Am to 6 Pm</p>
                        </span>
                    </div>
                    <div>
                        <i class="fa fa-envelope-o"></i>
                        <span>
                            <h5>info@pnt2022tmid01412.com</h5>
                            <p>Email us your query</p>
                        </span>
                    </div>
                </div>
                <div class="contact-col">
                    <form method="post" action="contact-form-handler.php">
                    <input type="text" name="name" placeholder="Enter your
name" required>
                    <input type="email" name="email" placeholder="Enter email
address" required>
                    <input type="text" name="subject" placeholder="Enter your
subject" required>
                    <textarea rows="8" name="message" placeholder="Message"
required></textarea>
                    <button type="submit" class="hero-btn red-btn">Send
Message</button>
```

```html
            </form>
        </div>
      </div>
    </section>

<!-------- footer ---------->

<section class="footer">
      <h4>About Us</h4>
      <p>The only way to find out if people have CKD is through simple
blood and urine tests. The blood test checks for the level of creatinine, a
waste product
          produced by muscles, to see how well the kidneys work. The urine
test checks for protein, which may indicate kidney damage.</p>
      <div class="icons">
          <i class="fa fa-facebook"></i>
          <i class="fa fa-twitter"></i>
          <i class="fa fa-instagram"></i>
          <i class="fa fa-linkedin"></i>
      </div>
      <p>made with <i class="fa fa-heart-o"></i> by PNT2022TMID01412</p>
</section>


<!----JavaScript for toggle menu---->
<script>
    var navLinks = document.getElementById("navLinks");

    function showMenu() {
        navLinks.style.right = "0";
    }

    function hideMenu() {
        navLinks.style.right = "-200px";
    }
</script>

</body>
</html>
```

BACK-END:

APP.PY:

```python
import numpy as np
import pandas as pd
import sklearn
from flask import Flask, request, render_template
import pickle5 as pickle


app = Flask(__name__)
model = pickle.load(open('Models/modeling.pkl', 'rb'))
```

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


@app.route('/Prediction', methods=['POST', 'GET'])
def prediction():
    return render_template('prediction.html')


@app.route('/Home', methods=['POST', 'GET'])
def my_home():
    return render_template('index.html')

@app.route('/result', methods=['POST', 'GET'])
def result():
    return render_template('result.html')

@app.route('/predict', methods=['POST'])
def predict():
    x=input()
    input_features = ([int(x) for x in request.form.values()])
    blood_urea = request.form["blood_urea"]
    blood_glucose_random = request.form["blood_glucose_random"]
    anemia = request.form["Anemia"]
    if (anemia == "no"):
        anemia = 0
    if (anemia == "yes"):
        anemia = 1
    coronary_artery_disease = request.form["coronary_artery_disease"]
    if (coronary_artery_disease == "no"):
        coronary_artery_disease = 0
    if(coronary_artery_disease == "yes"):
        coronary_artery_disease = 1

    pus_cell = request.form["pus_cell"]
    if (pus_cell == "no"):
        pus_cell = 0
    if (pus_cell == "yes"):
        pus_cell = 1

    red_blood_cell = request.form["red_blood_cell"]
    if (red_blood_cell == "no"):
        red_blood_cell = 0
    if (red_blood_cell == "yes"):
        red_blood_cell = 1

    diabetics_mellitus = request.form["diabetics_mellitus"]
    if (diabetics_mellitus == "no"):
        diabetics_mellitus = 0
    if (diabetics_mellitus == "yes"):
        diabetics_mellitus = 1

    pedal_edema = request.form["pedal_edema"]
    if (pedal_edema == "no"):
        pedal_edema = 0
    if (pedal_edema == "yes"):
```

```python
        pedal_edema = 1

    input_features =
[int(blood_urea),int(blood_glucose_random),int(anemia),int(coronary_artery_di
sease),int(pus_cell),int(red_blood_cell),int(diabetics_mellitus),int(pedal_ed
ema)]
    input_features =
[int(red_blood_cell),int(pus_cell),int(blood_glucose_random),int(blood_urea),
int(pedal_edema),int(anemia),int(diabetics_mellitus),int(coronary_artery_dise
ase)]
    print(input_features)
    features_value = [np.array(input_features)]


    features_name = ['red_blood_cells','pus_cell','blood glucose
random','blood_urea','pedal_edema','anemia','diabetesmellitus','coronary_arte
ry_disease']
    features_name = ['blood_urea','blood glucose
random','anemia','coronary_artery_disease','pus_cell','red_blood_cells','diab
etesmellitus','pedal_edema' ]
    df = pd.DataFrame(features_value, columns=features_name)
    output = model.predict(df)
    return render_template('result.html', prediction_text=output)

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

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

# Press the green button in the gutter to run the script.
if __name__ == '__main__':
    app.run(host='localhost', debug=True)
```

FRONT-END:

STYLE.CSS:

```css
          *{

  margin: 0;

  padding: 0;

  font-family: 'Poppins', sans-serif;

}

.header{

  min-height: 100vh;
```

```css
    width: 100%;

    background-image: linear-gradient(rgba(4,9,30,0.7),rgba(4,9,30,0.7)),url(images/about1.png);

    background-position: center;

    background-size: cover;

    position: relative;

    overflow: hidden;

}


nav{

    display: flex;

    padding: 2% 4%;

    justify-content: space-between;

    align-items: center;

}

nav img{

    width: 135px;

}

.nav-links{

    flex: 1;

    text-align: right;

}

.nav-links ul li{

    list-style: none;

    display: inline-block;

    padding: 8px 12px;
```

```css
    position: relative;

}

.nav-links ul li a{

    color: #fff;

    text-decoration: none;

    font-size: 13px;

}

.nav-links ul li::after{

    content: '';

    width: 0%;

    height: 2px;

    background: #f44336;

    display: block;

    margin: auto;

    transition: .5s;

}

.nav-links ul li:hover::after{

    width: 100%;

}

nav .fa{

    display: none;

}


.text-box{

    width: 90%;
```

```css
    color: #fff;

    position: absolute;

    top: 50%;

    left: 50%;

    transform: translate(-50%, -50%);

    text-align: center;

}

.text-box h1{

    font-size: 62px;

}

.text-box p{

    margin: 20px 0 40px;

    font-size: 14px;

    color: #fff;

}

.hero-btn {

    display: inline-block;

    text-decoration: none;

    color: #fff;

    border: 1px solid #fff;

    padding: 12px 34px;

    font-size: 13px;

    background: transparent;

    position: relative;

    cursor: pointer;
```

```css
    transition: 1s;

}


.hero-btn:hover{

    border: 1px solid #f44336;

    background: #f44336;

}



@media(max-width: 700px)

{

  .nav-links ul li

  {

    display: block;

  }

  .nav-links

  {

    position: fixed;

    background: #f44336;

    height: 100vh;

    width: 200px;

    top: 0;

    right: -200px;

    text-align: left;

    z-index: 2;
```

```css
            transition: 0.5s;

        }

        .nav-links ul{

            padding: 30px;

        }

        nav .fa{

            display: block;

            color: #fff;

            margin: 10px;

            font-size: 22px;

            cursor: pointer;

        }

        .text-box h1{

            font-size: 20px;

        }

    }


/*---------- course --------*/


.course{

    width: 80%;

    margin: auto;

    text-align: center;

    padding-top: 100px;

}
```

```css
h1{

    font-size: 36px;

    font-weight: 600;

}

p{

    color: #777;

    font-size: 14px;

    font-weight: 300;

    line-height: 22px;

    padding: 10px;

}

.row{

    margin-top: 5%;

    display: flex;

    justify-content: space-between;

}


.course-col{

    flex-basis: 31%;

    background: #fff3f3;

    border-radius: 10px;

    margin-bottom: 5%;

    padding: 20px 12px;

    box-sizing: border-box;

    transition: .5s;
```

```css
}
h3{

    text-align: center;

    font-weight: 600;

    margin: 10px 0;

}
.course-col:hover{

    box-shadow: 0 0 20px 0px rgba(0, 0, 0, 0.2);

}


@media (max-width:700px){

    .row{

        flex-direction: column;

    }
}


/*--------------- campus ---------------*/


.campus{

    width: 80%;

    margin: auto;

    text-align: center;

    padding-top: 50px;

}
.campus-col{
```

```css
    flex-basis: 32%;

    border-radius: 10px;

    margin-bottom: 30px;

    position: relative;

    overflow: hidden;

}
.campus-col img{

    width: 100%;

}


.layer{

    background: transparent;

    height: 100%;

    width: 100%;

    top: 0;

    left: 0;

    position: absolute;

    transition: .5s;

}
.layer:hover{

    background: rgba(226, 0, 0, 0.7);

}
.layer h3{

    width: 100%;

    font-weight: 500;
```

```css
    color: #fff;

    font-size: 26px;

    bottom: 0;

    left: 50%;

    transform: translateX(-50%);

    position: absolute;

    opacity: 0;

    transition: .5s;

}
.layer:hover h3{

    bottom: 49%;

    opacity: 1;

}


/*-------------- Facilities ---------------*/


.facility{

    width: 80%;

    margin: auto;

    text-align: center;

    padding-top: 100px;

}
.facility-col{

    flex-basis: 31%;

    border-radius: 10px;
```

```css
    margin-bottom: 5%;

    text-align: left;

}

.facility-col img{

    width: 100%;

    border-radius: 10px;

}

.facility-col p{

    padding: 0;

}

.facility-col h3{

    margin-top: 16px;

    margin-bottom: 15px;

    text-align: left;

}


/*---------------- testimonials ------------------*/


.testimonials{

    width: 80%;

    margin: auto;

    padding-top: 100px;

    text-align: center;

}
```

```css
.testimonial-col{

    flex-basis: 44%;

    border-radius: 10px;

    margin-bottom: 5%;

    text-align: left;

    background: #fff3f3;

    padding: 25px;

    cursor: pointer;

    display: flex;

}
.testimonial-col img{

    height: 40px;

    margin-left: 5px;

    margin-right: 30px;

    border-radius: 50%;

}
.testimonial-col p{

    padding: 0;

}
.testimonial-col h3{

    margin-top: 15px;

    text-align: left;

}
.testimonial-col .fa{

    color: #f44336;
```

```css
    }


    @media(max-width:700px){

        .testimonial-col img{

            margin-left: 0px;

            margin-right: 15px;

        }

    }


    /*-------- Call To Action ----------*/



    .cta{

        margin: 100px auto;

        width: 80%;

        background-image: linear-gradient(rgba(0,0,0,0.7),rgba(0,0,0,0.7)),url(images/banner2.jpg);

        background-position: center;

        background-size: cover;

        border-radius: 10px;

        text-align: center;

        padding: 100px 0;

    }
    .cta h1{

        color: #fff;

        margin-bottom: 40px;
```

```css
    padding: 0;

}


@media(max-width:700px){

   .cta h1{

      font-size: 24px;

   }

}


/*-------------Footer--------------*/


.footer{

   width: 100%;

   text-align: center;

   padding: 30px 0;

}
.footer h4{

   margin-bottom: 25px;

   margin-top: 20px;

   font-weight: 600;

}


.icons .fa{

   color: #f44336;

   margin: 0 13px;
```

```css
    cursor: pointer;

    padding: 18px 0;

}

.fa-heart-o{

    color: #f44336;

}
```

```css
.sub-header{

    height: 50vh;

    width: 100%;

    background-image: linear-

gradient(rgba(4,9,30,0.7),rgba(4,9,30,0.7)),url(images/background.jpg);

    background-position: center;

    background-size: cover;

    text-align: center;

    color: #fff;

}

.sub-header h1{

    margin-top: 100px;

}

.about-us{
```

```css
    width: 80%;

    margin: auto;

    padding-top: 80px;

    padding-bottom: 50px;

}


.about-col{

    flex-basis: 48%;

    padding: 30px 2px;

}
.about-col h1{

    padding-top: 0;

}
.about-col p{

    padding: 15px 0 25px;

}


.hero-btn.red-btn{

    border: 1px solid #f44336;

    background: transparent;

    color: #f44336;

}
.hero-btn.red-btn:hover{

    border: 1px solid #f44336;

    background: #f44336;
```

```css
    color: #fff;

}

.hero-btn.red-btn::after{

    background: #f44336;

}

.hero-btn.red-btn::before{

    background: #f44336;

}

.content-image{

    flex-basis: 50%;

}

.about-col img{

    width: 100%;

}


/*---------- Blog Page ------------*/


.blog-content{

    width: 80%;

    margin: auto;

    padding: 60px 0;

}

.blog-left{

    flex-basis: 65%;

}
```

```css
.blog-right{

   flex-basis: 32%;

}

.blog-left img{

   width: 100%;

}

.blog-left h2{

   color: #222;

   font-weight: 600;

   margin: 30px 0;

}

.blog-left p{

   color: #999;

   padding: 0;

}


.blog-right h3{

   background: #f44336;

   color: #fff;

   padding: 7px 0;

   font-size: 16px;

   margin-bottom: 20px;

}

.blog-right div{

   display: flex;
```

```css
    align-items: center;

    justify-content: space-between;

    color: #555;

    padding: 8px;

    box-sizing: border-box;

}


.comment-box{

    border: 1px solid #ccc;

    margin: 50px 0;

    padding: 10px 20px;

}


.comment-box h3{

    text-align: left;

}
.comment-form input, .comment-form textarea{

    width: 100%;

    padding: 10px;

    margin: 15px 0;

    box-sizing: border-box;

    border: none;

    outline: none;

    background: #f0f0f0;

}
```

```css
.comment-form button{

    margin: 10px 0;

}




@media (max-width:700px){

    .sub-header h1{

        font-size: 24px;

    }

}




/*------- Contact Us Page ------------*/


.location{

    width: 80%;

    margin: auto;

    padding: 80px 0;

}
.location iframe{

    width: 100%;

}


.contact-us{

    width: 80%;
```

```css
    margin: auto;

}

.contact-col{

    flex-basis: 48%;

    margin-bottom: 30px;

}


.contact-col div{

    display: flex;

    align-items: center;

    margin-bottom: 40px;

}


.contact-col div .fa{

    font-size: 28px;

    color: #f44336;

    margin: 10px;

    margin-right: 30px;

}


.contact-col div p{

    padding: 0;

}

.contact-col div h5{

    font-size: 20px;
```

```css
    margin-bottom: 5px;

    color: #555;

    font-weight: 400;


}

.contact-col input, .contact-col textarea{

    width: 100%;

    padding: 15px;

    margin-bottom: 17px;

    outline: none;

    border: 1px solid #ccc;

}


.footer-link{

    text-decoration: none;

    color: #777;

}
```

Github Link: https://github.com/IBM-EPBL/IBM-Project-5478-1658766875.git

Project Demo Link: https://youtu.be/mZQrDMljKRw