Project Name: Luvia Medical Center

With Smart AI Diagnosis Hub

Project Subtitle: Hospital Management System with AI powered.

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1. Introduction

Introduction:

Luvia Medical Center is an innovative, web-based hospital management system designed to simplify healthcare operations and provide intelligent health predictions. Built on the Flask framework, it integrates machine learning models for Diabetes and Heart Disease prediction, a MySQL database for secure data storage, and Power BI dashboards for advanced data visualization. The system caters to patients, doctors, and administrators, ensuring smooth operations, better decision-making, and improved patient care. With its user-friendly interface, role-based access, and predictive healthcare features, Luvia Medical Center delivers a modern, reliable, and comprehensive solution for hospital management.

Motivation:

In today's fast-paced world, people are constantly seeking smarter, faster, and more reliable solutions for managing their health and daily needs. Traditional approaches often lack real-time insights, proper data-driven decision-making, and personalized services.
With the rise of Machine Learning and Data Visualization tools like Power BI, we now have the opportunity to turn raw data into meaningful predictions and insights. By combining these technologies with the simplicity and flexibility of Flask, this project is motivated to:

- Bridge the gap between raw medical data and actionable predictions.
- Provide users with easy-to-use, interactive web applications.
- Enable better healthcare decisions through predictive ML models.
- Present insights in a visually engaging way using dashboards.

This project is inspired by the vision of creating a smart, accessible, and data-driven medical platform that can positively impact people's lives.

Objective:

The main objectives of this project are:

Donor Management – Enable easy registration, editing, and management of donor profiles.

Disease Prediction – Build ML-powered prediction models (Diabetes, Heart, Pregnancy, etc.) integrated with Flask.

User-Friendly Interface – Ensure patients and admins can easily interact through a clean, responsive design.

Secure Data Handling – Implement proper authentication, database management, and privacy control.

Interactive Analytics – Use Power BI and dashboards to visualize data dynamically.

Centralized Management – Create an all-in-one platform for doctors, donors, patients, and admins to manage healthcare efficiently.

Scalability – Develop the system in a way that can expand with more ML models and features in the future.

2. System Technologies Used

Technologies:

1. Programming Language

- **Python 3.10+** – Backend development and ML model integration

2. Web Framework

- **Flask** – Lightweight Python web framework for building the web application

3. Frontend Technologies

- **HTML5** – Structuring web pages
- **CSS3 / Bootstrap / Tailwind CSS** – Styling and responsive design
- **JavaScript** – Interactive UI components

4. Database

- **SQLite / MySQL** – Storing user data, hospital records, and form submissions

5. Libraries & Packages

- **Pandas, NumPy** – Data processing for ML models
- **Scikit-learn** – Machine learning model implementation
- **Flask-WTF** – Form validation
- **Flask-Login** – User authentication
- **Jinja2** – HTML templating

6. Visualization & BI Tools

- **Power BI** – Advanced data visualization and dashboard reporting for insights

7. Development Tools

- **VS Code** – IDE for coding
- **Git & GitHub** – Version control and repository management

8. Operating System

- Windows 11 pro

Run the Application

```
flask run
```

Open your browser at: `http://127.0.0.1:5000/`

System Requirements

Hardware Requirements

- **Processor:** Intel i3
- **RAM:** Minimum 4 GB (8 GB recommended)
- **Storage:** Minimum 2 GB free (5 GB recommended)
- **Display:** 1366x768 resolution or higher

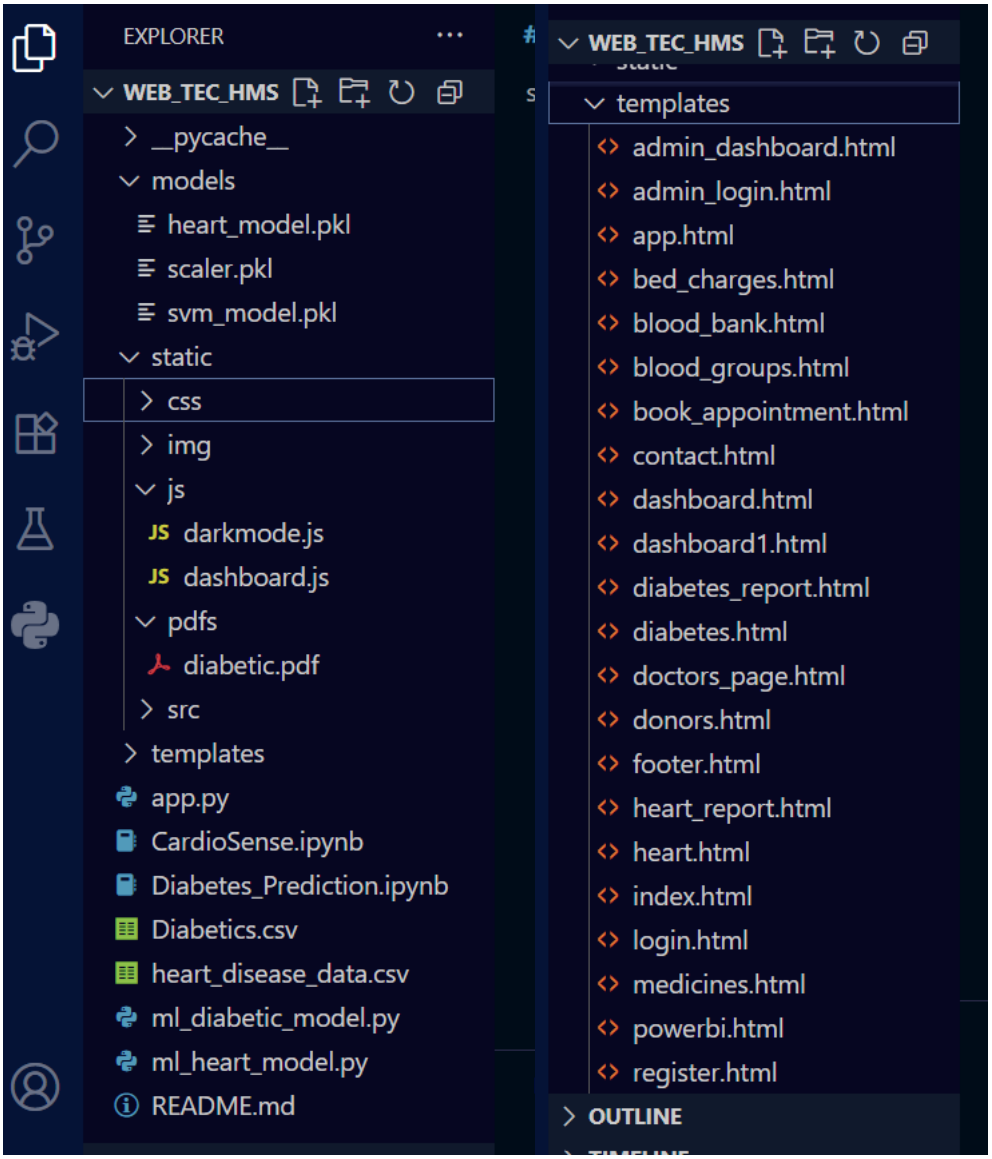
Software Requirements

- **Operating System:** Windows 10/11

- **Python:** Version 3.8+ (3.10 recommended)
- **Database:** MySQL Server 8.0+
- **Web Browser:** Chrome, Firefox, or Edge (latest versions)
- **Libraries/Frameworks:** Flask, Pandas, NumPy, Scikit-Learn
- **Frontend:** HTML5, CSS3, JavaScript (Tailwind CSS optional)

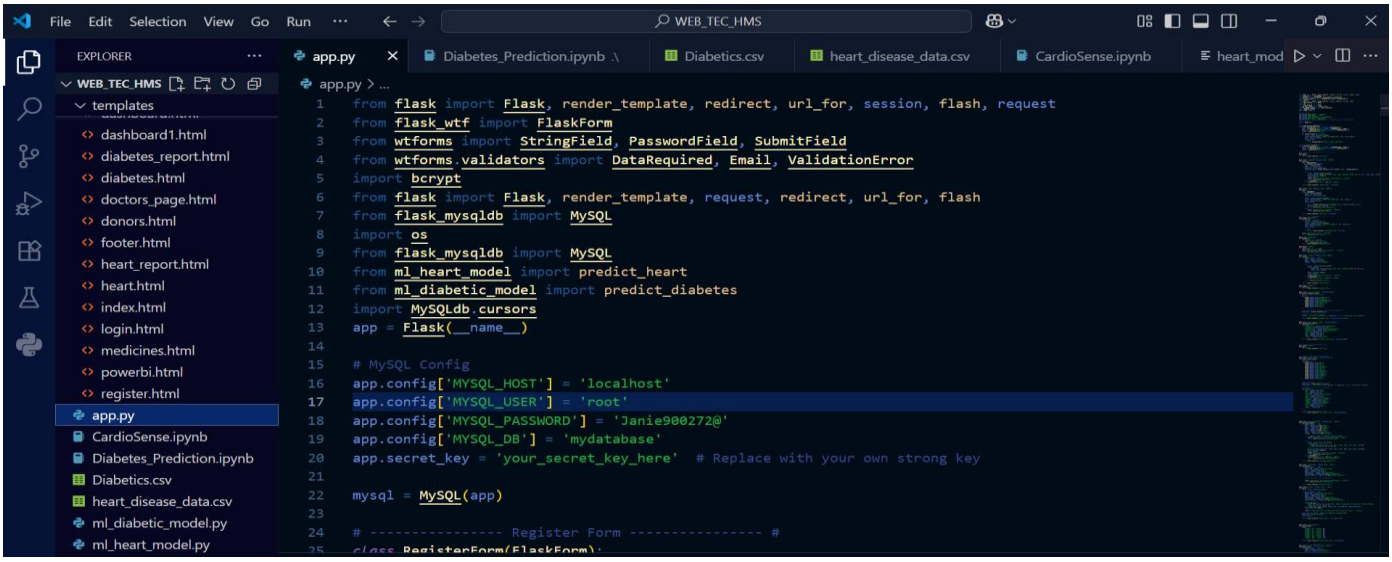
Application Structure:

Structure of my project files:



3. Source Code

- App.py file:



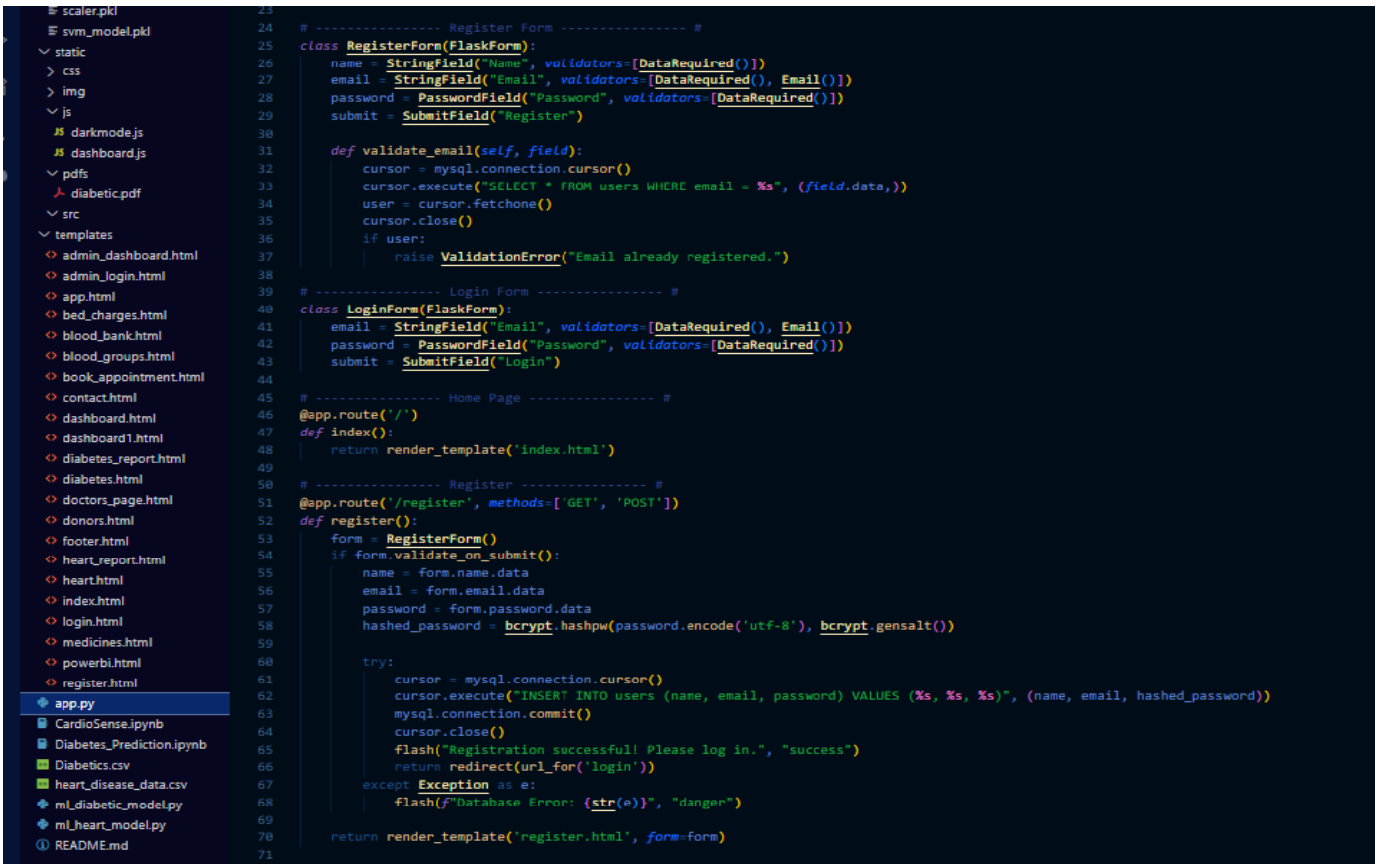
```
from flask import Flask, render_template, redirect, url_for, session, flash, request
from flask_wtf import FlaskForm
from wtforms import StringField, PasswordField, SubmitField
from wtforms.validators import DataRequired, Email, ValidationError
import bcrypt
from flask import Flask, render_template, request, redirect, url_for, flash
from flask_mysqldb import MySQL
import os
from flask_mysqldb import MySQL
from ml_heart_model import predict_heart
from ml_diabetic_model import predict_diabetes
import MySQLdb.cursors
app = Flask(__name__)

# MySQL Config
app.config['MYSQL_HOST'] = 'localhost'
app.config['MYSQL_USER'] = 'root'
app.config['MYSQL_PASSWORD'] = 'Janie900272@'
app.config['MYSQL_DB'] = 'mydatabase'
app.secret_key = 'your_secret_key_here'  # Replace with your own strong key

mysql = MySQL(app)

# ---------------- Register Form ---------------- #
class RegisterForm(FlaskForm):
```

Install Libraries in Flask and add MySQL



```
# ---------------- Register Form ---------------- #
class RegisterForm(FlaskForm):
    name = StringField("Name", validators=[DataRequired()])
    email = StringField("Email", validators=[DataRequired(), Email()])
    password = PasswordField("Password", validators=[DataRequired()])
    submit = SubmitField("Register")

    def validate_email(self, field):
        cursor = mysql.connection.cursor()
        cursor.execute("SELECT * FROM users WHERE email = %s", (field.data,))
        user = cursor.fetchone()
        cursor.close()
        if user:
            raise ValidationError("Email already registered.")

# ---------------- Login Form ---------------- #
class LoginForm(FlaskForm):
    email = StringField("Email", validators=[DataRequired(), Email()])
    password = PasswordField("Password", validators=[DataRequired()])
    submit = SubmitField("Login")

# ---------------- Home Page ---------------- #
@app.route('/')
def index():
    return render_template('index.html')

# ---------------- Register ---------------- #
@app.route('/register', methods=['GET', 'POST'])
def register():
    form = RegisterForm()
    if form.validate_on_submit():
        name = form.name.data
        email = form.email.data
        password = form.password.data
        hashed_password = bcrypt.hashpw(password.encode('utf-8'), bcrypt.gensalt())

        try:
            cursor = mysql.connection.cursor()
            cursor.execute("INSERT INTO users (name, email, password) VALUES (%s, %s, %s)", (name, email, hashed_password))
            mysql.connection.commit()
            cursor.close()
            flash("Registration successful! Please log in.", "success")
            return redirect(url_for('login'))
        except Exception as e:
            flash(f"Database Error: {str(e)}", "danger")

    return render_template('register.html', form=form)
```

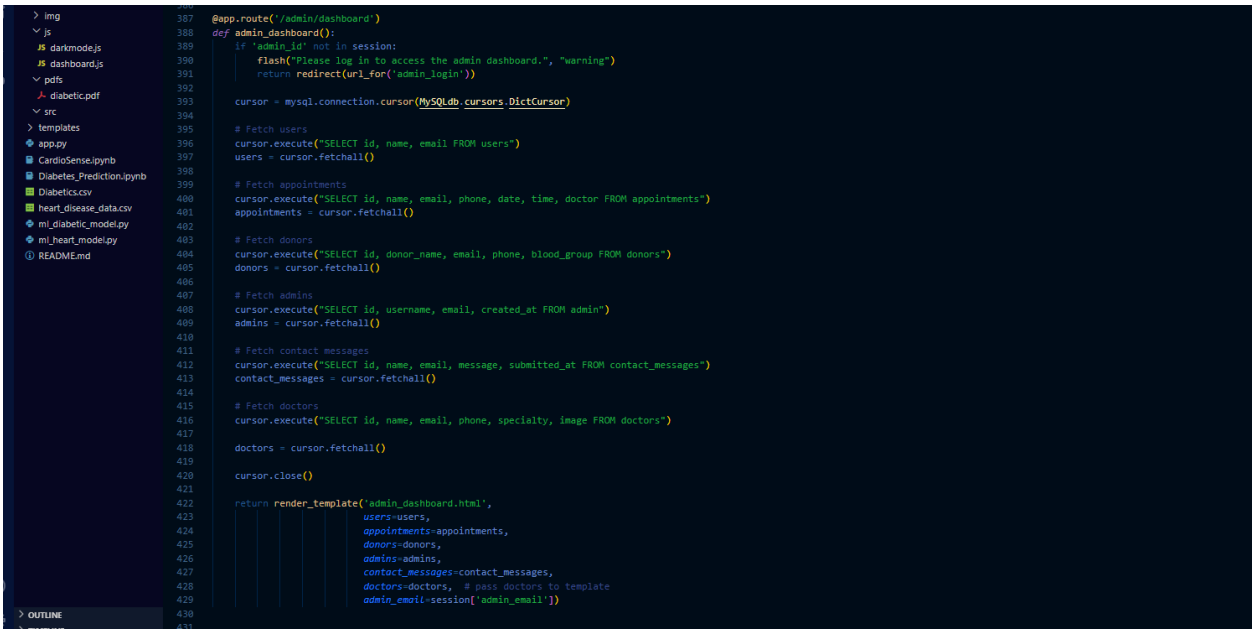
Register and Login

Diabetes Prediction

Heart Disease Prediction and report

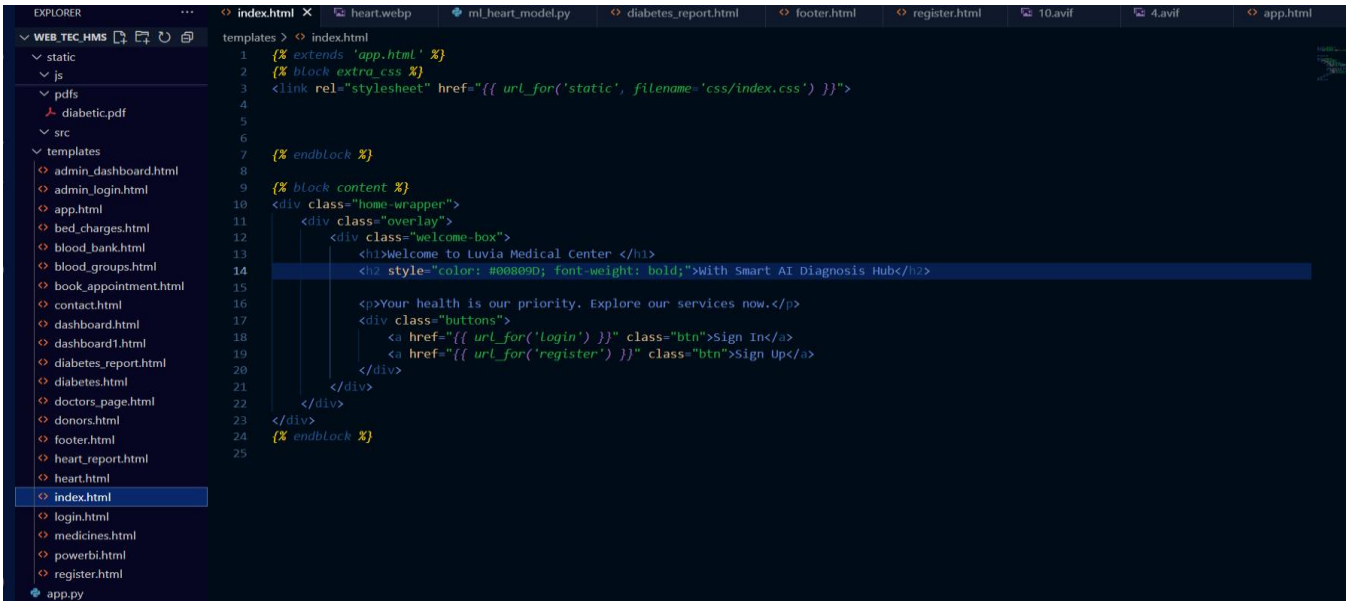
Book Appointment to consult with Doctor

Blood Section and Add new Donor

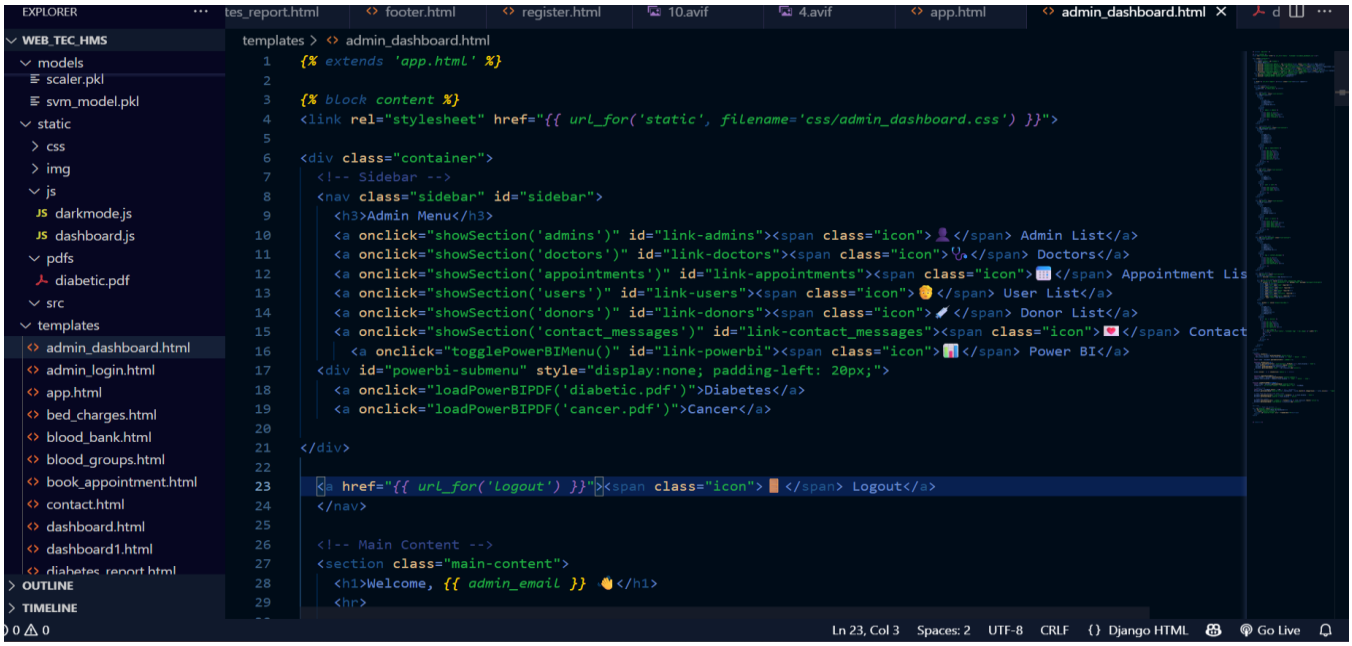


Admin Dashboard

- Admin & User Panel(html files)

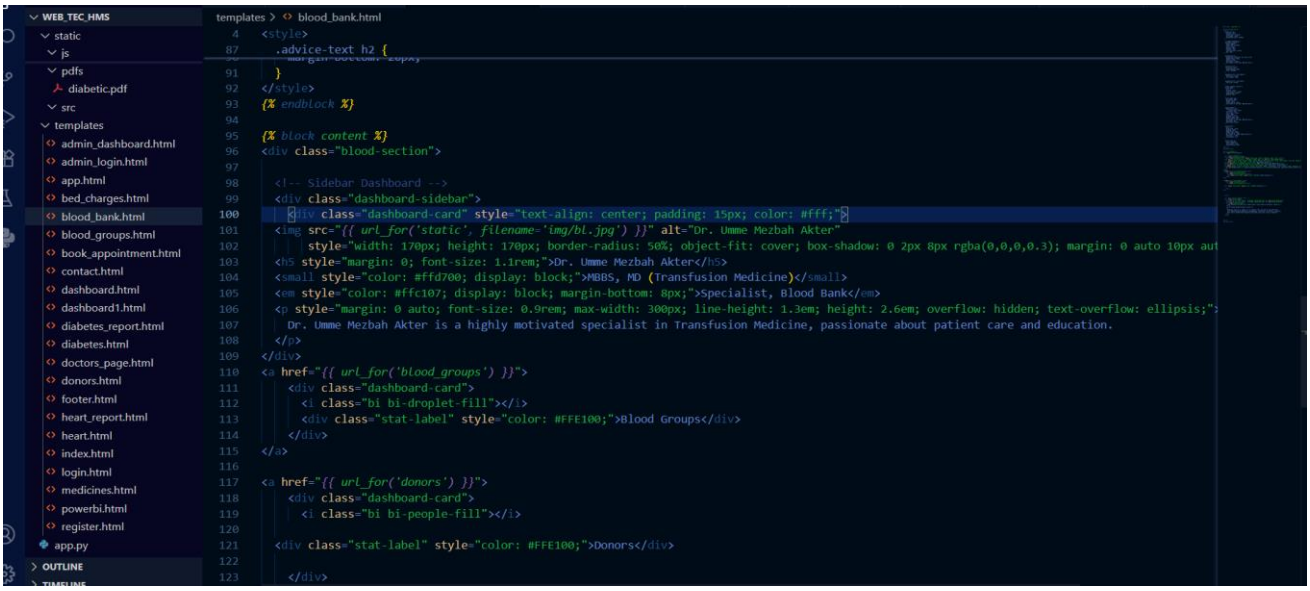


Index Page

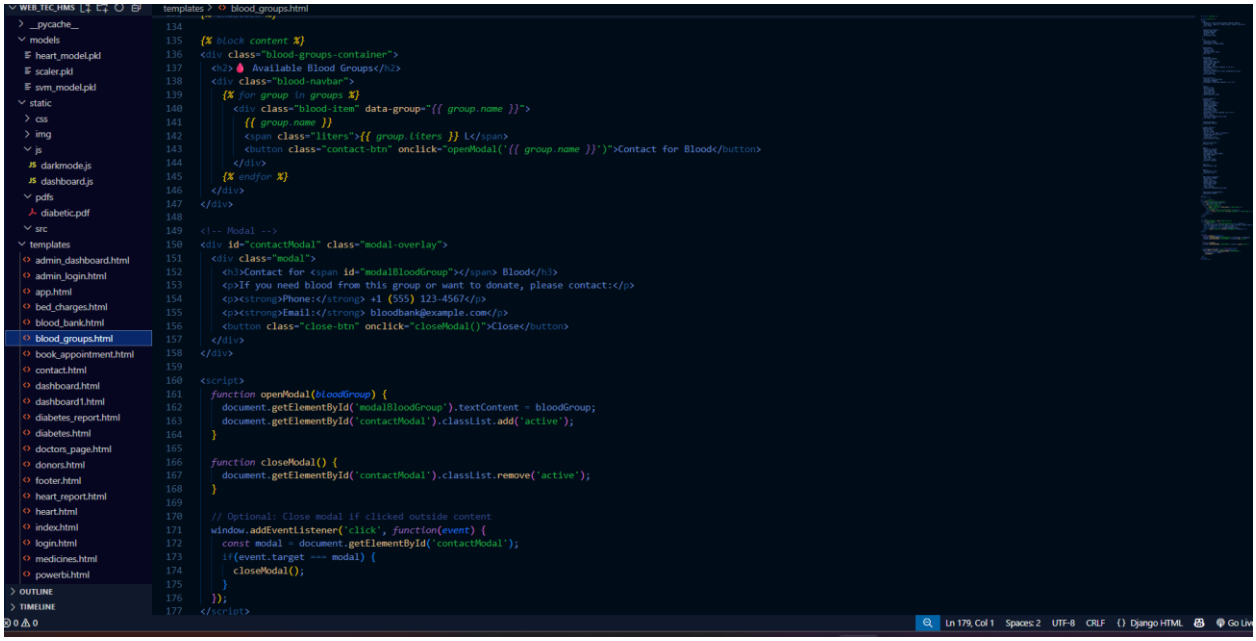


Admin Dashboard

Doctor Page

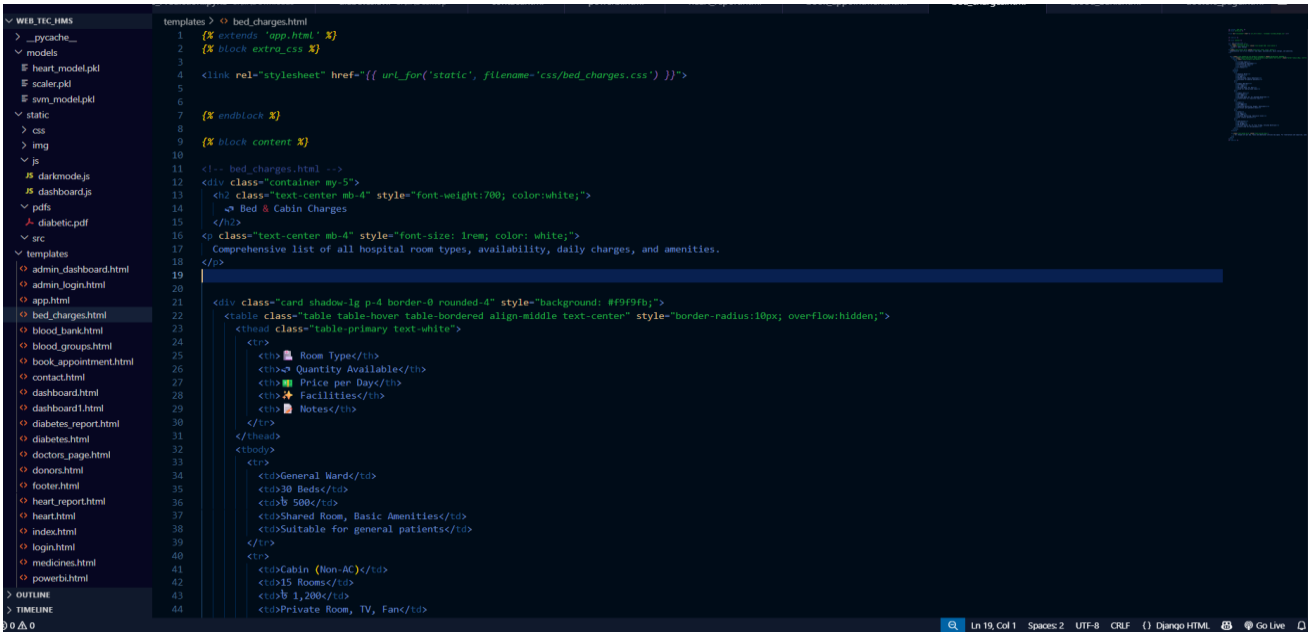


Blood_bank

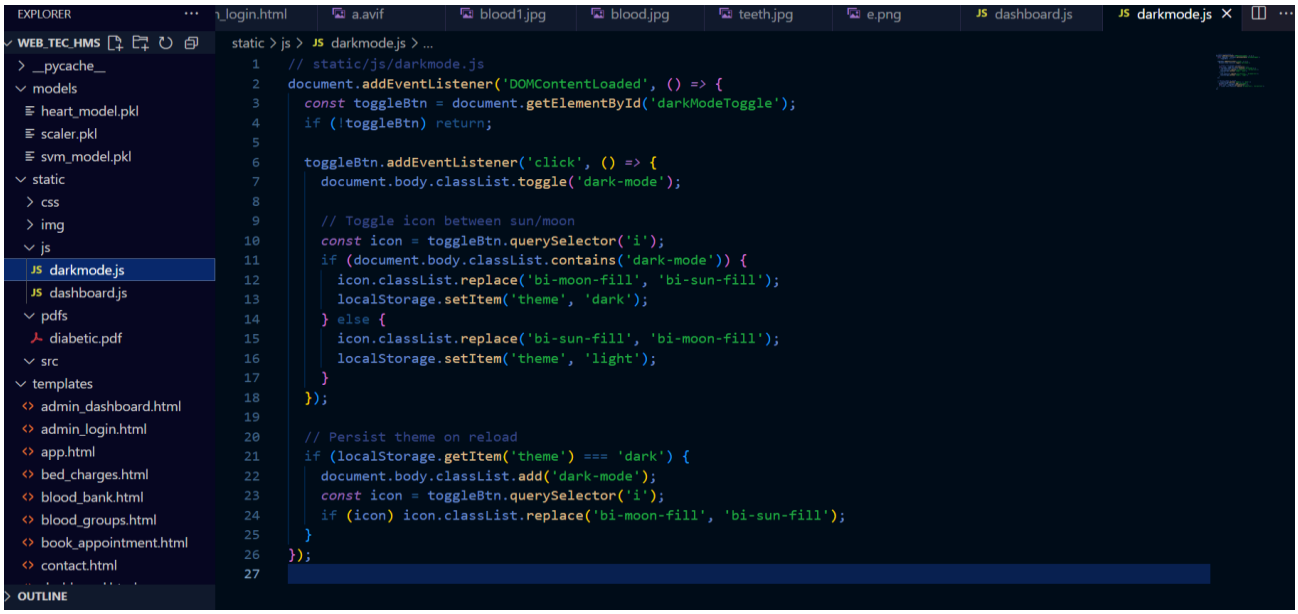


Blood Groups

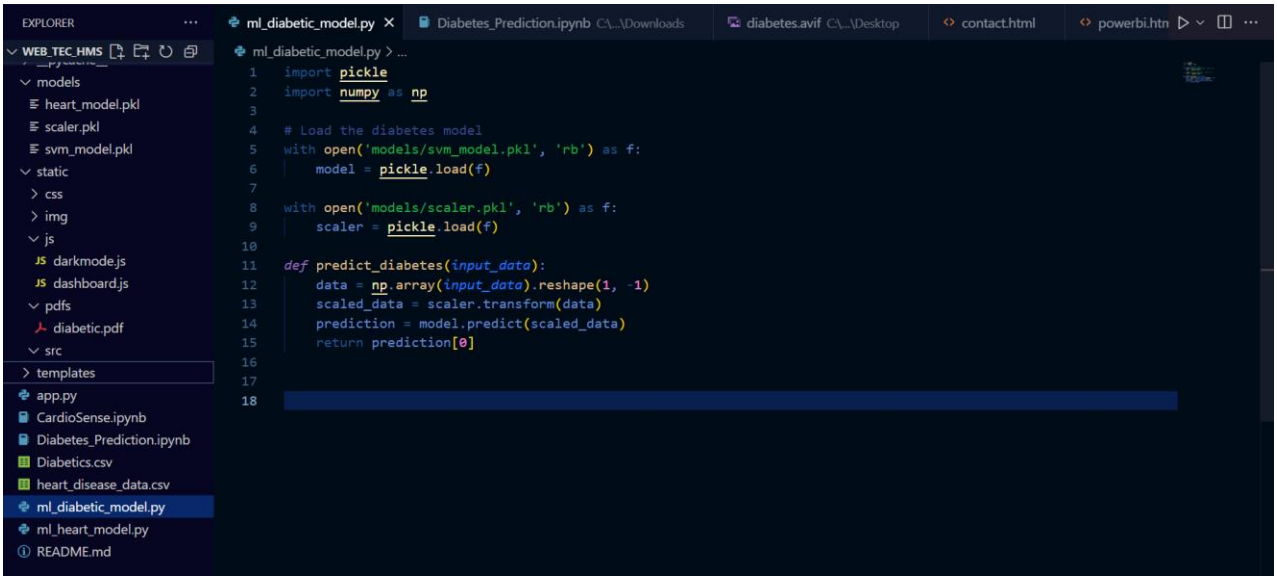
Heart Diseases Report



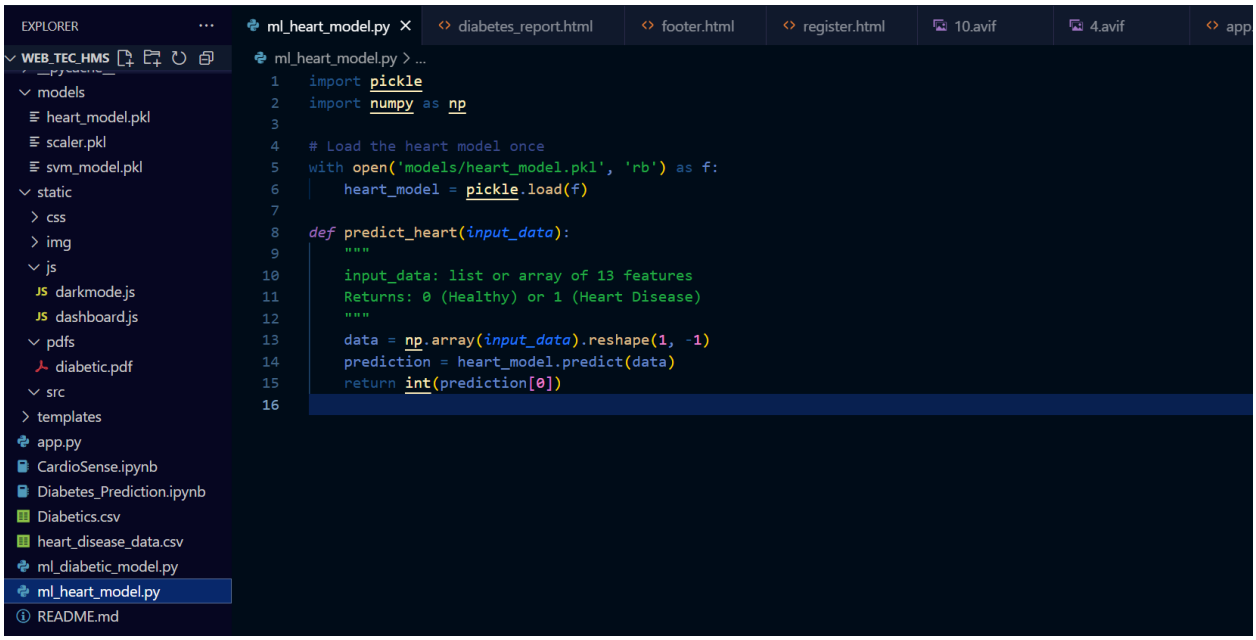
Bed Info



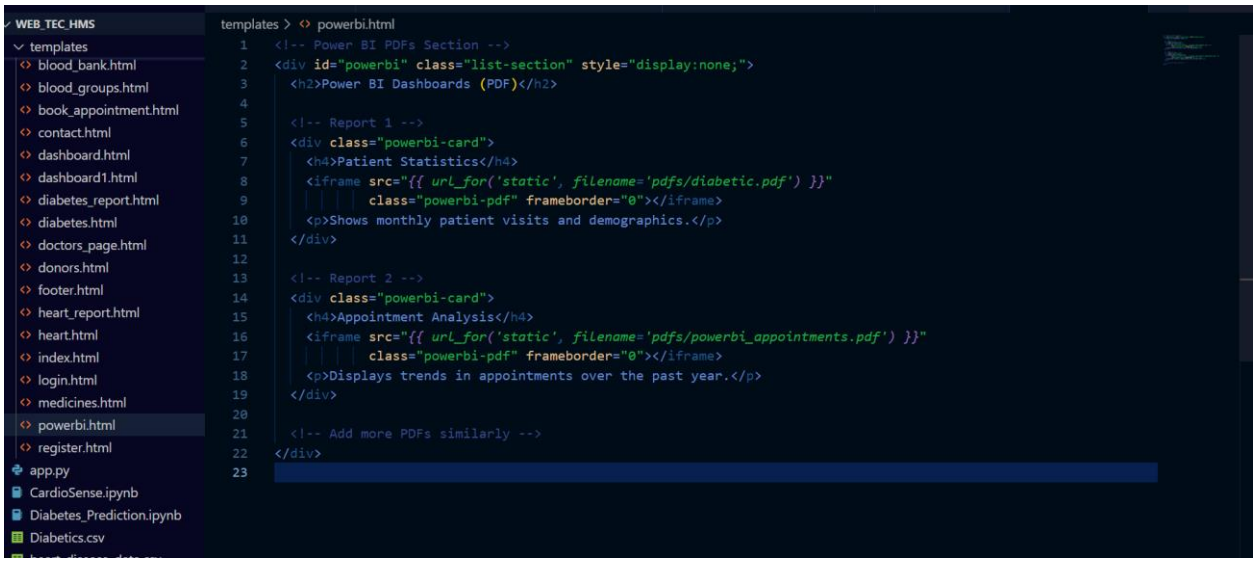
Darkmode.js file



ML Diabetic Model.py

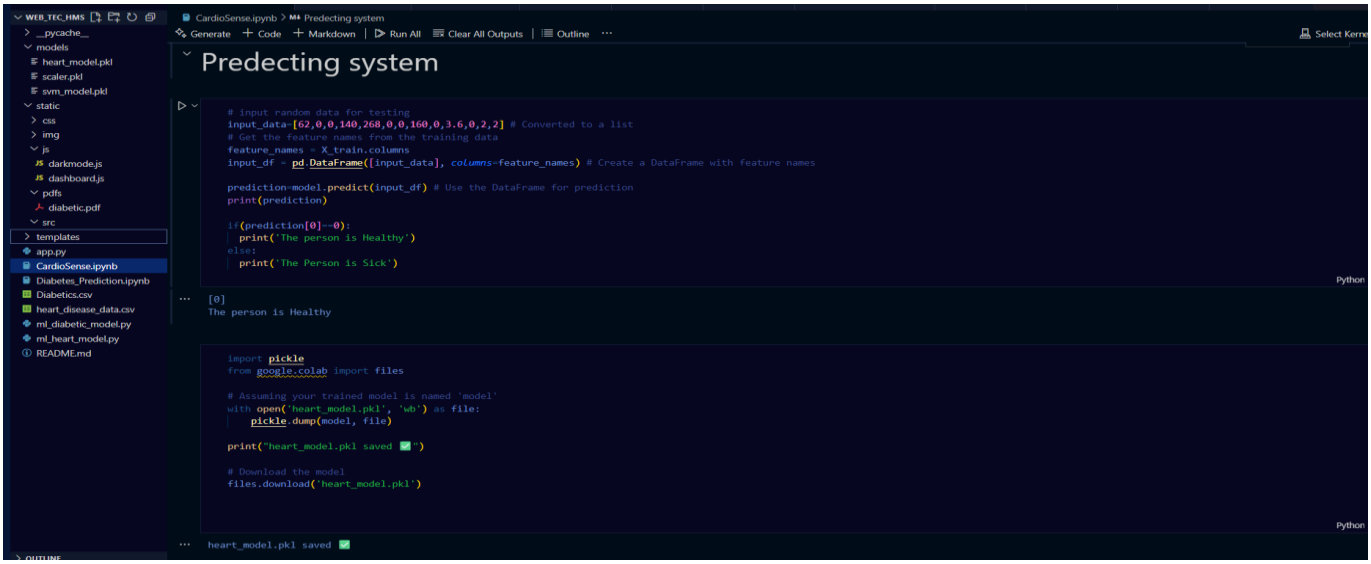


ML Heart Model.py

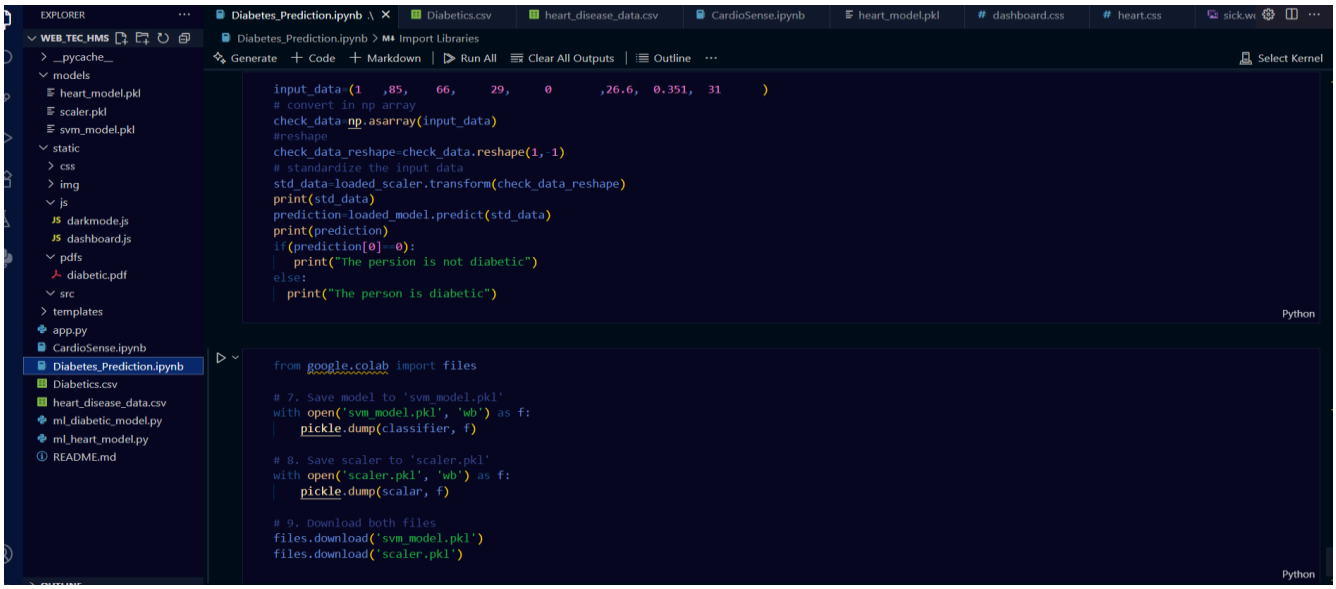


Power Bi file

- Prediction Model



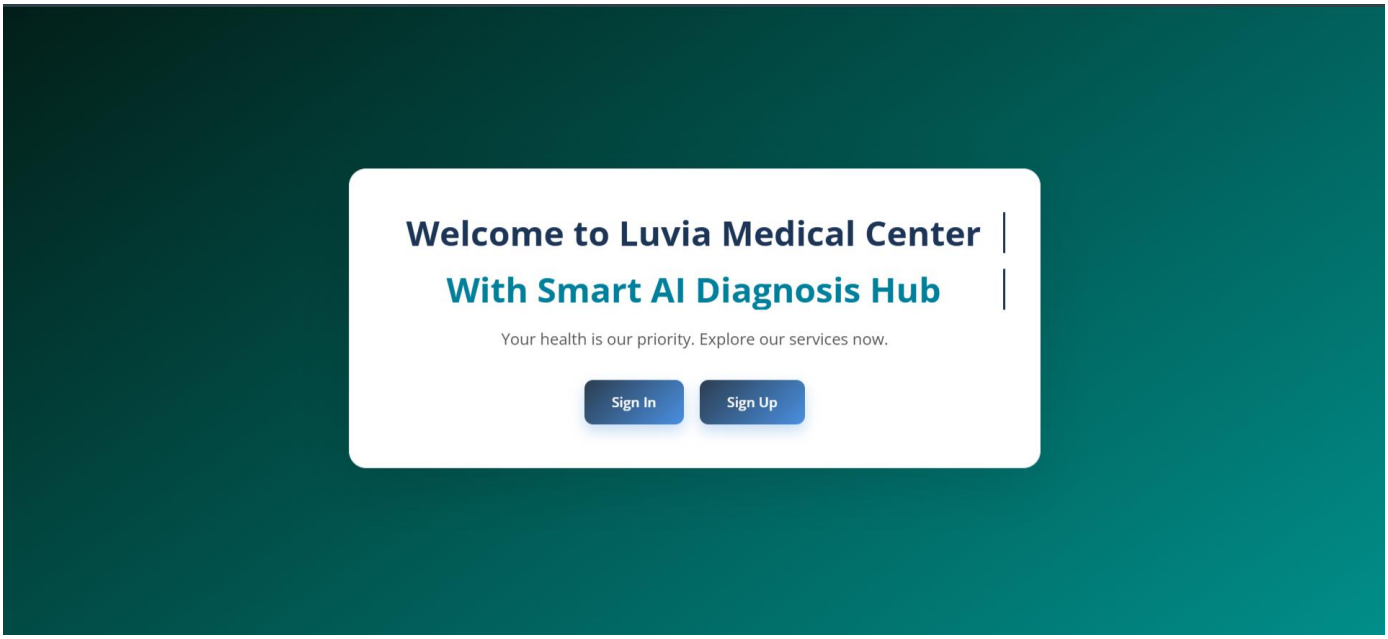
Heart Diseases



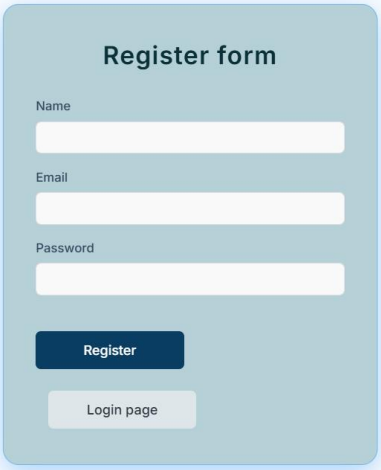
Diabetic

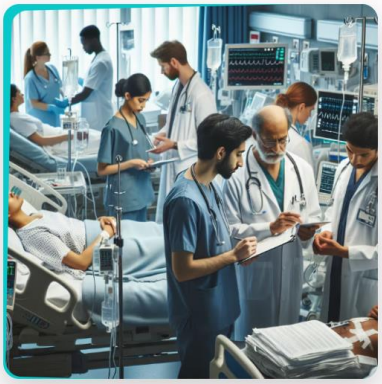
4. Output

- User Interface

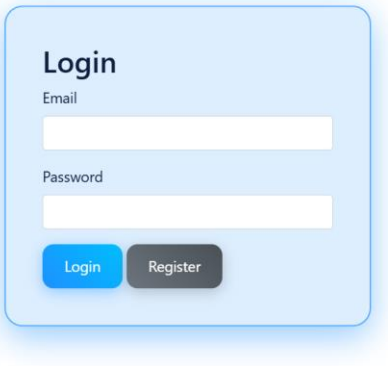


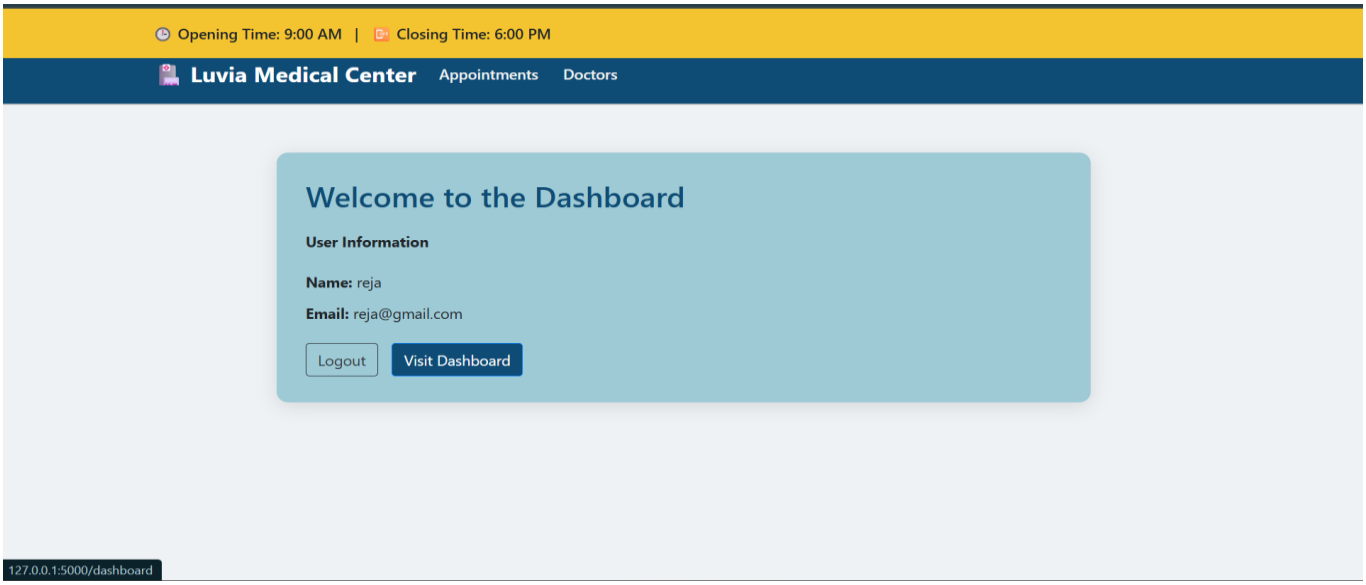
- User Register Form



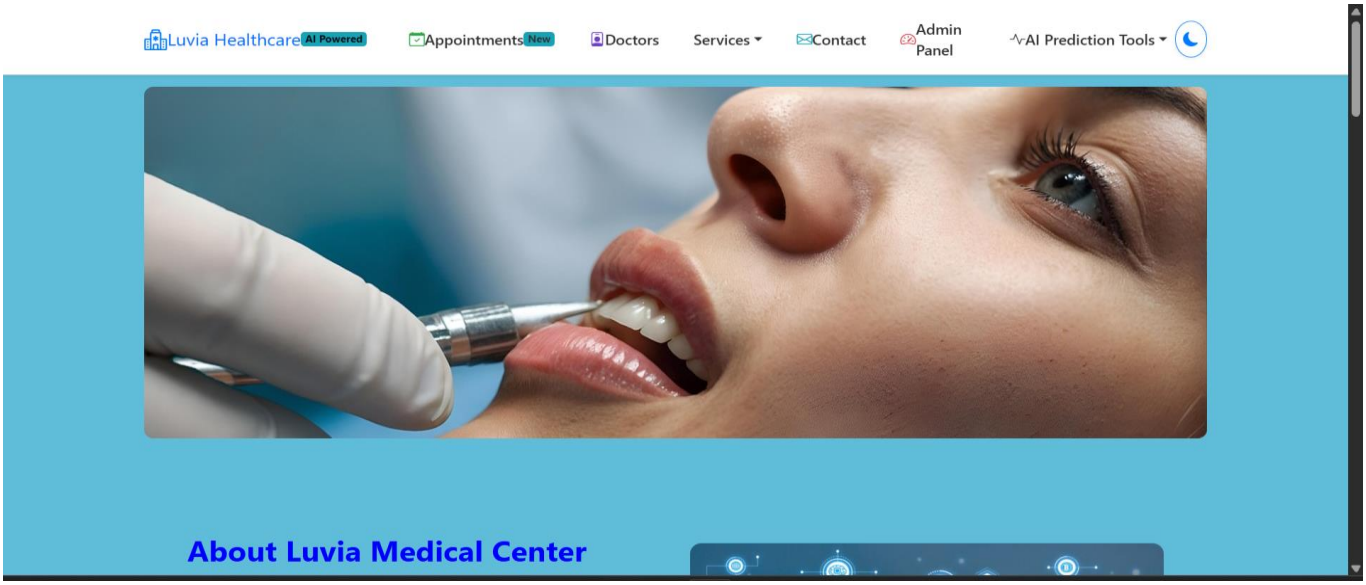


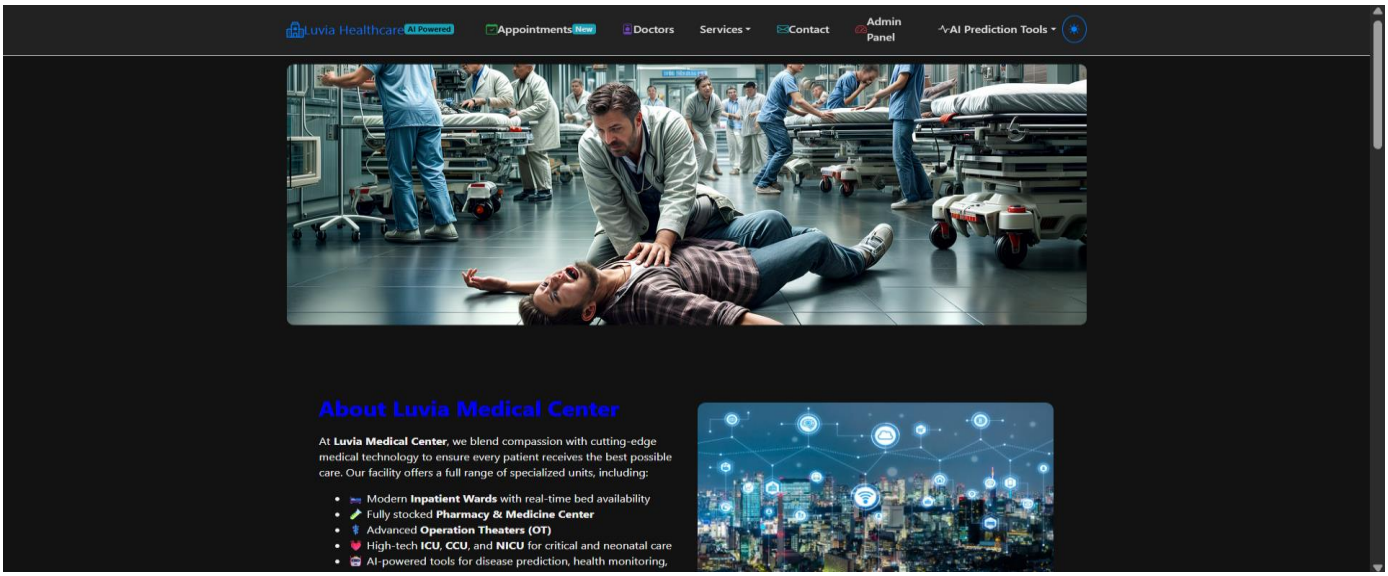
- User Login Form





- Dashboard


Luvia Healthcare
AI Powered
Appointments
New
Doctors
Services
Contact
Admin Panel
AI Prediction Tools
About Luvia Medical Center


Luvia Healthcare
AI Powered
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AI Prediction Tools
About Luvia Medical Center
At Luvia Medical Center, we blend compassion with cutting-edge medical technology to ensure every patient receives the best possible care. Our facility offers a full range of specialized units, including:
Modern Inpatient Wards with real-time bed availability
Fully stocked Pharmacy & Medicine Center
Advanced Operation Theaters (OT)
High-tech ICU, CCU, and NICU for critical and neonatal care
AI-powered tools for disease prediction, health monitoring,

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- Fully stocked **Pharmacy & Medicine Center**
- Advanced **Operation Theaters (OT)**
- High-tech **ICU**, **CCU**, and **NICU** for critical and neonatal care
- AI-powered tools for disease prediction, health monitoring, and diagnostics

Our Facilities

We constantly invest in high-end equipment

- 24/7 Emergency & ICU
- Modern Diagnostic Lab
- Experienced Doctors & Nurses
- Free Health Checkup Camps
- Online Appointment & Report

AI-Powered Disease Prediction

Use our advanced machine learning models to assess your health risk and get preventive guidance instantly.

Heart Disease

Check your heart risk with just a few inputs.

Predict Now

Diabetes

Get personalized diabetes risk assessment.

Predict Now

Cancer

Early detection predictions using ML models.

Predict Now

COVID-19

Predict your COVID-19 risk based on symptoms.

Predict Now

Emergency Care

Our emergency department is open 24/7 to provide critical care and life-saving support.

24/7 ER

Fully staffed emergency room ready for any critical situation.

Trauma & Critical Care

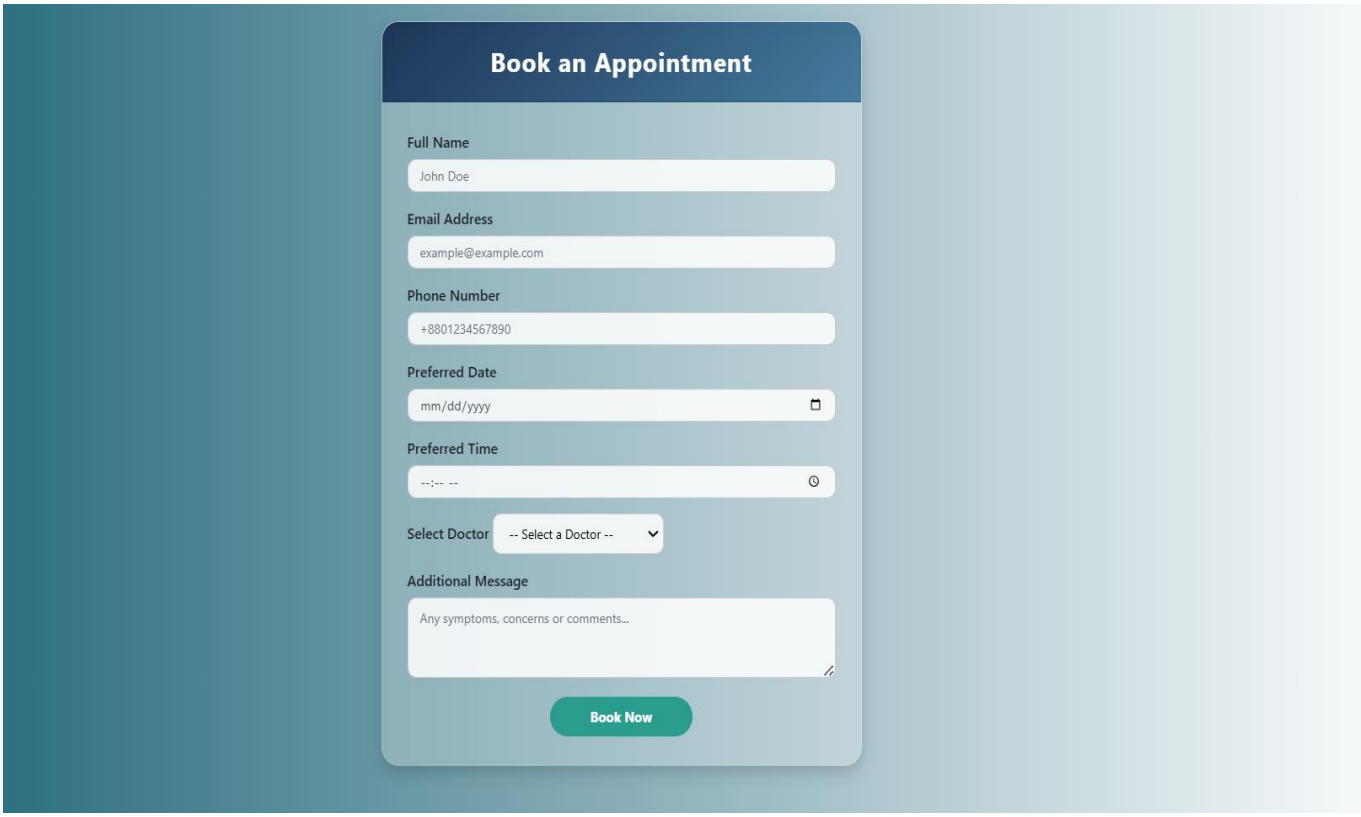
Advanced trauma and critical care units for immediate treatment.

Ambulance Service

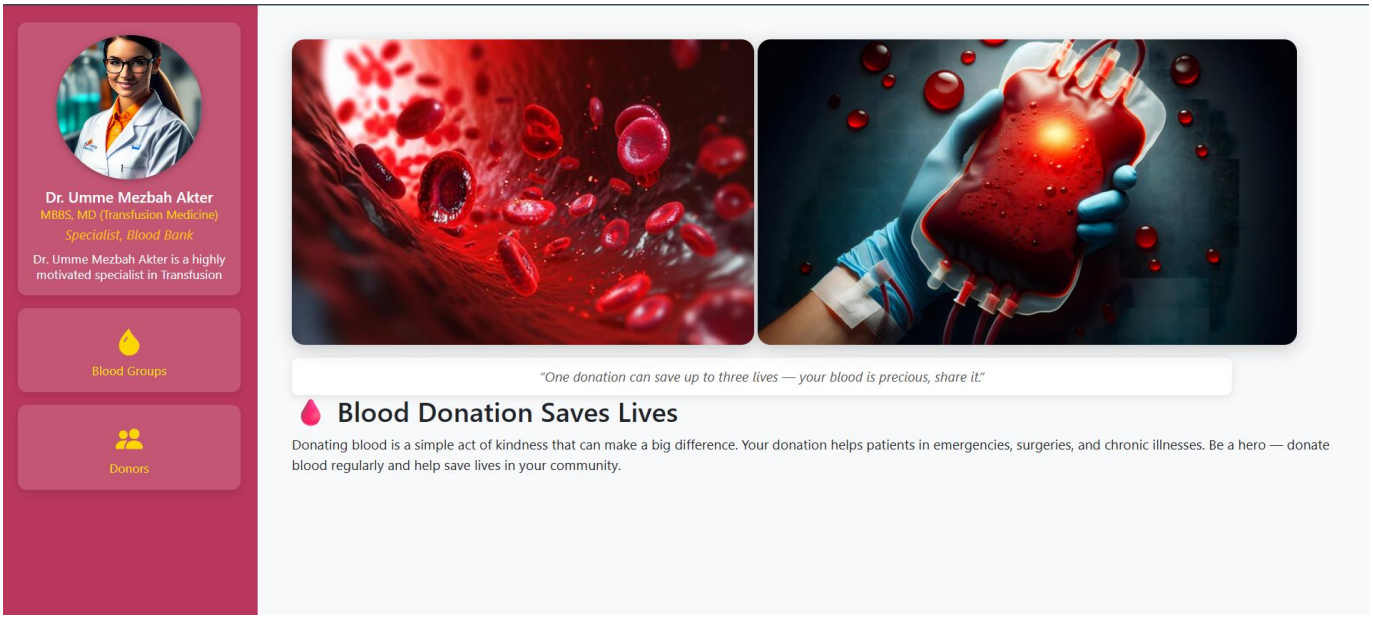
Rapid response ambulance & mobile ICU for emergencies.

Call Emergency Now

- Book an Appointment



- Blood Bank




Available Blood Groups
A+
12 L
Contact for Blood
A-
5 L
Contact for Blood
B+
8 L
Contact for Blood
B-
3 L
Contact for Blood
O+
15 L
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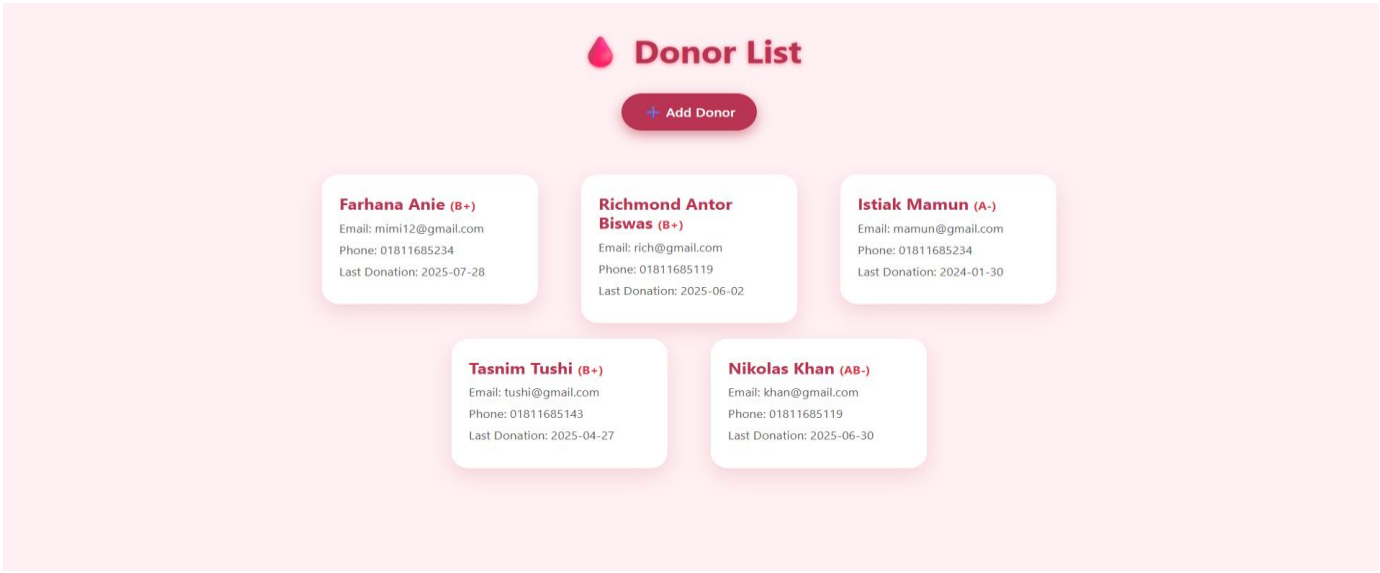
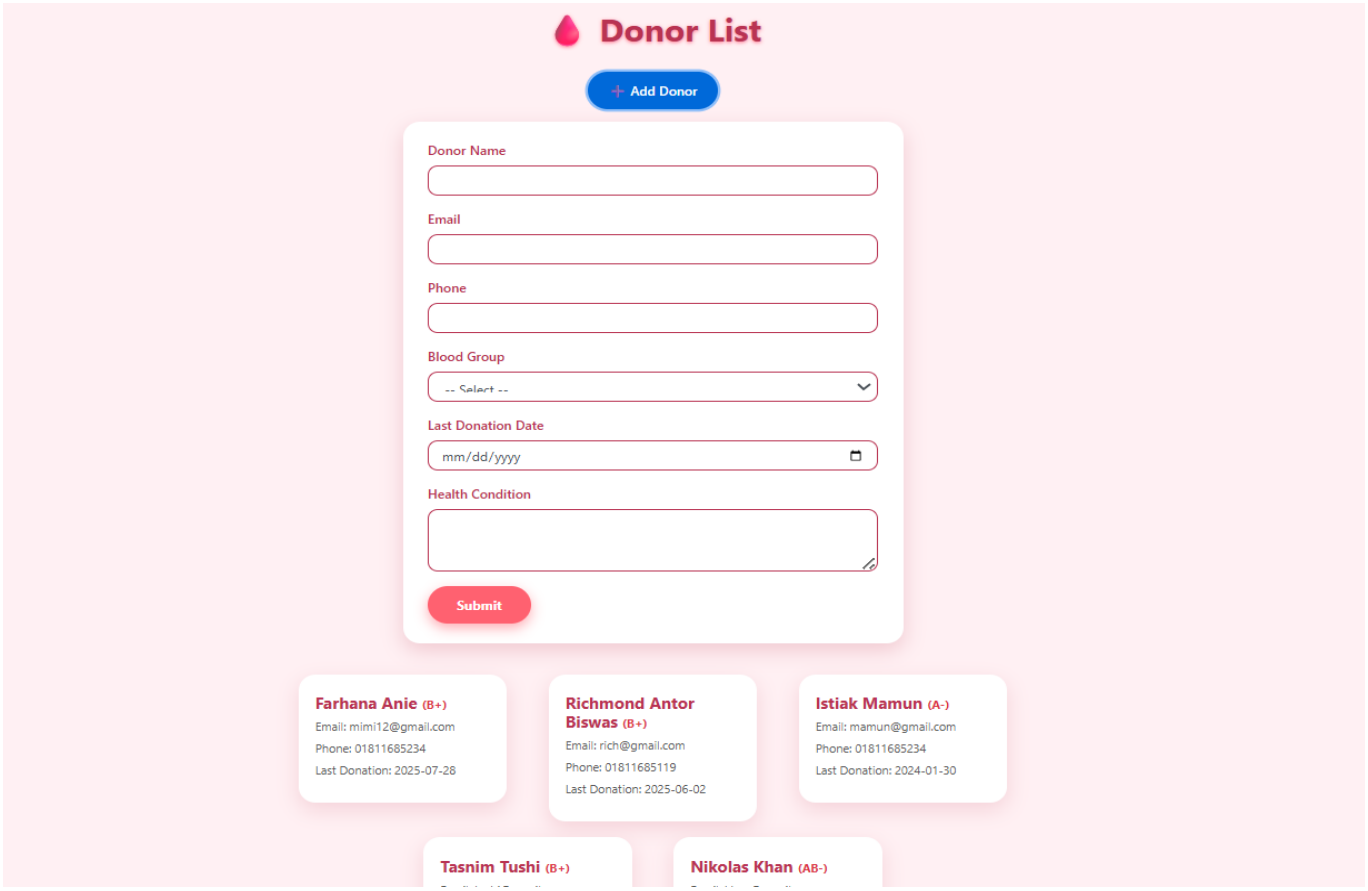
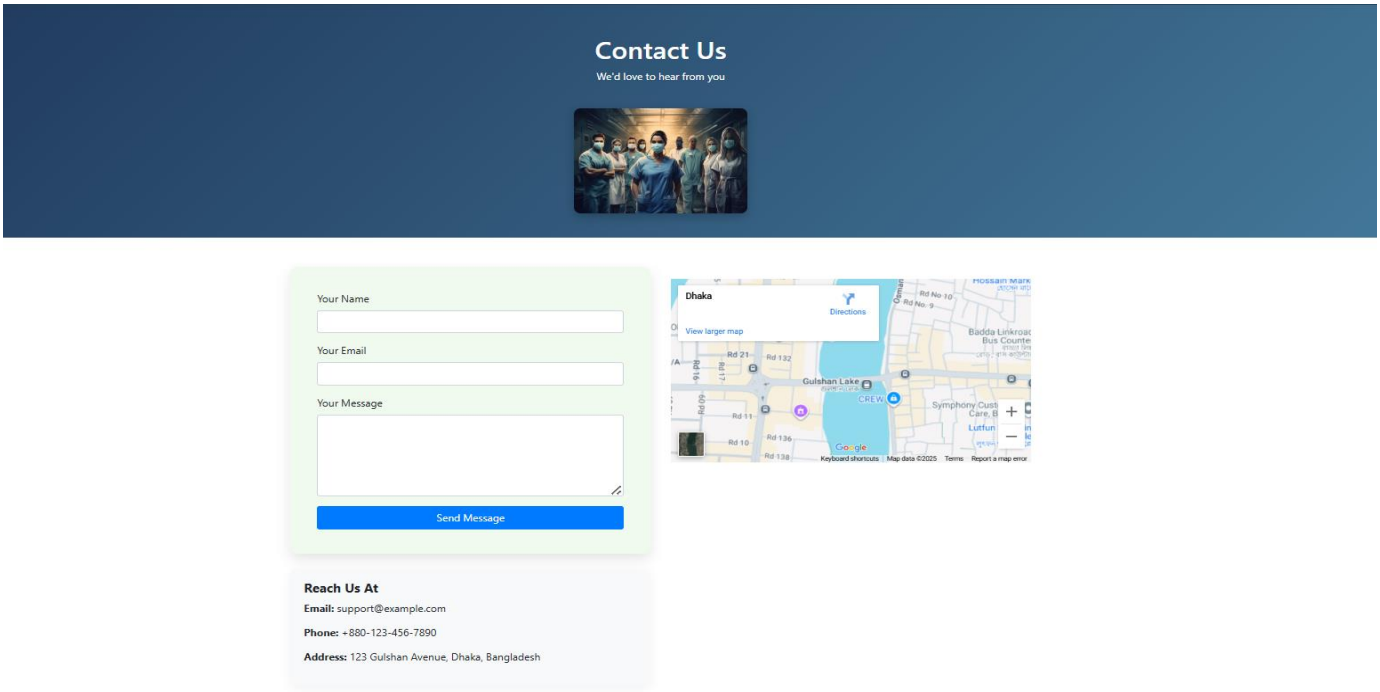
O-
2 L
Contact for Blood
AB+
6 L
Contact for Blood
AB-
1 L
Contact for Blood


Donor List
Add Donor
Farhana Anie (B+)
Email: mimi12@gmail.com
Phone: 01811685234
Last Donation: 2025-07-28
Richmond Antor Biswas (B+)
Email: rich@gmail.com
Phone: 01811685119
Last Donation: 2025-06-02
Istiak Mamun (A-)
Email: mamun@gmail.com
Phone: 01811685234
Last Donation: 2024-01-30
Tasnim Tushi (B+)
Email: tushi@gmail.com
Phone: 01811685143
Last Donation: 2025-04-27
Nikolas Khan (AB-)
Email: khan@gmail.com
Phone: 01811685119
Last Donation: 2025-06-30

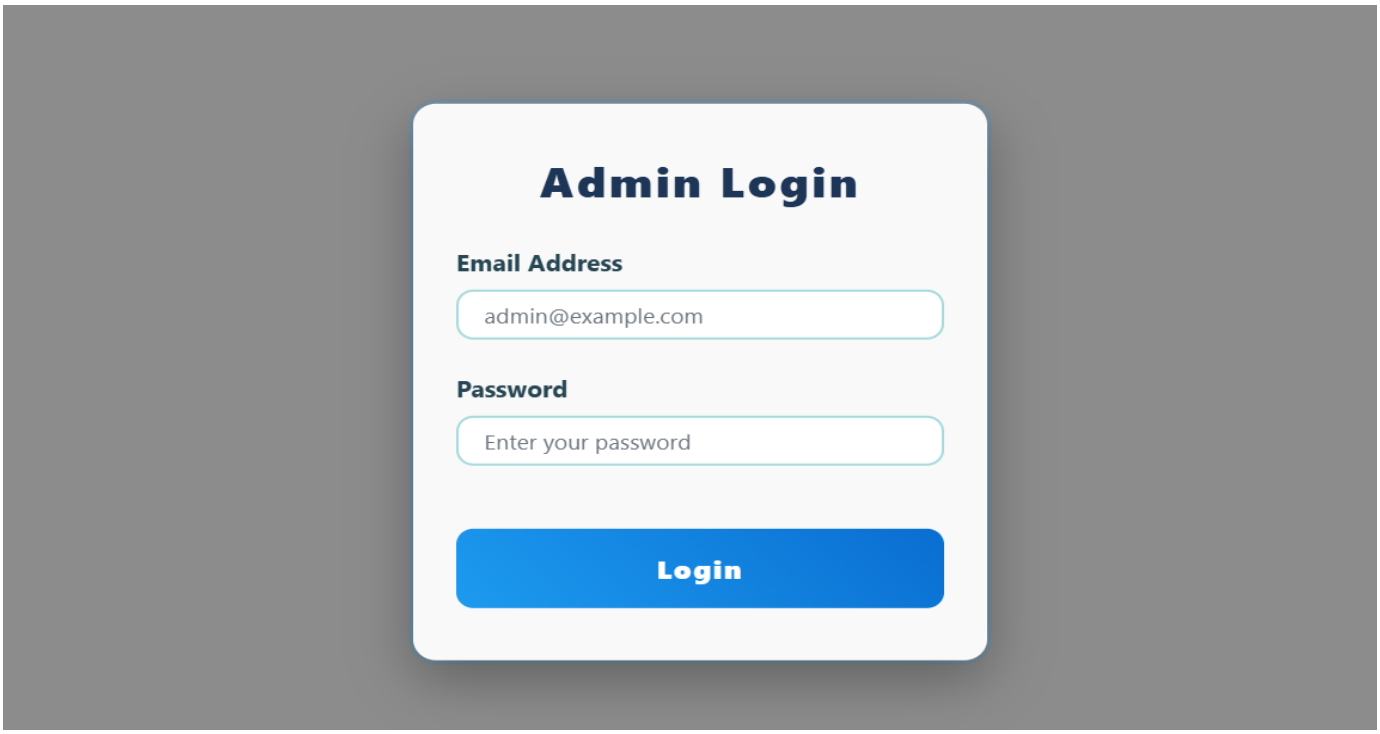


- Bed Information

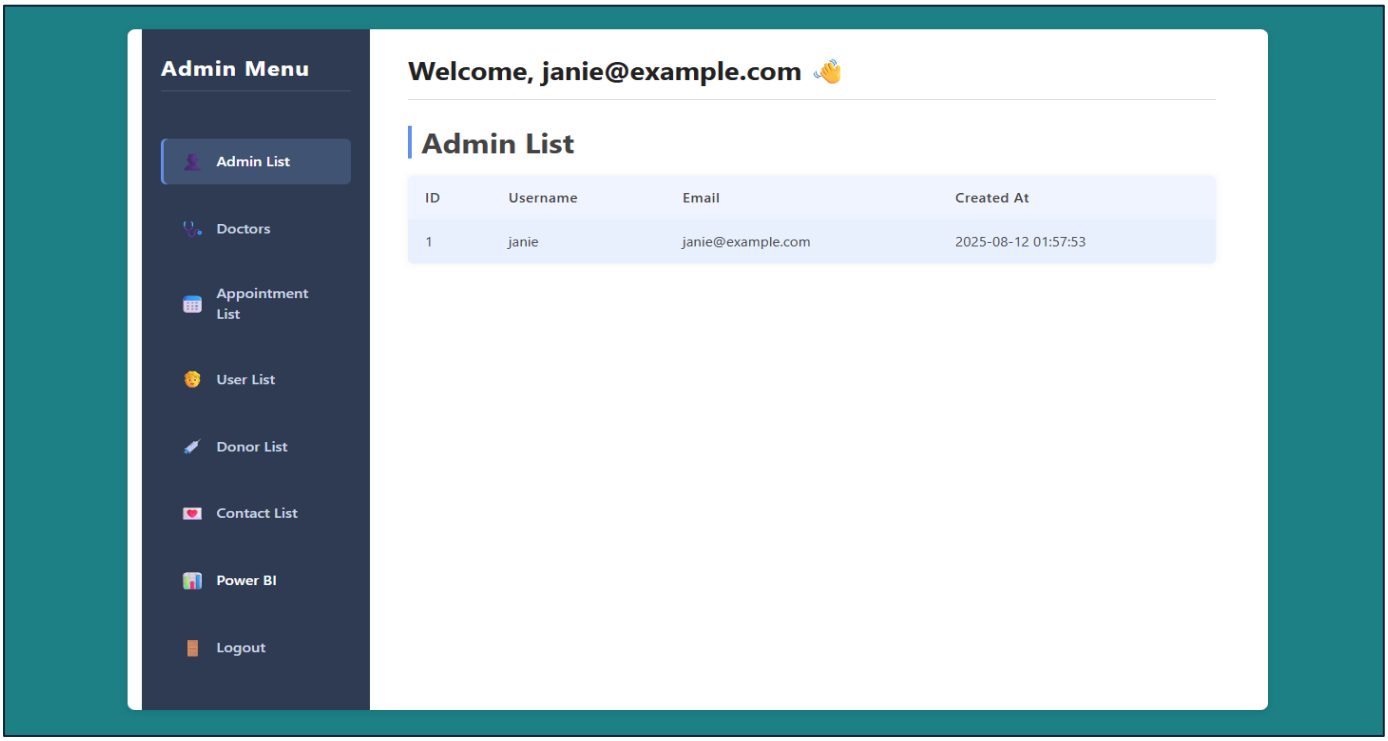
- Contact Us

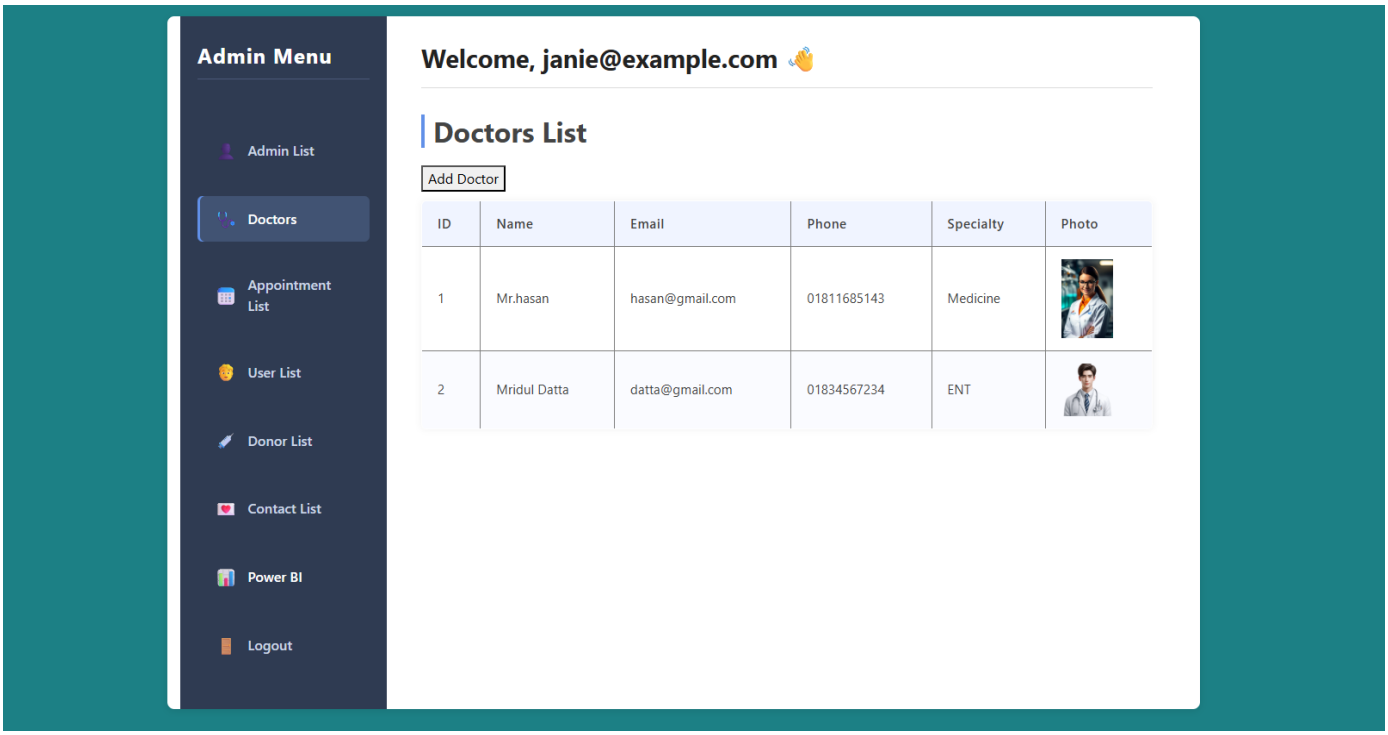


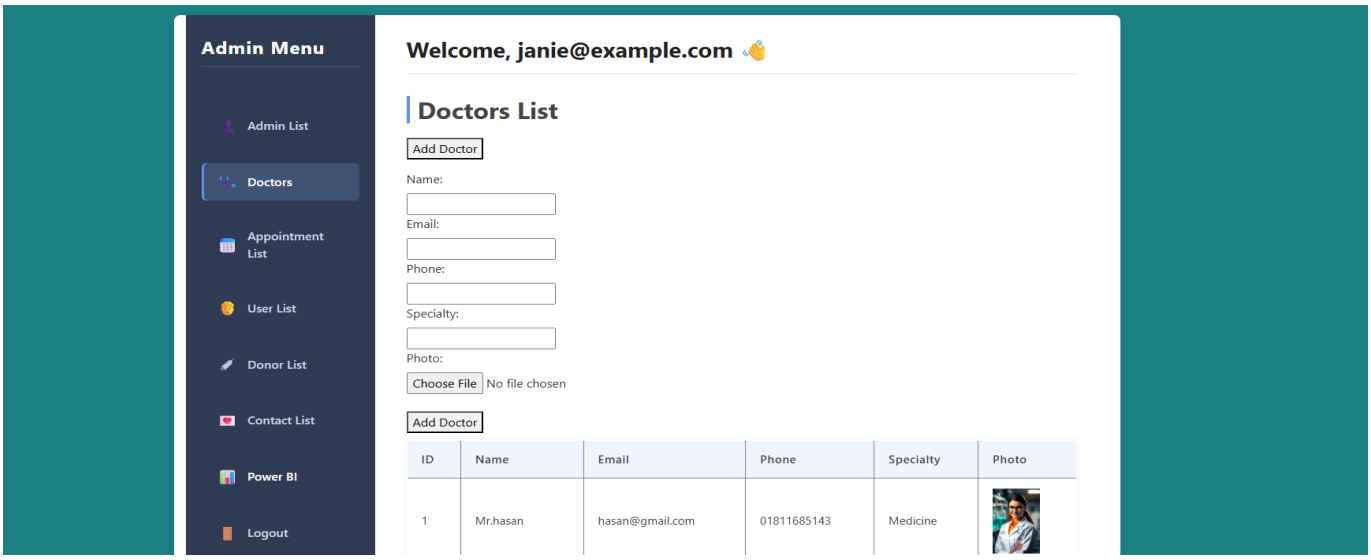
- Admin Login Form



- Admin Dashboard






Admin Menu
Admin List
Doctors
Appointment List
User List
Donor List
Contact List
Power BI
Logout
Welcome, janie@example.com
Doctors List
Add Doctor
Name:
Email:
Phone:
Specialty:
Photo:
Choose File
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ID
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Email
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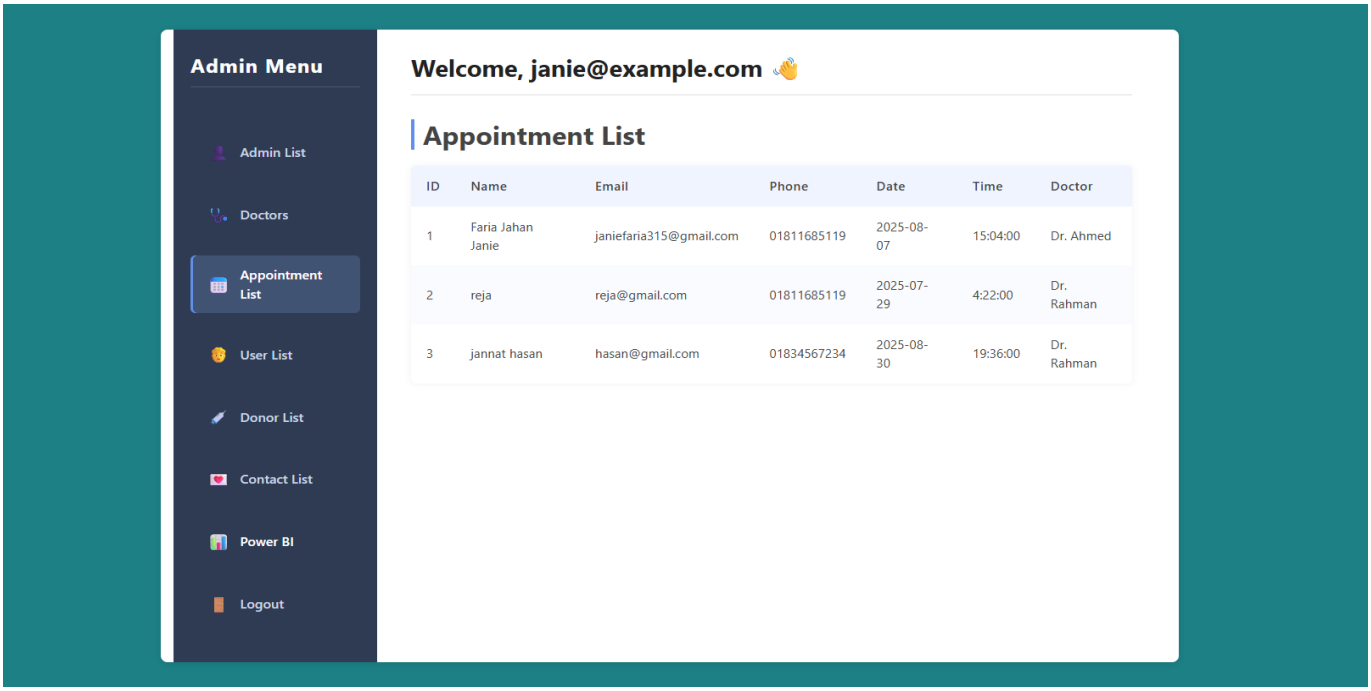
Photo
1
Mr.hasan
hasan@gmail.com
01811685143
Medicine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Logout
Welcome, janie@example.com
Appointment List
ID
Name
Email
Phone
Date
Time
Doctor
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01811685119
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Dr. Ahmed
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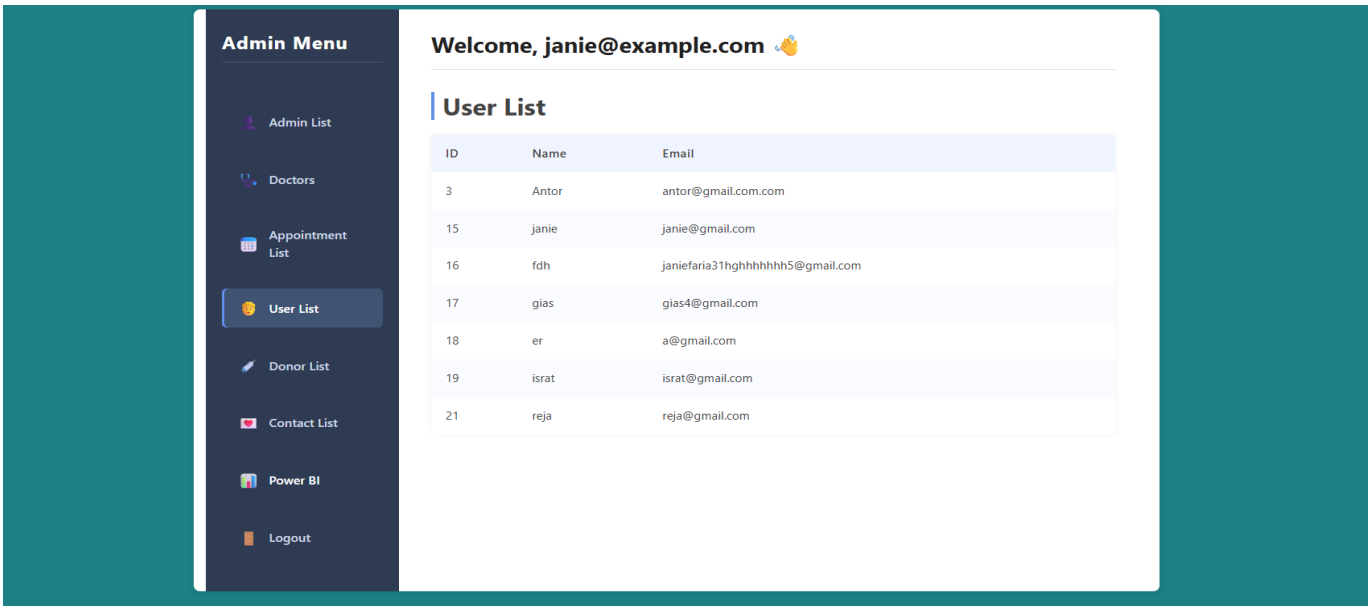
Dr. Rahman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User List
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15 janie janie@gmail.com
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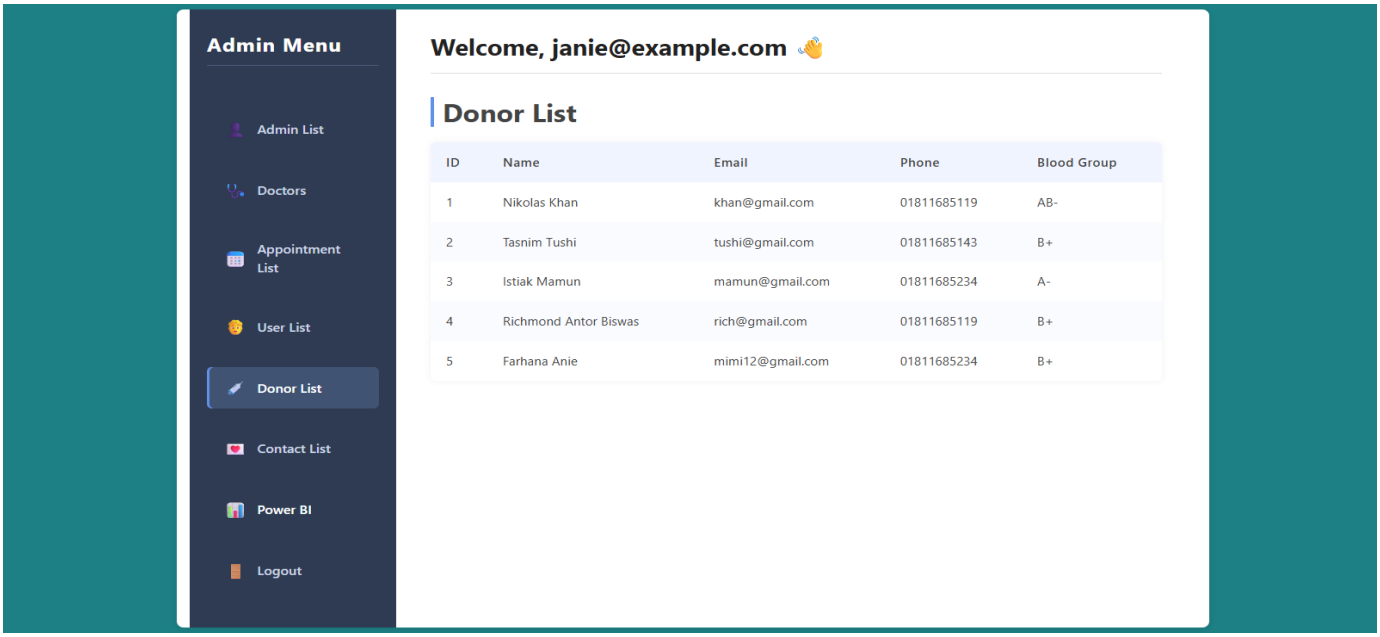
21 reja reja@gmail.com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Logout
Welcome, janie@example.com
Donor List
ID Name Email Phone Blood Group
1 Nikolas Khan khan@gmail.com 01811685119 AB-
2 Tasnim Tushi tushi@gmail.com 01811685143 B+
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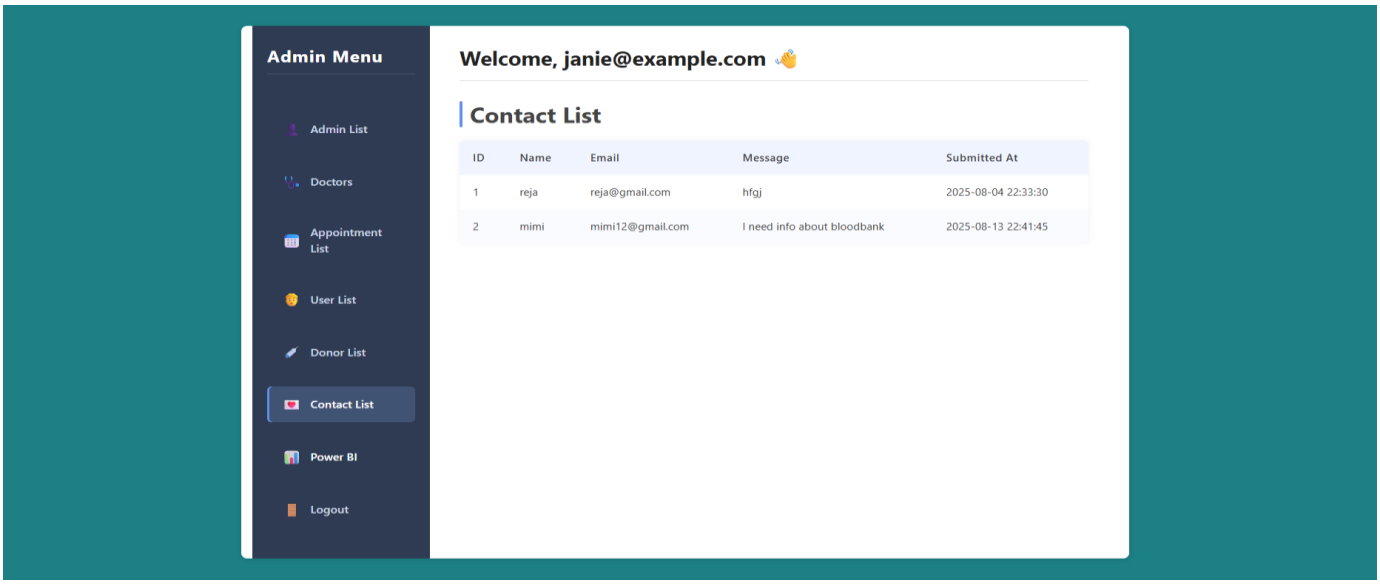
Admin Menu
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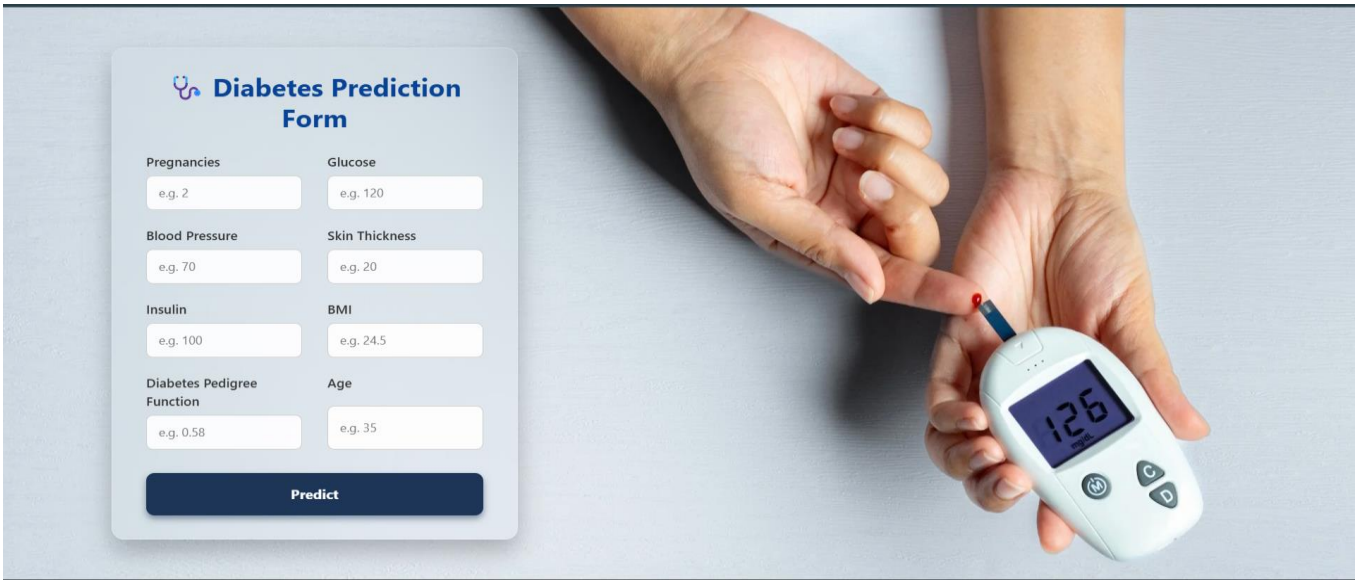
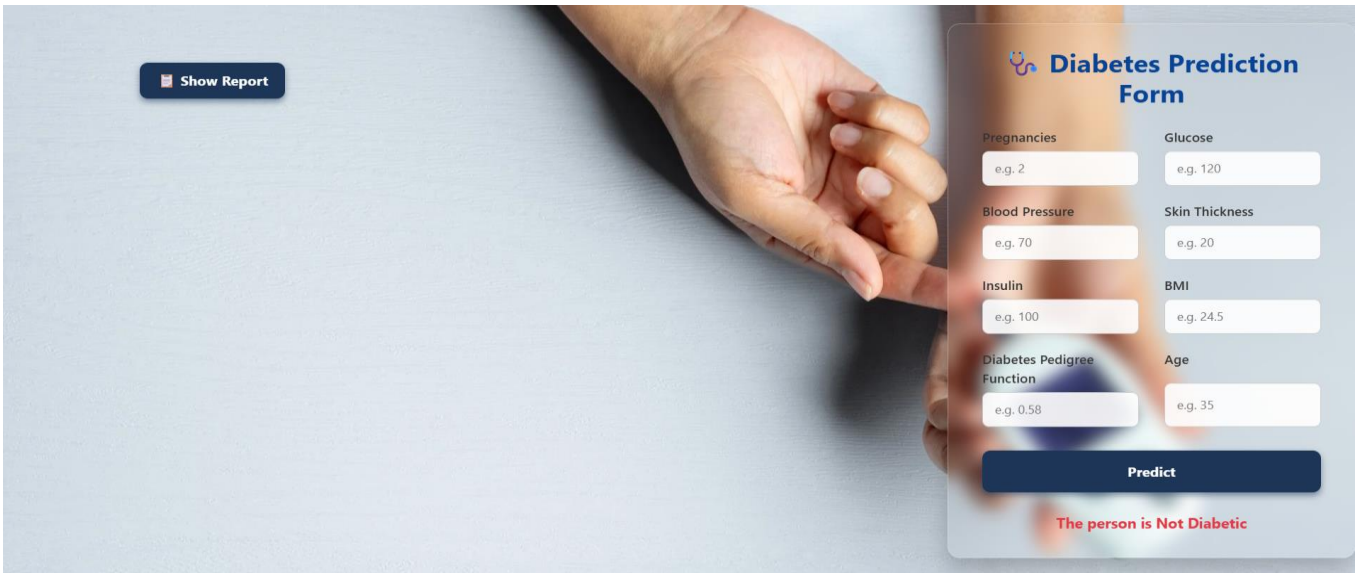
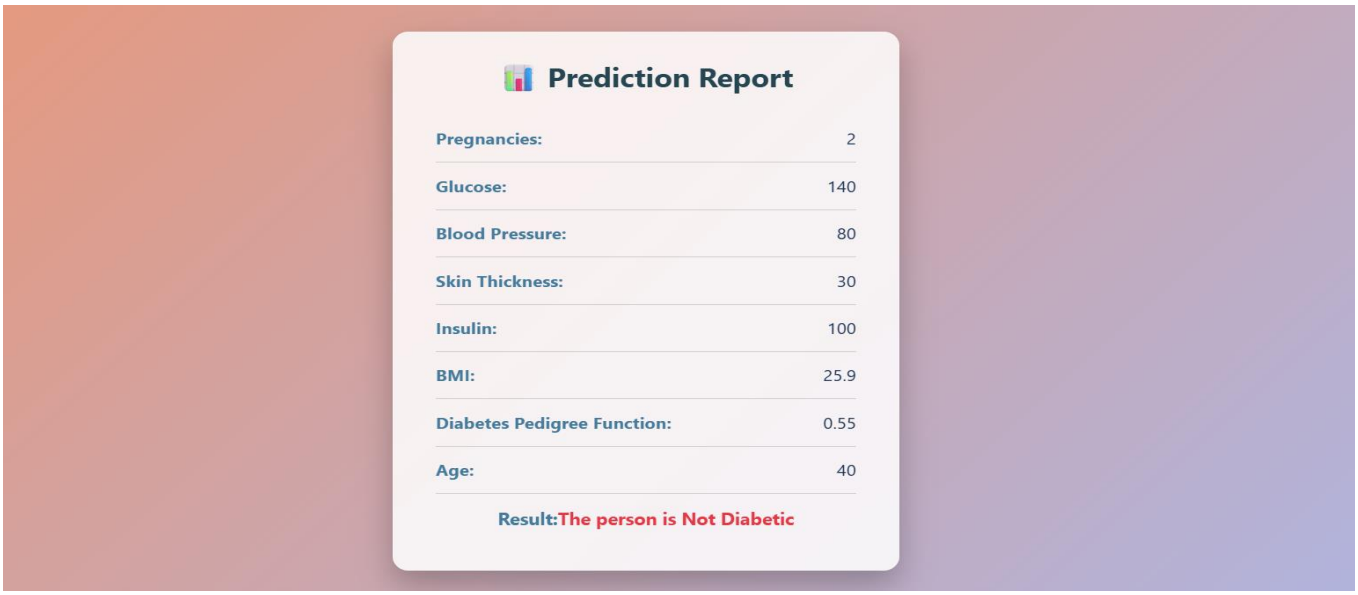
Power BI
Logout
Welcome, janie@example.com
Contact List
ID Name Email Message Submitted At
1 reja reja@gmail.com hfgj 2025-08-04 22:33:30
2 mimi mimi12@gmail.com I need info about bloodbank 2025-08-13 22:41:45

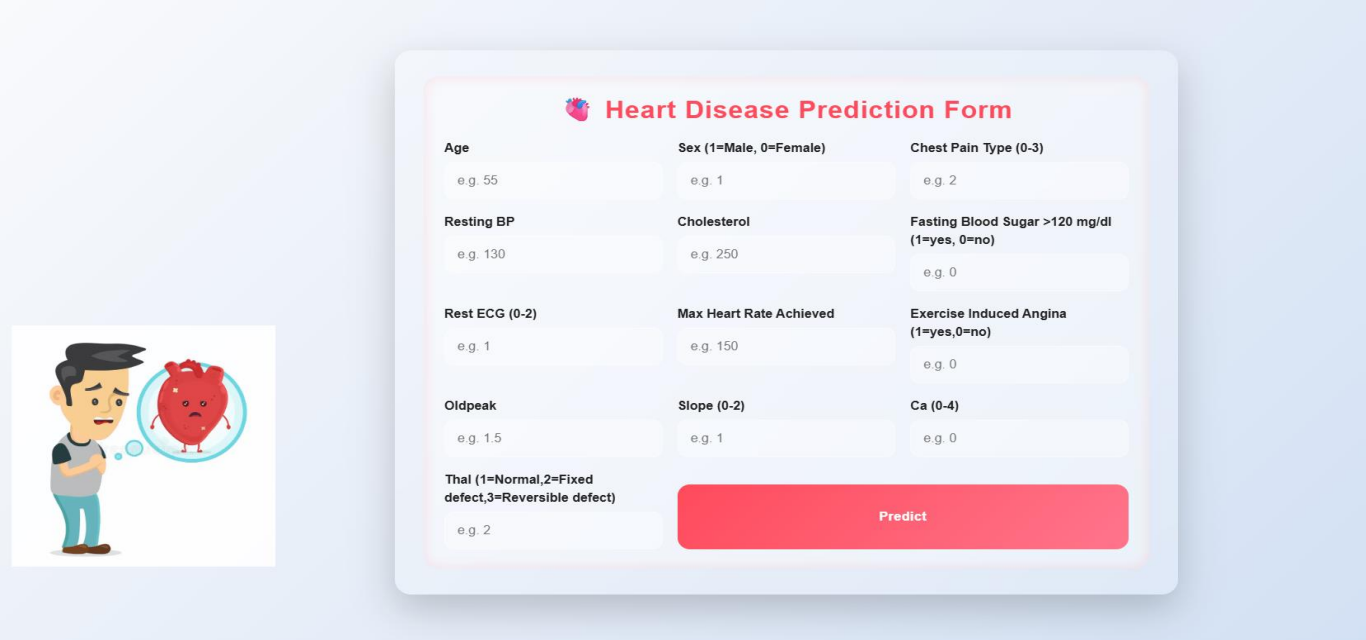
- Predict Diabetic:

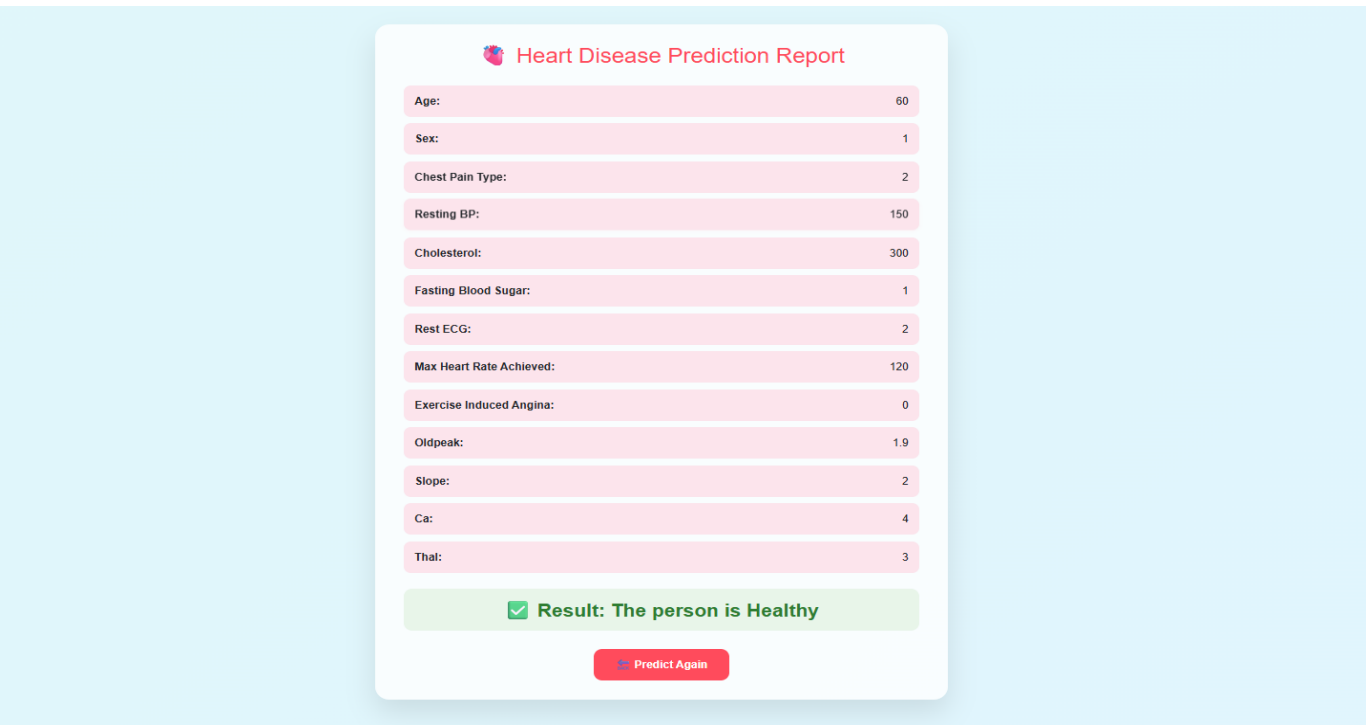




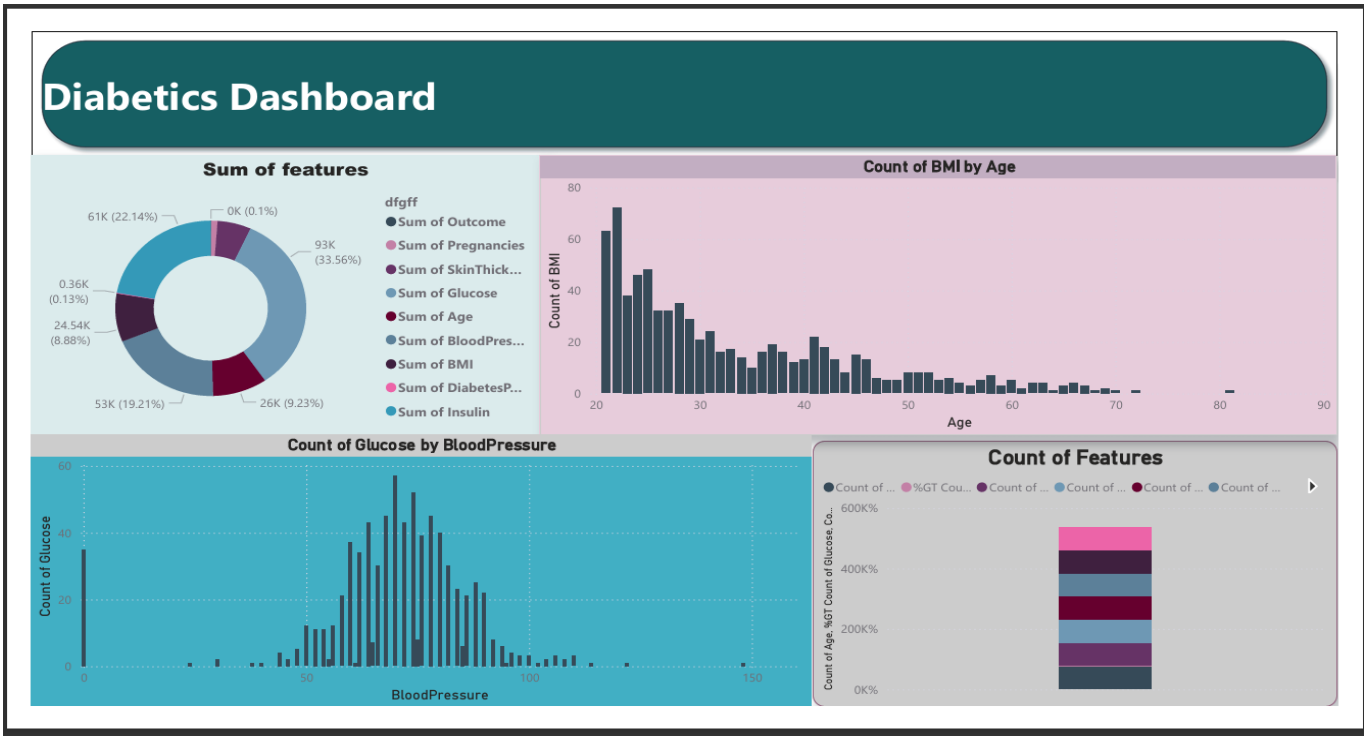


- Predict Heart Diseases:

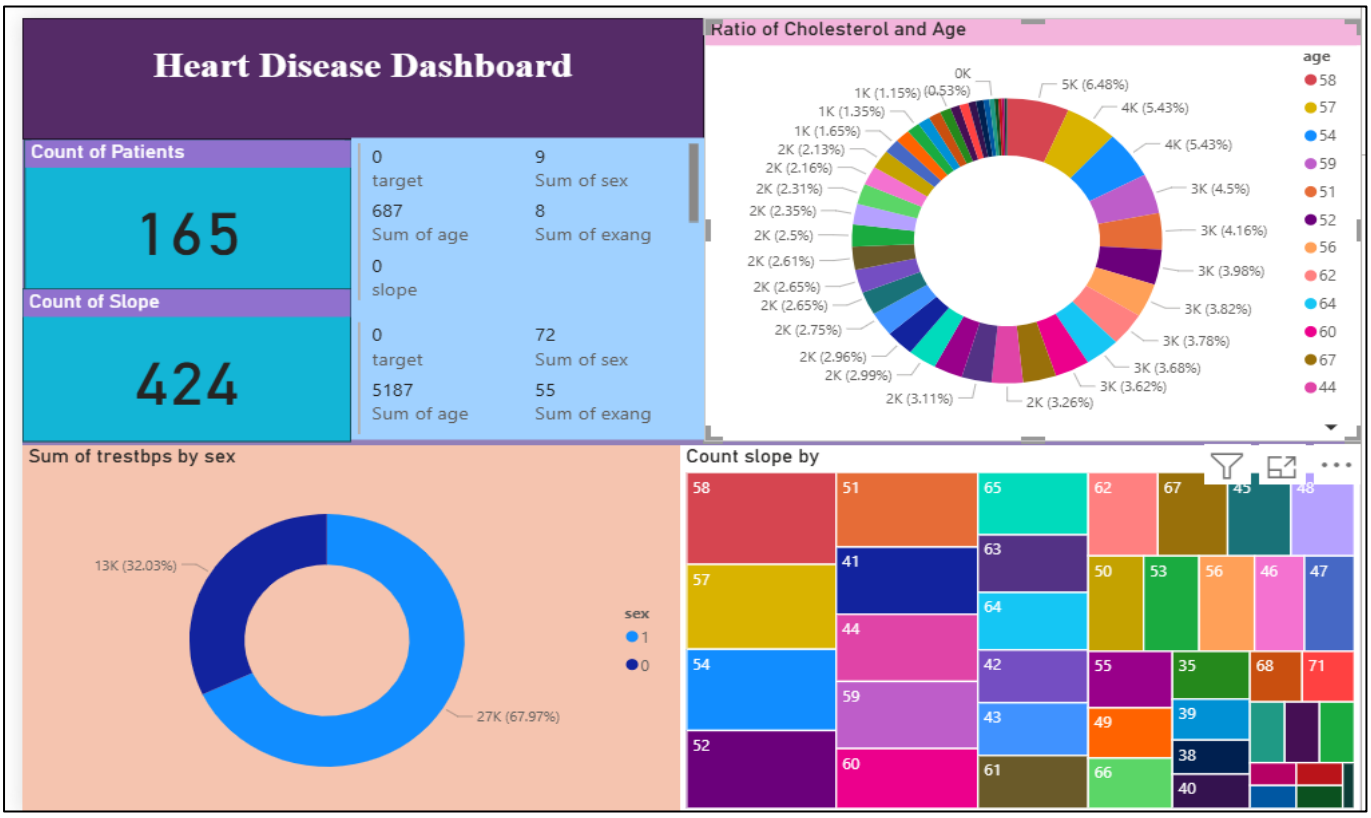




- PowerBI :



Diabetic Dashboard



Heart Disease Dashboard

5. Conclusion

This project successfully demonstrates the use of Flask to build a complete hospital management and prediction system. It integrates different technologies such as Python, Flask, MySQL, and machine learning to provide reliable healthcare-related services in one platform. The system includes features like patient management, doctor information, health tips, bed availability, and prediction models for diseases such as diabetes, cancer, and pregnancy. By combining data visualization and machine learning, the project helps in offering quick and effective decision support for both patients and hospital staff. The use of Flask makes the application lightweight, fast, and easy to maintain, while the database ensures secure and organized storage of information. This hospital system not only provides medical predictions but also focuses on improving patient care by offering emergency care options, doctor lists, and contact facilities. Overall, the project highlights how technology can be applied in the healthcare sector to make hospital services smarter, more accessible, and more efficient. It also creates scope for future improvements like adding more advanced prediction models, real-time data updates, and expanding the system into a fully digital healthcare solution.