MINI PROJECT PRESENTATION

ON

PREDICTIVE HEALTH ANALYTICS

FOR DIABETES RISK ASSESSMENT AND PERSONALIZED REPORTING
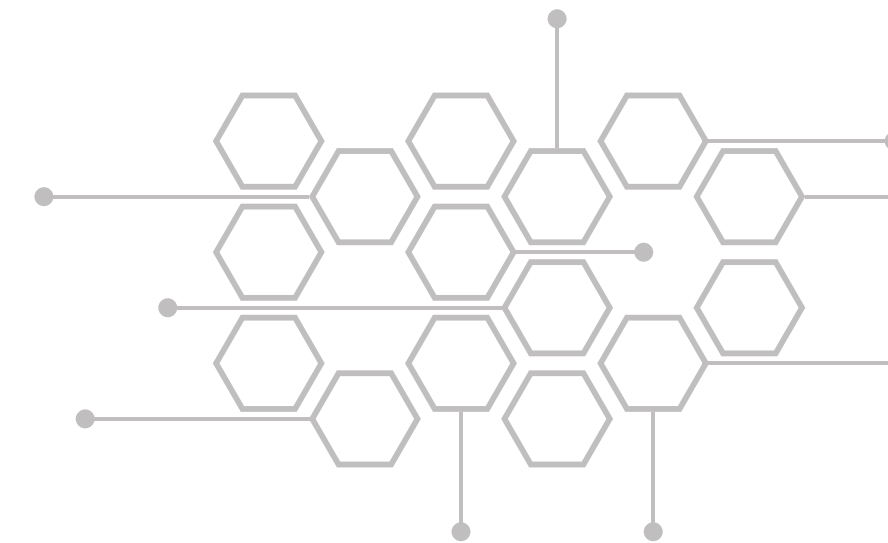
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UNDER THE GUIDENCE OF
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(ASSISTANT PROFESSOR)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
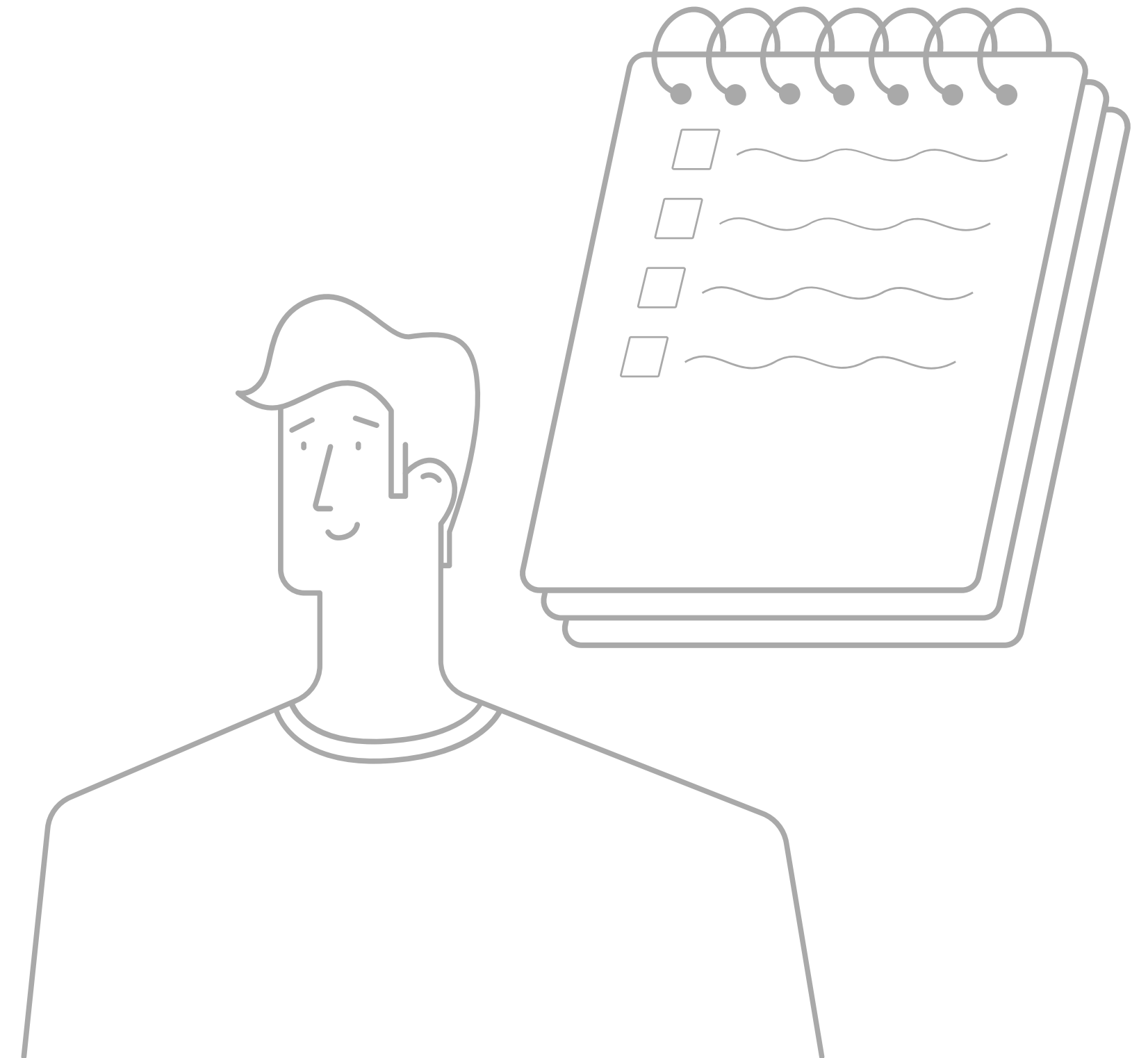
17/11/2023

PREDICTIVE HEALTH ANALYTICS

FOR DIABETES RISK ASSESSMENT AND PERSONALIZED REPORTING

TABLE OF CONTENT

MARRI LAXMAN REDDY GROUP OF INSTITUTIONS

MLR Institute of Technology

ABSTRACT

Predictive Health Analytics for Diabetes Risk Assessment and Personalized Reporting Integrates advanced machine learning for precise diabetes risk assessment. Combining health assessments, user interactions, and multidimensional analytics, our model synthesizes diverse data sets,delivering personalized medical reports. With exceptional accuracy, it discerns potential diabetes risks, offering comprehensive insights into individual health profiles. The system effortlessly translates complex analytics into userfriendly reports, ensuring accessibility for both professionals and users. The dynamic HTML-to-PDF integration streamlines the reporting process, facilitating the efficient distribution of personalized medical documentation. This project marks a leap in predictive health analytics,bridging sophisticated machinelearning with user-centric medical reporting.

INTRODUCTION

In an era marked by technological advancements and a growing emphasis on personalized healthcare, our project, "Predictive Health Analytics for Diabetes Risk Assessment and Personalized Reporting," stands at the intersection of sophisticated machine learning and user-centric medical reporting. Diabetes, a prevalent and chronic health condition, necessitates innovative approaches to risk assessment and management. Our project strives to address this imperative by leveraging advanced machine learning techniques, combining health assessments, and introducing a multidimensional analytics framework. We go beyond conventional methodologies, integrating diverse datasets that encompass health assessments and user interactions.

LITERATURE SURVEY

⚙️ Numerous studies have demonstrated the effectiveness of predictive health analytics in identifying individuals at risk of developing diabetes. For instance, a study by Khoslaetal (2017) used a machine learning algorithm to predict diabetes risk with an accuracy of 88%.

⚙️ In addition to predicting diabetes risk, predictive health analytics can also be used to provide personalized insights into individual health profiles. For example, a study by Shahetal(2019) used a machine learning algorithm to identify individuals at risk of developing diabetic retinopathy.

EXISTING SYSTEMS

1. **IBM Watson Health:**
   - Description: IBM Watson Health is a prominent platform that harnesses artificial intelligence (AI) and machine learning for predictive health analytics.
2. **Google Health:**
   - Description: Google Health leverages its extensive capabilities in data analytics and machine learning to offer personalized health insights.
3. **Epic Systems - Chronicles Diabetes Management:**
   - Description: Epic Systems, a leading electronic health record (EHR) provider, offers Chronicles Diabetes Management, a comprehensive solution for diabetes care.

OBJECTIVES

1. **Develop a Robust Predictive Model**
2. **Incorporate Multidimensional Analytics**
3. **Enable Personalized Medical Reports**
4. **Integrate Dynamic HTML-to-PDF Conversion**
5. **Enhance User-Centric Accessibility**
6. **Explore Hybrid Classification Methods**
7. **Validate and Test on Diverse Datasets**
8. **Address Ethical Considerations**
9. **Empower Individuals with Actionable Insights**
10. **Contribute to the Advancement of Predictive Health Analytics**

PROPOSED SYSTEM

The proposed system will have following :

1. **Cutting-Edge Predictive Analytics:**
   - The proposed system leverages advanced machine learning algorithms in predicting diabetes risks in ensuring unparalleled accuracy.
2. **Comprehensive Multidimensional Analysis:**
   - By adopting a multidimensional analytics framework, the system considers diverse factors such as lifestyle, genetics, and health history.
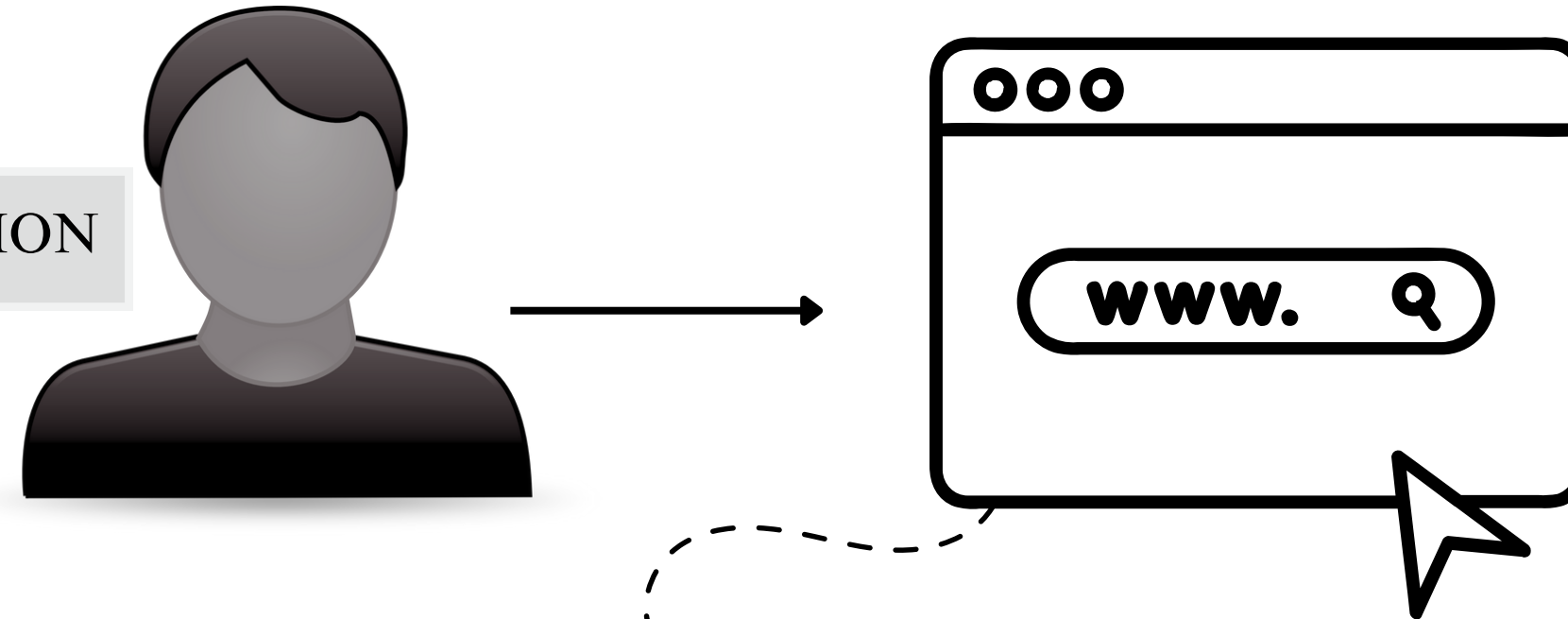3. **User-Friendly Personalized Reporting:**
   - A key feature of the system is the generation of user-friendly medical reports.
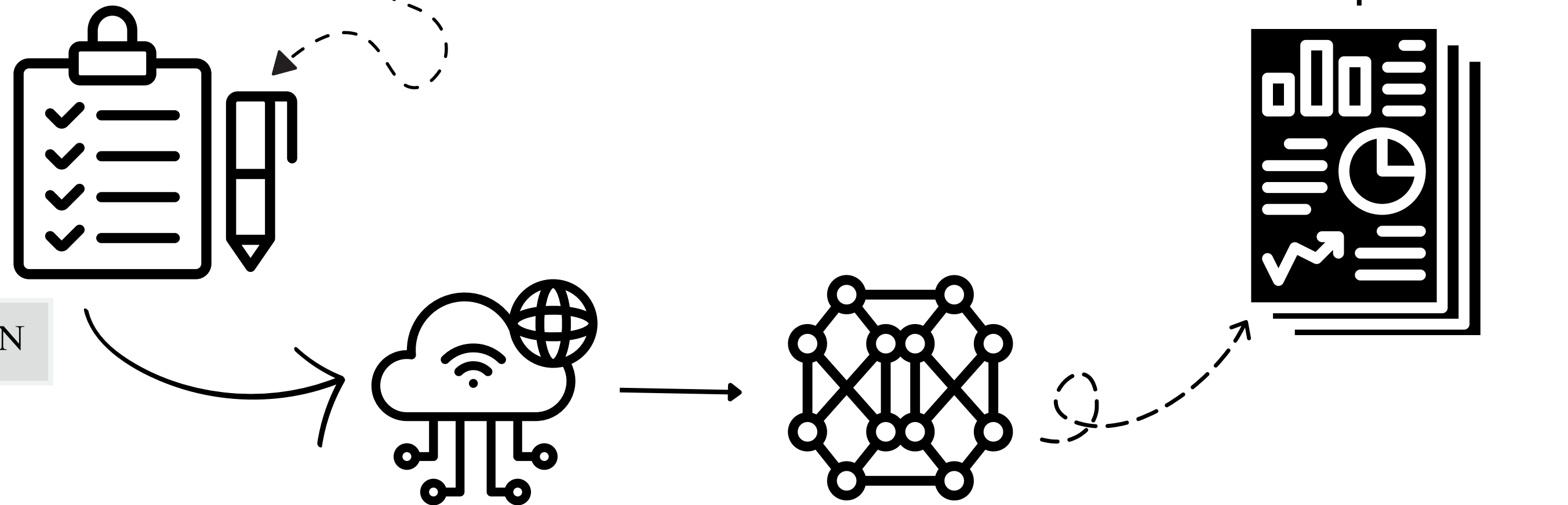4. **Ethical Use and Validation:**
   - The proposed system prioritizes ethical considerations in handling sensitive health data.
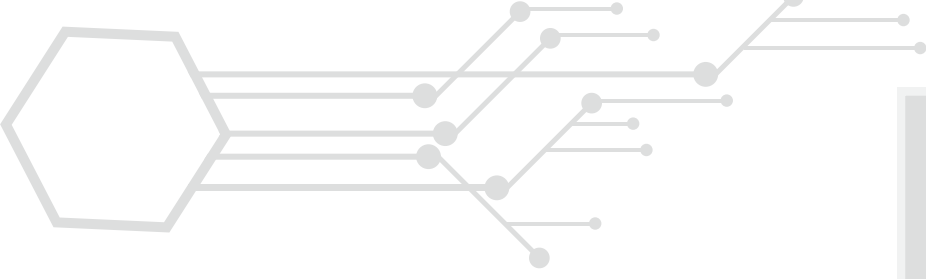
ARCHITECTURE

HIGH LEVEL IMPLEMENTATION
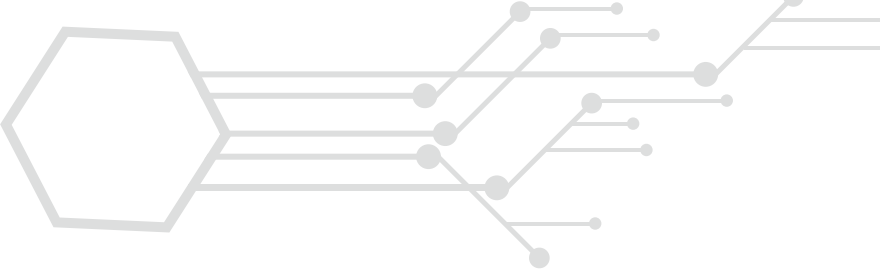
LOW LEVEL IMPLEMENTATION

MODULES

- HTML
- CSS
- JavaScript
- React
- Web Accessability
- Python
- SkLearn
- pandas
- Pillow

- Netlify
- OnRender
- StreamLit
- Excel
- Seaborn
- Matplotlib
- Numpy
- Plotly
- Git
- GitHub

```python
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.ensemble import RandomForestClassifier
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score

# Load the diabetes dataset
df = pd.read_csv("diabetes.csv")

# Customizing Streamlit theme for dark mode
st.markdown(
    """
    <style>
        body {
            color: white;
            background-color: #1E1E1E;
        }
        .sidebar .sidebar-content {
            background-color: #1E1E1E;
        }
```

```python
    .Widget>label {
        color: white;
    }
    .stButton>button {
        color: black;
    }
    </style>
    """,
    unsafe_allow_html=True
)

# Page 1: Project Description
def project_description():
    st.title("Predictive Health Analytics for Diabetes Risk Assessment and Personalized Reporting")

    # Our Mission
    st.header("Our Mission")
    st.write("Welcome to DiabSynth, the frontier of predictive health analytics, where the synergy of algorithms and empathy "
             "transforms the very fabric of diabetes care. Within our consortium, trailblazing minds, visionary engineers, "
             "and dedicated healthcare aficionados unite with unwavering determination. Our collective mission is nothing short "
             "of redefining the boundaries of healthcare technology, ushering in a new era in diabetes management that transcends the ordinary.")

    # Our Vision
    st.header("Our Vision")
    st.write("Our vision transcends the confines of algorithms and raw data. DiabSynth aspires to manifest a world where individuals "
             "don't merely receive healthcare insights but hold the knowledge and tools to seize control of their well-being. In our "
             "revolutionary pursuit, we propel beyond the conventional boundaries, determined to bridge the formidable gap between "
             "sophisticated machine learning techniques and pragmatic, user-friendly medical reporting.")
```

```python
def team_member_details():
    st.title("Team Members")

    team_members = [
        {"name": "Sudarsanam Bharath", "role": "Team Lead", "bio": "Hey everyone, I'm Bharath, a skilled multitasker capable of getting the work done before due with high accuracy and consistency. I'm a tech enthusiast with a primary goal of learning almost every technology possible that the market requires. Revolutionary in thought and code, I spearhead our machine learning endeavor. With a background in Full Stack Development, Machine Learning & Advanced algorithms, UI&UX Design, and API's Development, I bring a visionary approach to decoding the complexities of diabetes analytics.", "image": "bharath.jpg"},
        {"name": "Pooja Chinta", "role": "Data Insights Specialist", "bio": "I am Pooja, an undergraduate at MLR Institute of Technology, donning the role of a Data Insights Specialist in this project. With a keen focus on unraveling the stories hidden within vast datasets, I bring a meticulous approach to Data Analytics, Data Extraction, and Data Preprocessing. My expertise lies in transforming raw data into actionable insights, navigating the complexities of diverse datasets to extract meaningful narratives.", "image": "pooja.jpg"},
        {"name": "Yenuganti Sai Kumar", "role": "Research Coordinator", "bio": "I'm honored to take on the pivotal role of Research Coordinator in the DiabSynth project. As a dedicated and insightful team member, my focus is on delving into the latest advancements in predictive health analytics. I take the lead in ensuring our team is well-informed about cutting-edge research, industry trends, and regulatory developments, contributing valuable insights to shape DiabSynth's innovative approach.", "image": "sai_kumar.jpg"},

    ]

    for member in team_members:
        st.subheader(member["name"])
        st.write(f"**Role:** {member['role']}")
        st.write(member["bio"])

# Page 3: Diabetes Prediction
def diabetes_prediction():
    st.title('Diabetes Checkup')
    st.sidebar.header('Patient Data')
    st.subheader('Training Data Stats')
    st.write(df.describe())

    # X AND Y DATA
    x = df.drop(['Outcome'], axis=1)
    y = df['Outcome']
    x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.2, random_state=0)

    # FUNCTION
```

```python
def user_report():
    pregnancies = st.sidebar.slider('Pregnancies', 0, 17, 3)
    glucose = st.sidebar.slider('Glucose', 0, 200, 120)
    bp = st.sidebar.slider('Blood Pressure', 0, 122, 70)
    skinthickness = st.sidebar.slider('Skin Thickness', 0, 100, 20)
    insulin = st.sidebar.slider('Insulin', 0, 846, 79)
    bmi = st.sidebar.slider('BMI', 0, 67, 20)
    dpf = st.sidebar.slider('Diabetes Pedigree Function', 0.0, 2.4, 0.47)
    age = st.sidebar.slider('Age', 21, 88, 33)

    user_report_data = {
        'Pregnancies': pregnancies,
        'Glucose': glucose,
        'BloodPressure': bp,
        'SkinThickness': skinthickness,
        'Insulin': insulin,
        'BMI': bmi,
        'DiabetesPedigreeFunction': dpf,
        'Age': age
    }
    report_data = pd.DataFrame(user_report_data, index=[0])
    return report_data

# PATIENT DATA
user_data = user_report()
st.subheader('Patient Data')
st.write(user_data)

# MODEL
rf = RandomForestClassifier()
rf.fit(x_train, y_train)
user_result = rf.predict(user_data)

# VISUALIZATIONS
st.title('Visualised Patient Report')

# COLOR FUNCTION
color = 'red' if user_result[0] == 1 else 'blue'
```

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```python
    # Age vs Pregnancies
    st.header('Pregnancy count Graph (Others vs Yours)')
    fig_preg = plt.figure()
    ax1 = sns.scatterplot(x='Age', y='Pregnancies', data=df, hue='Outcome', palette='Greens')
    ax2 = sns.scatterplot(x=user_data['Age'], y=user_data['Pregnancies'], s=150, color=color)
    plt.xticks(np.arange(10, 100, 5))
    plt.yticks(np.arange(0, 20, 2))
    plt.title('0 - Healthy & 1 - Unhealthy')
    st.pyplot(fig_preg)

    # Add similar blocks for other visualizations...
    # OUTPUT

    st.subheader('Your Report: ')
    output = 'You are not Diabetic' if user_result[0] == 0 else 'You are Diabetic'
    st.title(output)
    st.subheader('Accuracy: ')
    st.write(str(accuracy_score(y_test, rf.predict(x_test)) * 100) + '%')
# Page 4: Contact Us
def contact_us():
    st.title("Contact Us")
    st.write("Feel free to reach out to us with any questions or feedback!")

    # Simple contact form
    name = st.text_input("Your Name:")
    email = st.text_input("Your Email:")
    message = st.text_area("Message:")

    if st.button("Submit"):
        # Perform any desired action with the form data (e.g., send an email)
        st.success("Ticket Raised!!.. we will get back to you asap")
# Main App
def main():
    st.sidebar.title("DiabSynth Navigator")
    page = st.sidebar.radio("Choose a Path", ["Project Description", "Home", "About", "Contact", "Blogs and References", "Diabetes Prediction"])
# Page routing
    if page == "Project Description":
        project_description()
```

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```python
    # Include your Home page content here
    elif page == "About":
        st.markdown("[Click Here for About:](https://diabsynth.netlify.app/homepage/about)")
    # Include your About page content here
    elif page == "Diabetes Prediction":
        diabetes_prediction()
    # Include your Diabetes Prediction page content here
    elif page == "Contact":
        st.markdown("[Click Here for Contact:](https://diabsynth.netlify.app/homepage/contact)")
    # Include your Contact page content here
    elif page == "Blogs and References":
        st.markdown("[Click Here for Blogs and Reference:](https://diabsynth.netlify.app/homepage/faq)")
    elif page == "Project Description":
        project_description()
    elif page == "Home":
        st.markdown("[Click Here for Home:](https://diabsynth.netlify.app/homepage/index.html)")
    elif page == "Team Members":
        team_member_details()
    elif page == "Diabetes Prediction":
        diabetes_prediction()
    elif page == "Contact Us":
        contact_us()
if __name__ == "__main__":
    main()
```
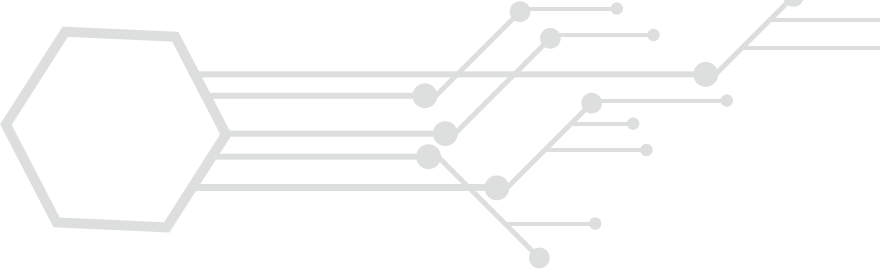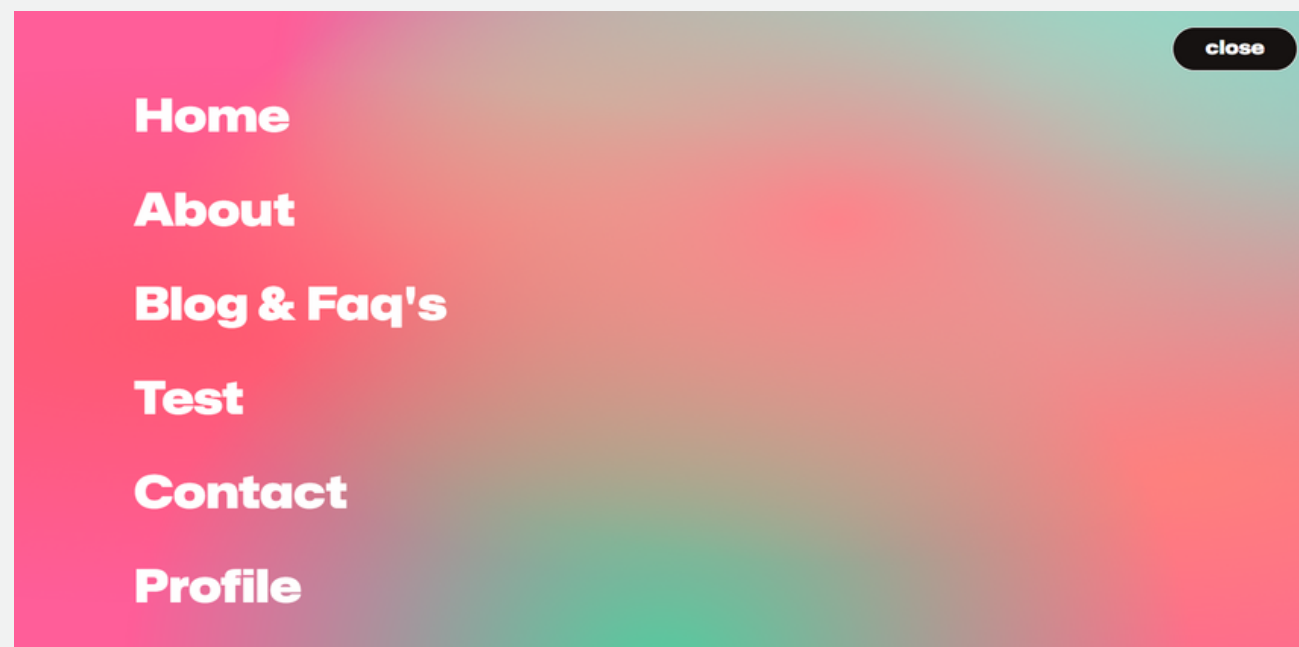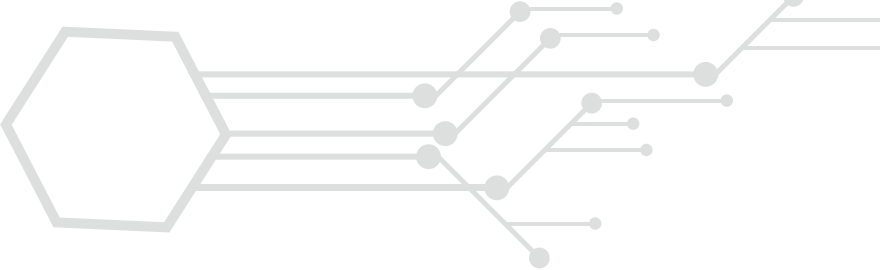
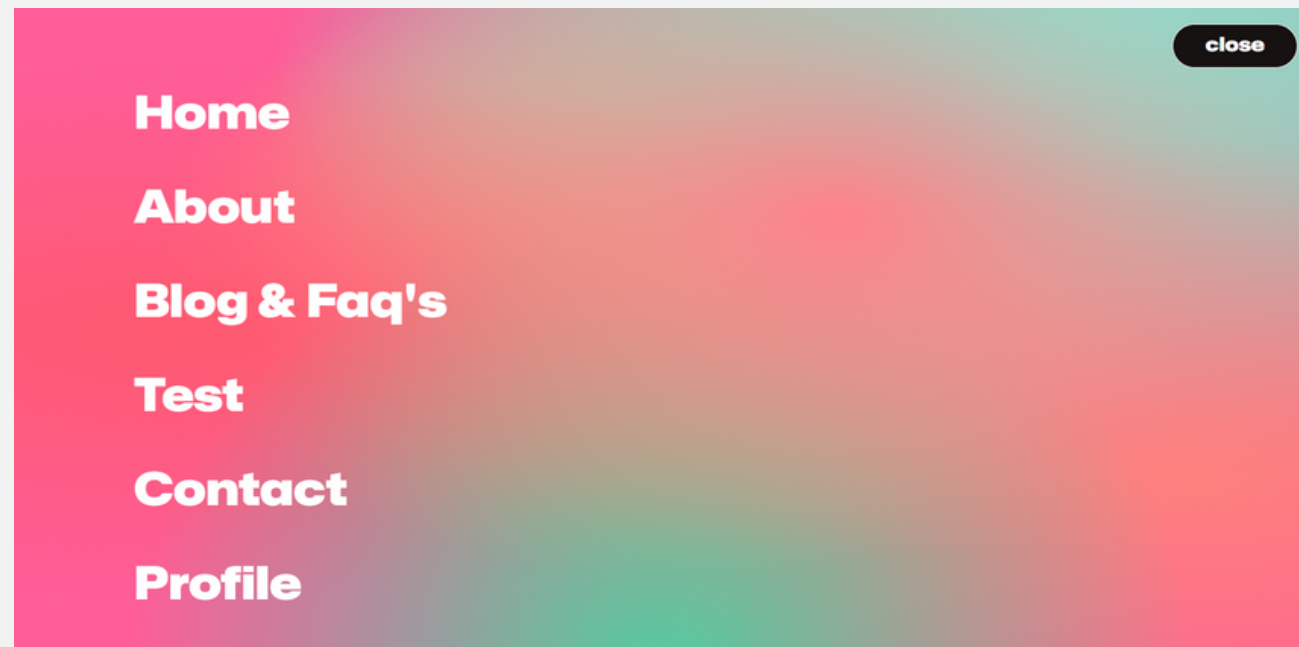# IMPLEMENTATION
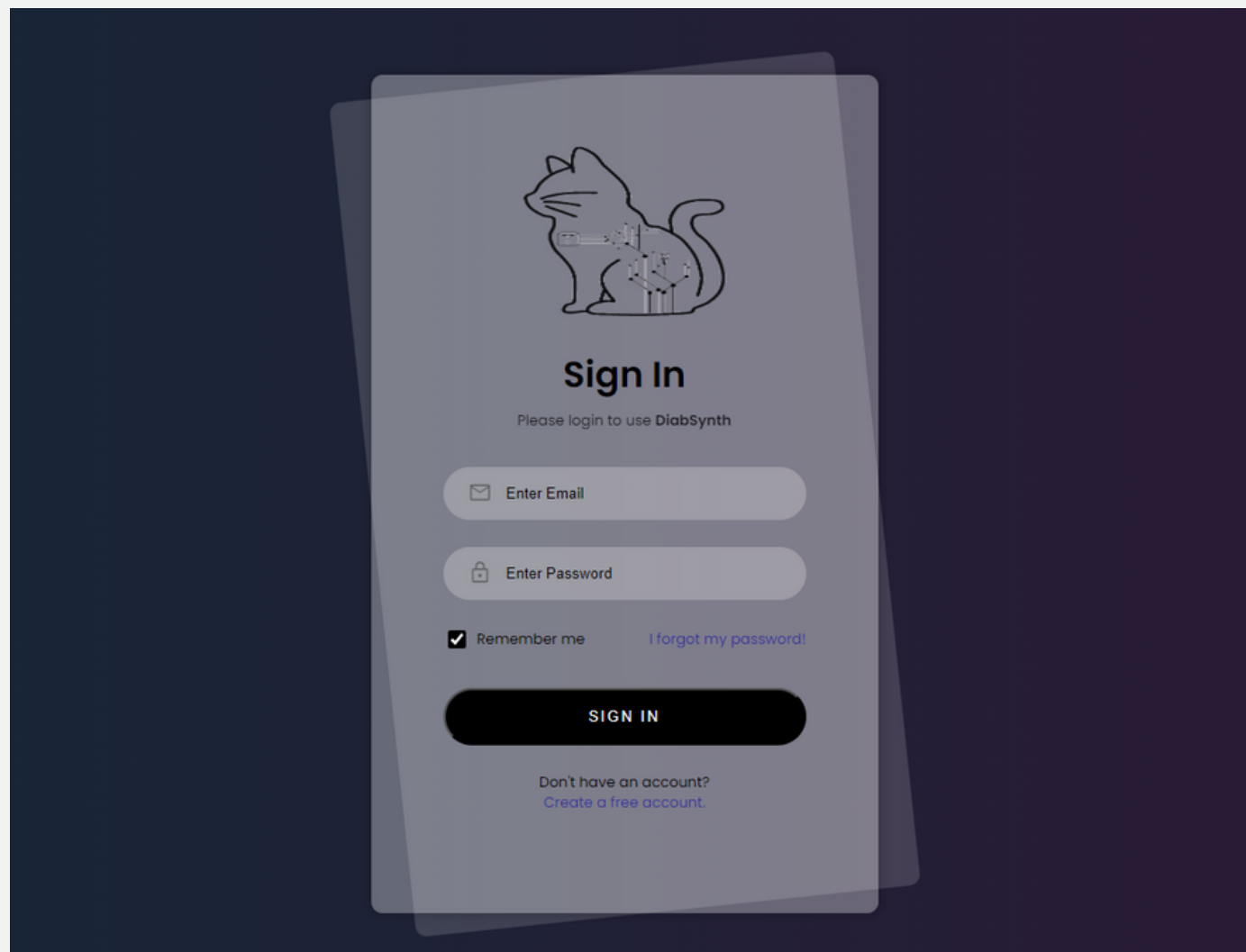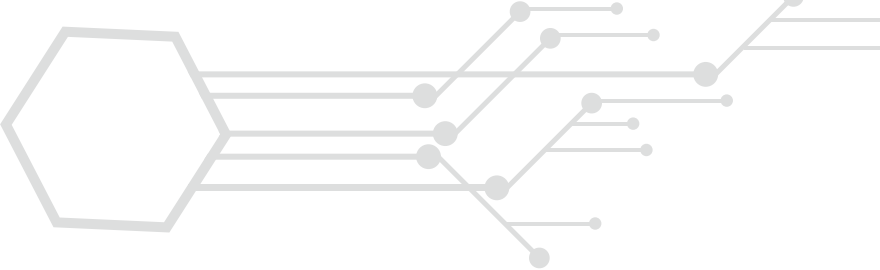

Login Page
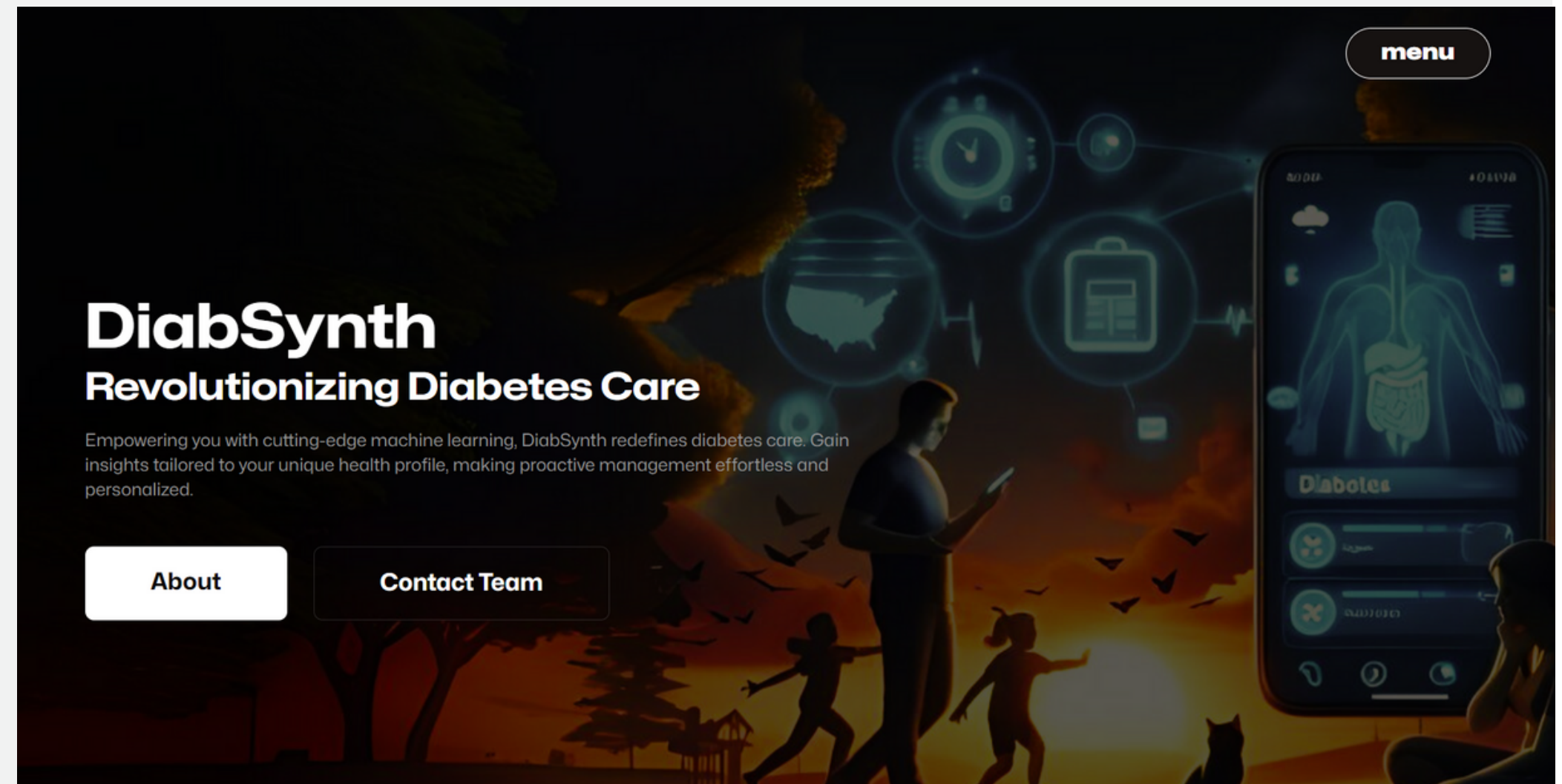
Home Page

IMPLEMENTATION

Navigation Options

Test Page

Navigation Options

Test Page

IMPLEMENTATION
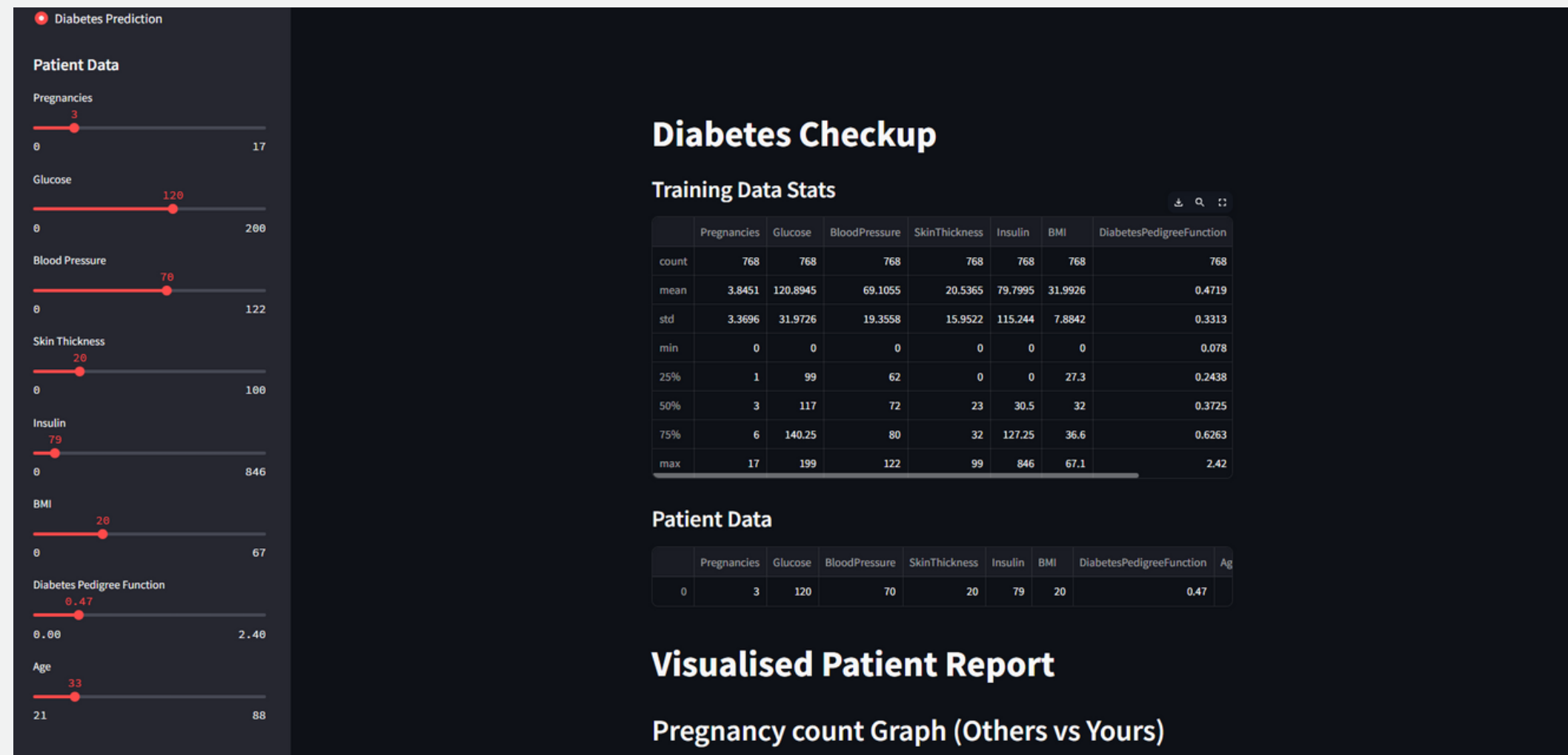
**progress bar
setup**
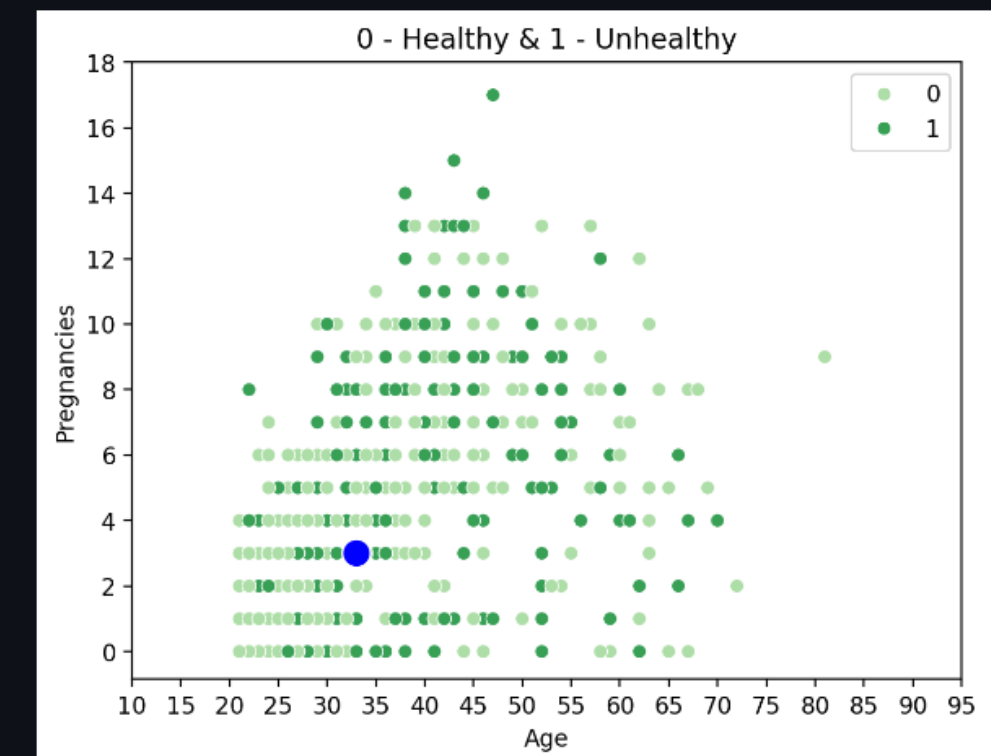
Test Result

RESULT AND DISCUSSION

DiabSynth has achieved its goal of revolutionizing diabetes care by implementing advanced machine learning technologies. Users can benefit from personalized insights, empowering them to proactively manage their health. The platform's user-friendly interface and robust features make it a valuable tool for individuals seeking effective diabetes management.

Key Outcomes:

1. **Personalized Insights:** DiabSynth delivers tailored health insights based on individual profiles.
2. **Effortless Management:** The platform simplifies diabetes management, allowing users to take proactive measures.
3. **User-Friendly Design:** With an intuitive interface, DiabSynth ensures a seamless experience for users.
4. **Innovative Technology:** Leveraging state-of-the-art machine learning, the platform stays at the forefront of healthcare technology.

CONCLUTION

In conclusion, DiabSynth stands as a testament to the positive impact of technology on healthcare. By combining machine learning with a user-centric approach, it empowers individuals to manage diabetes effectively. The project's success is not just in its functionality but in its potential to enhance the quality of life for those dealing with diabetes.

FUTURE ENHANCEMENT

1. **Integration of Wearable Devices**
2. **Community Engagement Features**
3. **Expanded Health Metrics**
4. **Predictive Analysis**
5. **Multi-Language Support**
6. **Telehealth Integration**
7. **Gamification Elements**
8. **Research Collaboration**
9. **Regular Software Updates**

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THANK YOU

Presentation by

Bharath, Pooja, Lakshmi and Sai Kumar