A

PROJECT REPORT

ON

“WE CARE”

SUBMITTED BY - **Manish Jangid**
Seat no. 10832

UNDER THE GUIDANCE OF

Mrs. Kalyani Sahastrabuddhe

SAVITRIBAI PHULE PUNE UNIVERSITY (SPPU)
MASTER OF COMPUTER APPLICATIONS

DR. D. Y. PATIL UNITECH SOCIETY’S
DR. D. Y. PATIL INSTITUTE OF MANAGEMENT AND RESEARCH, PIMPRI, PUNE-18

2024-2025

Dr. D. Y. Patil Unitech Society's
Dr. D.Y. PATIL INSTITUTE OF MANAGEMENT & RESEARCH
Sant Tukaram Nagar, Pimpri, Pune-411018
Recognized by the Savitribai Phule Pune University (SPPU-IMMP014220) AISHE CODE C-42109

Recipient of the "Best College Award" of Savitribai Phule Pune University | Accredited by NAAC with "A++ Grade" (CGPA 3.52) | MBA & MCA Programme Accredited by NBA

CERTIFICATE

This is to certify that **Manish Tulcharam Jangid** has successfully completed the project on**''We Care''**as a partial fulfilment of his **Master of Computer Applications (MCA-I Sem-III)** under the curriculum of **Savitribai Phule Pune University, Pune** for the academic year 2024-25

Mrs. Kalyani S.	Dr. Shikha Dubey	Dr. Vishal Wadajkar
Project Guide	**H.O.D. MCA**	**Director**

Signature
Name
Internal Examiner
Date :

Signature
Name
External Examiner
Date :

Acknowledgement

The success and final outcome of the "**We Care**" project were achieved thanks to the invaluable guidance and assistance from many individuals. We are deeply grateful for the support we received throughout the project's completion. Our accomplishments are a direct result of this guidance, and we are truly thankful.

We sincerely thank to the Director **Dr. Vishal Wadajkar**, and HOD **Dr. Shikha Dubey** and to my project guide **Mrs. Kalyani Sahastrabuddhe**, for providing us an opportunity to do the project work and give us all support and guidance which made us completes the project duty.

We are deeply indebted to our project guides for their continuous interest in our work and for steering us through the project by providing essential information necessary for developing an effective system.

We are also immensely grateful for the constant encouragement, support, and guidance from all the teaching staff, which played a significant role in the successful completion of our project. Furthermore, we extend our sincere appreciation to all the laboratory staff for their timely assistance.

Additionally, we would like to acknowledge the support of our families and friends, whose encouragement and understanding provided us with the motivation to persevere through the challenges of this project. Their unwavering belief in our capabilities helped us maintain focus and dedication, allowing us to achieve our goals.

Table of Content

1. Introduction to Proposed System

1.1 Problem Definition

Polycystic Ovary Syndrome (PCOS) is one of the most common endocrine disorders in women of reproductive age, affecting between 5% and 10% of women worldwide. It can lead to a variety of symptoms, including irregular menstrual cycles, infertility, excessive hair growth, acne, and obesity. Diagnosis is often complex and delayed due to the variability in symptoms and the lack of specific diagnostic tests.

The aim of the **"WE CARE"** project is to build a predictive system that can help healthcare professionals diagnose PCOS early using machine learning techniques based on a set of biomarkers. The system streamlines the process of gathering patient data and helps generate accurate predictions, assisting in timely interventions for better health outcomes.

1.2 System Overview

The system provides two machine learning models:

- **PCOS Predictor with Infertility**: Focuses on infertility-related PCOS predictions, taking into account infertility-specific biomarkers such as Beta-HCG and AMH.
- **PCOS Predictor without Infertility**: A generalized PCOS prediction model that doesn't require infertility markers.

Both models run on a **Streamlit-based web interface**, allowing healthcare professionals to input biomarkers and receive real-time PCOS predictions. The models are trained using a dataset of women’s biomarkers, focusing on hormones like FSH, LH, AMH, and physical parameters such as BMI, height, and weight.

1.3 Project Functionalities with Module Specification

- **Biomarker Input Module**: Accepts biomarker values from the user, including hormone levels and physical attributes.
- **Prediction Module**: Based on the input data, this module uses pre-trained machine learning models to predict whether PCOS is present.
- **Result Display Module**: Displays the prediction outcome and suggests whether PCOS is detected or not.
- **Navigation Module**: Provides seamless navigation between different prediction models (with or without infertility markers).

1.4 Operating Environment (H/W & S/W Requirement Specification)

- **Hardware**:
    - A system with at least 4 GB RAM and a dual-core processor.

- **Software**:
    - **Language**: Python
    - **Libraries**: scikit-learn, Pandas, Streamlit, Pandas
    - **Model Files**: Pre-trained machine learning models (Imodel.pickle, Wmodel.pickle) using Random Forest
    - **Operating System**: Windows OS

2. Overview of the Proposed System

2.1 Proposed System

The proposed system leverages two machine learning models that predict whether a woman has PCOS. Both models take into account a variety of biomarkers to make predictions. The **PCOS Predictor with Infertility** includes infertility-specific markers like Beta-HCG and AMH, while the **PCOS Predictor without Infertility** focuses on general biomarkers such as FSH, LH, and BMI.

The system is built to be user-friendly, with an intuitive interface that can be used by healthcare providers without extensive technical knowledge.

2.2 Objectives of the System

- **Primary Objective**: To provide healthcare professionals with a quick, accurate, and reliable tool to help diagnose PCOS.
- **Secondary Objective**: To serve as a decision support tool in clinical settings, aiding early intervention and reducing diagnosis delays.

2.3 Feasibility Study

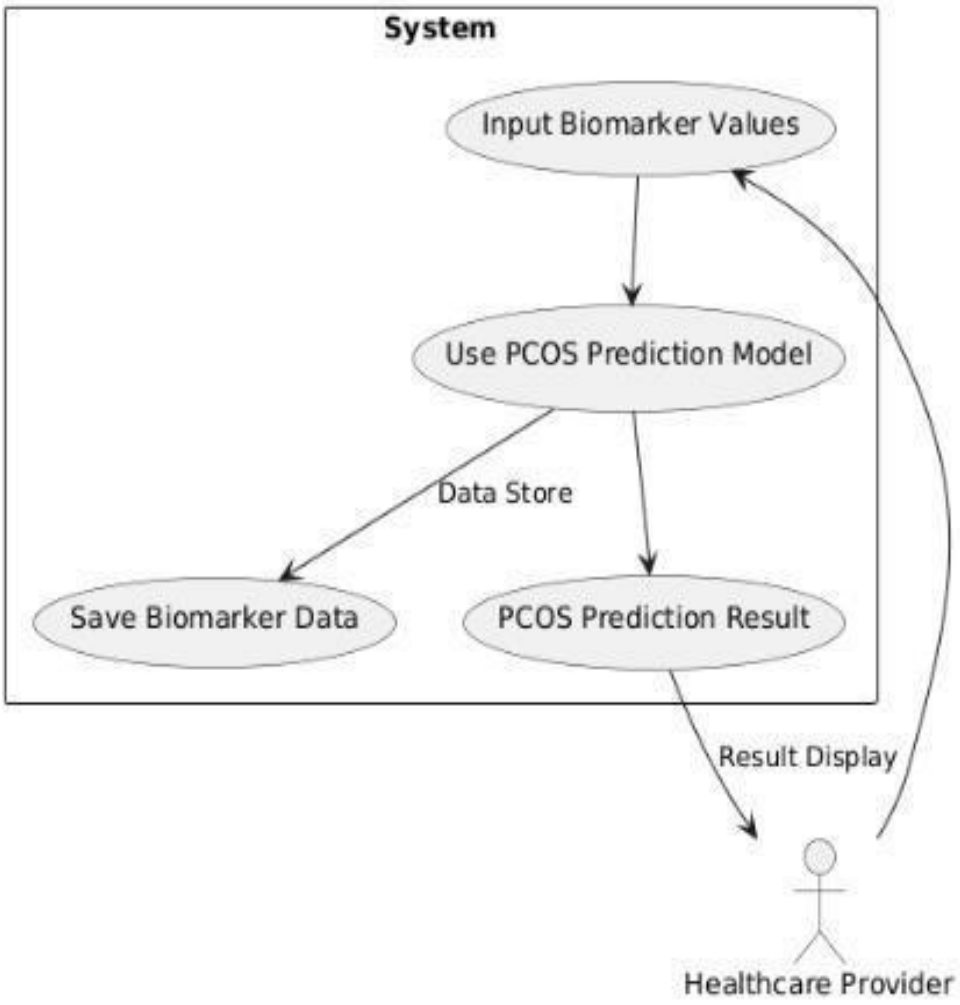
- **Technical Feasibility**: The system is developed using widely available tools (Python, scikit-learn, Streamlit), making it technically feasible to deploy across different platforms.
- **Operational Feasibility**: The system is designed to be simple and efficient for healthcare providers. The graphical user interface is built using Streamlit, making it easy for non-technical users to operate.
- **Economic Feasibility**: Minimal hardware and software costs are associated with running the system. It can be deployed on existing hospital/clinic infrastructure.

2.4 User Requirement Specification

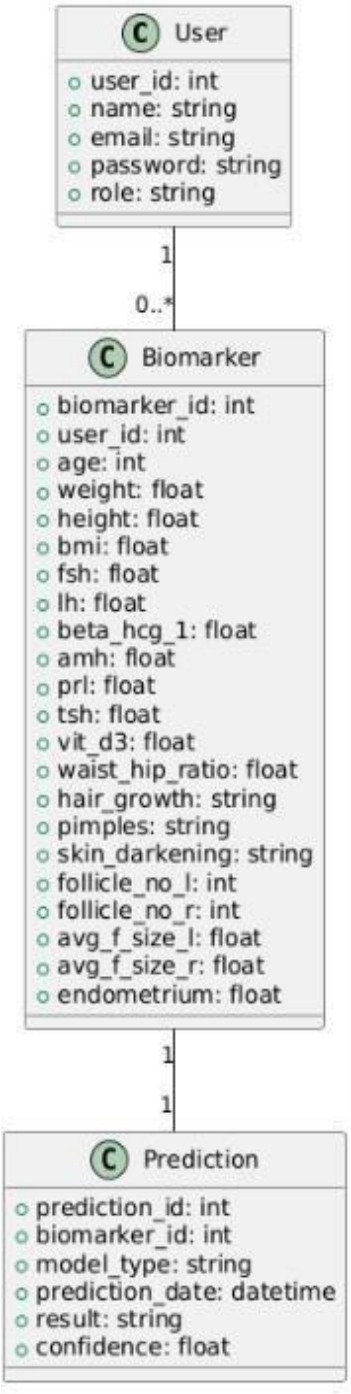
The user inputs critical biomarker values such as hormone levels and physical attributes. These values are collected using an easy-to-use interface, and the system processes the data to generate predictions.

3. System Analysis & Design

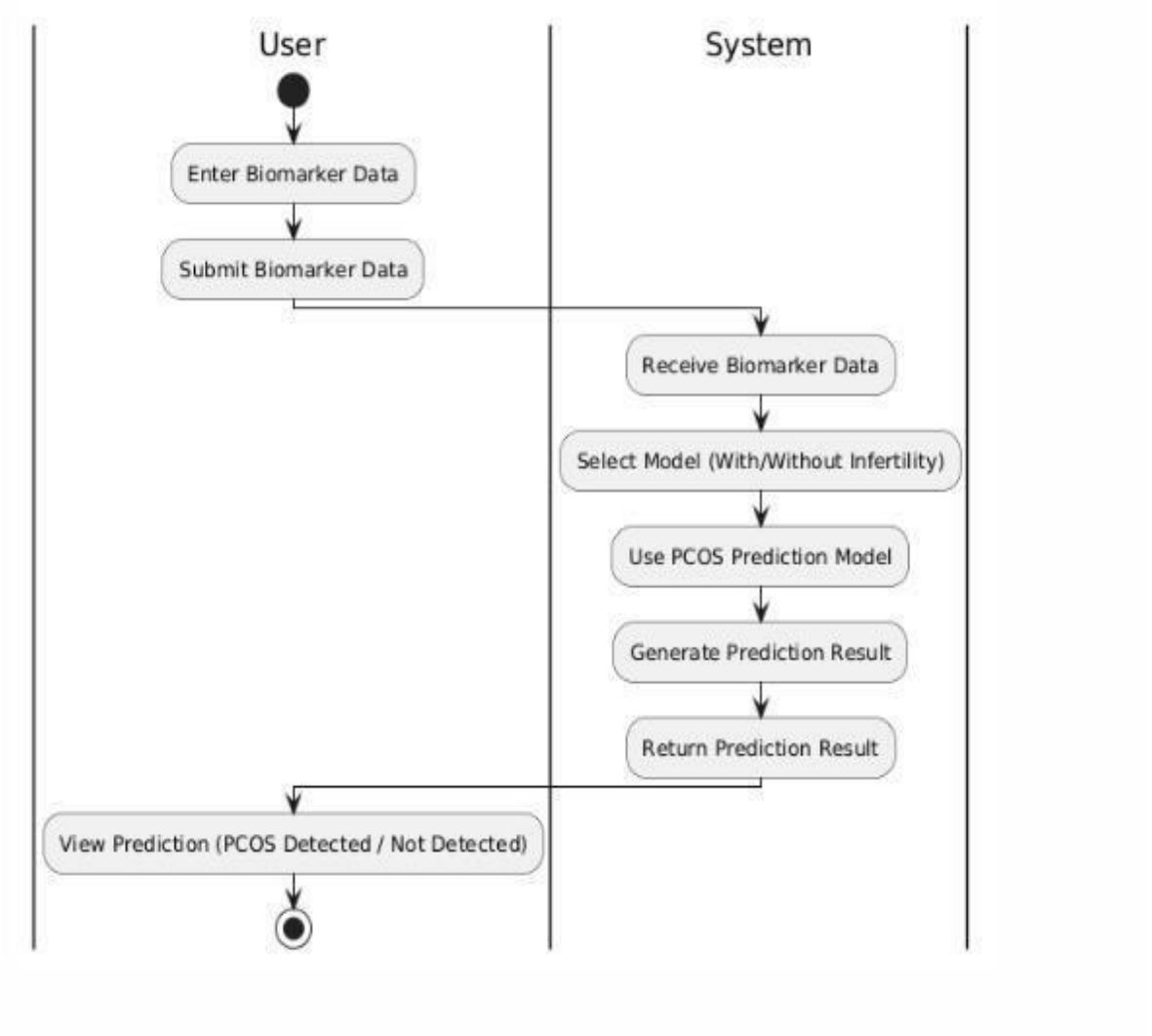
3.1 Data Flow Diagram (Context Level Diagram)



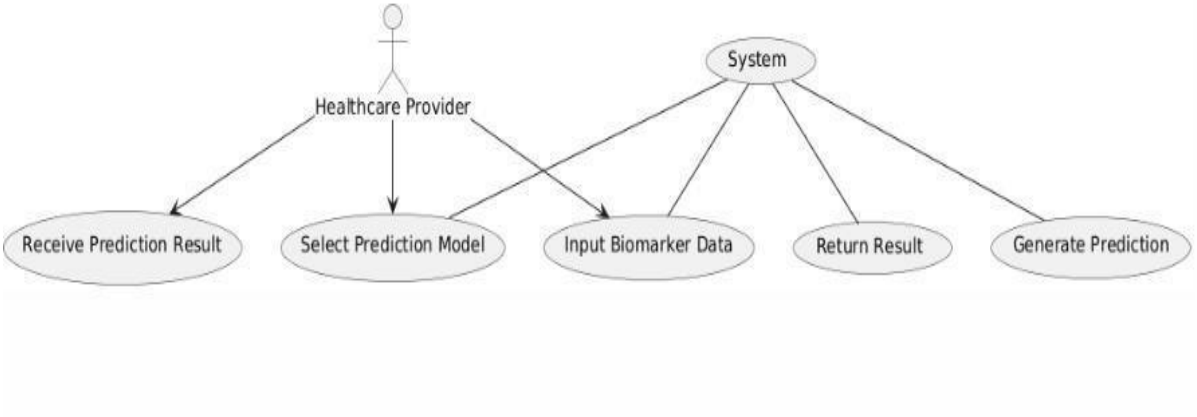
3.2 Class Diagram/ ERD



3.3 Activity Diagram



3.4 Use Case Diagram



3.5 Data Dictionary with Table Specification

The following table summarizes the data fields:

Field Name	Description
Age	Age of the patient (years)
Weight	Weight of the patient (kg)
Height	Height of the patient (cm)
BMI	Body Mass Index
FSH	Follicle Stimulating Hormone (mIU/mL)
LH	Luteinizing Hormone (mIU/mL)
AMH	Anti-Müllerian Hormone (ng/mL)
Beta-HCG I/II	Human Chorionic Gonadotropin hormone
PRL	Prolactin (ng/mL)
TSH	Thyroid Stimulating Hormone (mIU/L)
Vit D3	Vitamin D3 levels (ng/mL)
Waist Ratio	Waist to hip ratio
Hair Growth, Pimples, Skin Darkening	Binary indicators (Y/N)
Follicle Count (L/R)	Follicle count in left/right ovary
Avg. Follicle Size	Average follicle size in mm (left/right)
Endometrium	Endometrial thickness (mm)

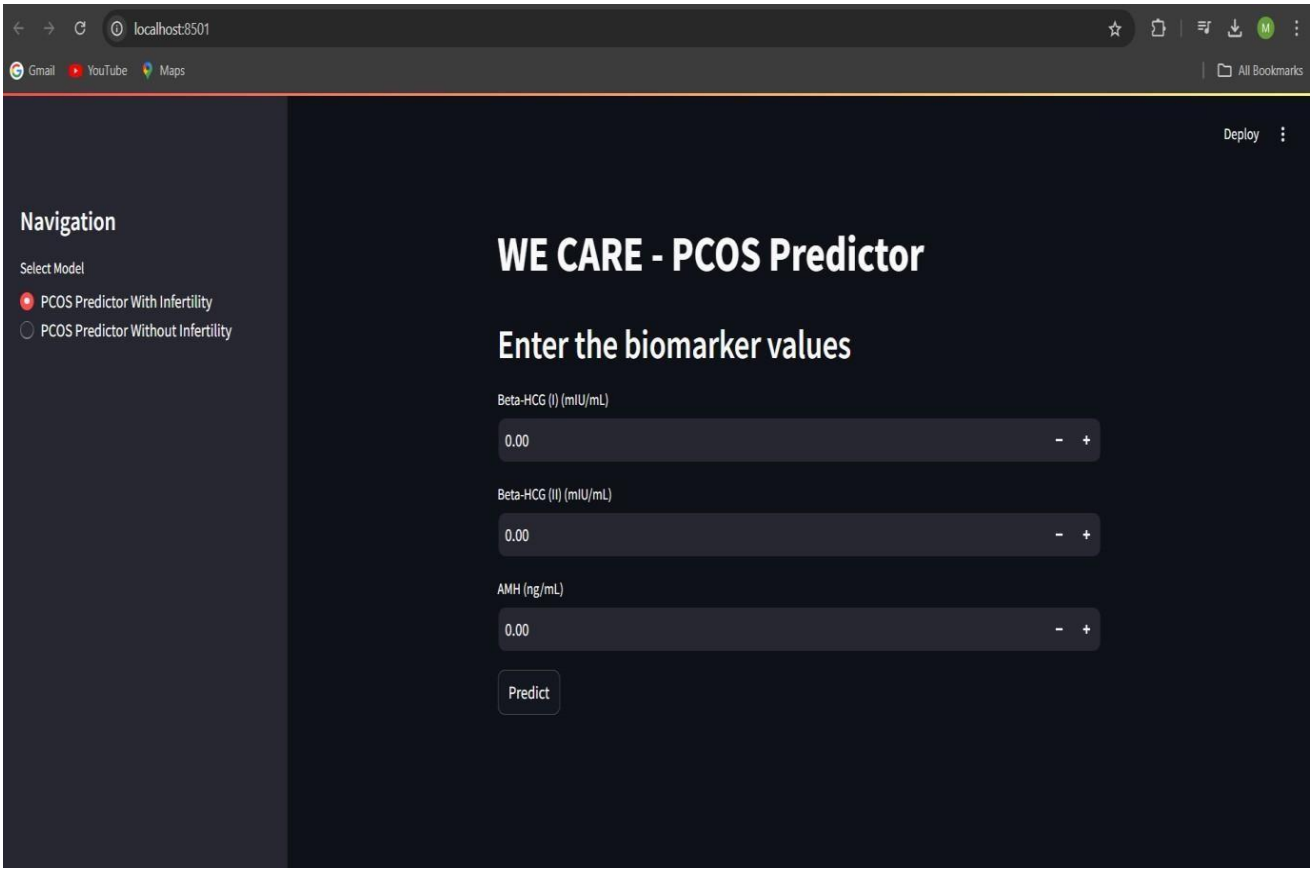
4. User Manual

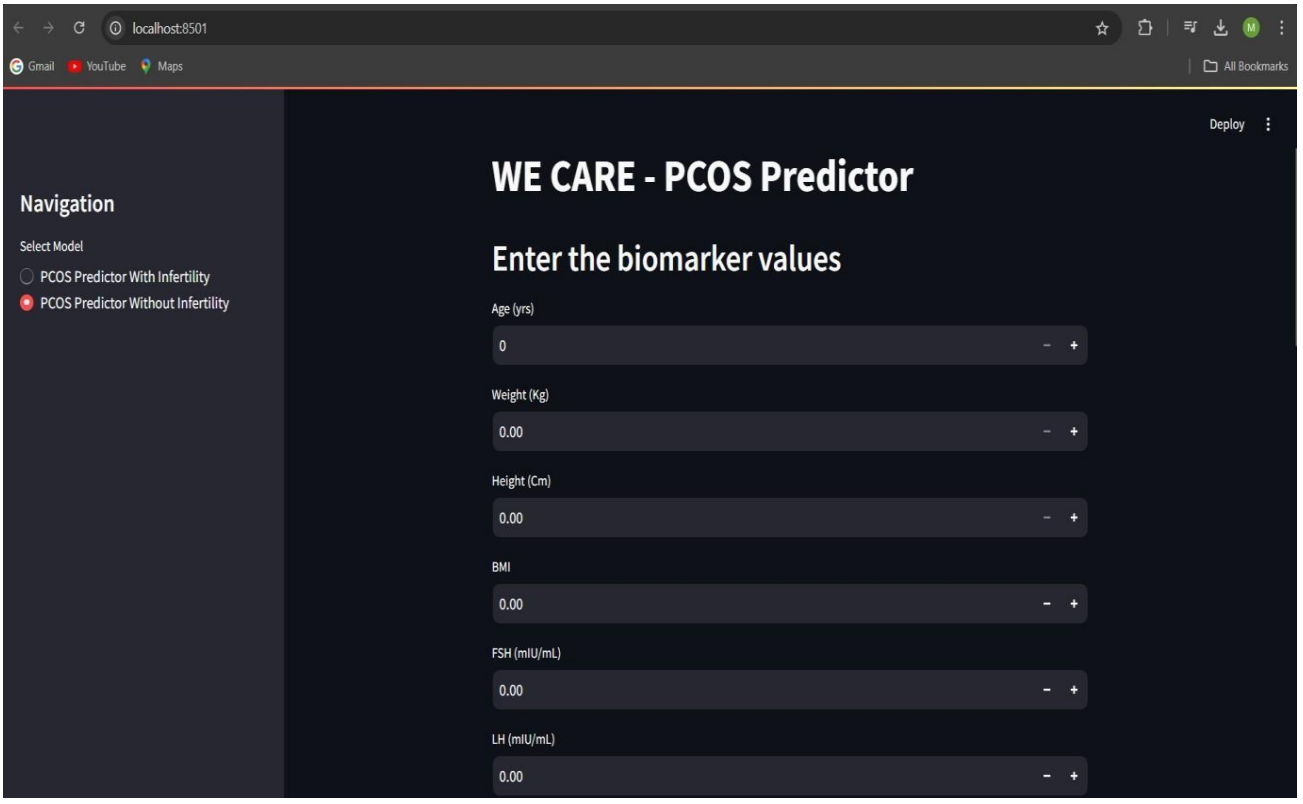
4.1 Operational Instructions

- **Step 1**: Start the web application.
- **Step 2**: Choose either the "PCOS Predictor With Infertility" or "PCOS Predictor Without Infertility" option from the sidebar.
- **Step 3**: Input the biomarker data into the appropriate fields.
- **Step 4**: Click "Predict" to generate the result.
- **Step 5**: The system will display the prediction result, indicating whether PCOS is detected or not.

4.2 Input/output Screens

- **Input Screens**: The input screens will display all the fields for biomarker data input.
- **Output Screen**: After clicking the "Predict" button, the output screen will display whether PCOS has been detected.


localhost:8501
Gmail
YouTube
Maps
All Bookmarks
Deploy
Navigation
Select Model
PCOS Predictor With Infertility
PCOS Predictor Without Infertility
WE CARE - PCOS Predictor
Enter the biomarker values
Beta-HCG (I) (mIU/mL)
0.00
Beta-HCG (II) (mIU/mL)
0.00
AMH (ng/mL)
0.00
Predict


localhost:8501
Gmail
YouTube
Maps
All Bookmarks
Deploy
Navigation
Select Model
PCOS Predictor With Infertility
PCOS Predictor Without Infertility
WE CARE - PCOS Predictor
Enter the biomarker values
Age (yrs)
0
Weight (Kg)
0.00
Height (Cm)
0.00
BMI
0.00
FSH (mIU/mL)
0.00
LH (mIU/mL)
0.00

4.3 Reports

The system can generate a report based on the inputs and predictions made. The report can be used for medical documentation and further diagnosis.

The "We Care" system incorporates a reporting feature that compiles input biomarker data and prediction results into structured reports. These reports are designed to aid healthcare professionals by providing a clear summary of the diagnostic process, enhancing documentation and decision-making. By integrating real-time predictive insights with user-friendly formats, the report functionality serves as a critical component for maintaining medical records and facilitating further patient analysis. Although the system does not guarantee absolute diagnostic certainty, its comprehensive reporting capability ensures valuable support in clinical settings.

5. System Limitation

1. Dependency on Input Data Quality

The system's accuracy is heavily reliant on the quality and completeness of input biomarker data. Inaccurate or incomplete data could lead to unreliable predictions.

2. Limited Scope of Diagnosis

The system focuses solely on predicting PCOS and may not consider other conditions with similar symptoms, potentially leading to misinterpretation of results without proper medical guidance.

3. No Absolute Diagnostic Certainty

Predictions are based on statistical models and cannot provide a definitive diagnosis. The system is intended to assist healthcare professionals rather than replace clinical judgment.

4. Lack of Patient History Integration

The current system does not track or analyze patient history comprehensively, which could provide valuable context for making predictions more accurate.

6. Future Enhancement and Conclusion

6.1 Future Enhancement

- **Improved Prediction Accuracy**: Future work could involve training more complex models using larger datasets to improve the accuracy of predictions.
- **Patient History Tracking**: Implementing functionality to track patient history over time, allowing doctors to monitor changes in biomarker levels.
- **Multi-Language Support**: Adding support for multiple languages to make the system accessible to non-English-speaking regions.
- **Integration with Healthcare Systems**: Future versions could integrate with electronic health record (EHR) systems, allowing seamless data entry and retrieval.

6.2 Conclusion

The "WE CARE" PCOS Prediction System is a valuable tool for healthcare professionals. By leveraging machine learning and biomarker data, the system can help speed up PCOS diagnosis, especially in cases where traditional methods may be delayed. The ease of use and real-time prediction capabilities make it a practical addition to clinical settings.

7. Bibliography and Glossary

Bibliography:

- scikit-learn Documentation, https://scikit-learn.org
- Streamlit Documentation, https://streamlit.io
- Research papers on PCOS diagnostics and biomarker analysis.
- “IEEE Standards for Software Development"

Glossary:

- **PCOS**: Polycystic Ovary Syndrome, a condition affecting a woman's hormone levels.
- **BMI**: Body Mass Index, a value derived from the mass and height of a person.
- **AMH**: Anti-Müllerian Hormone, a marker for ovarian reserve.
- **FSH**: Follicle-Stimulating Hormone, involved in reproductive processes.
- **LH**: Luteinizing Hormone, which triggers ovulation in females.
- **Beta-HCG**: Human Chorionic Gonadotropin, often used in fertility-related studies.