

Project Report: Women's Health Dashboard

1. Introduction

Problem Statement:

Analyze datasets related to women's health (e.g., maternal health, menstrual cycle patterns, mental well-being) to derive insights and predictions. Build data visualizations and predictive models to improve awareness and healthcare access.

Objective:

The goal of this project is to create a Women's Health Dashboard that provides actionable insights and predictions for:

1. Maternal Health Risks
2. Menstrual Cycle Patterns
3. Mental Well-being

The dashboard will help women make informed decisions about their health and encourage them to seek timely medical assistance when needed.

2. Brief of the Solution

Introduction:

The ***Women's Health Dashboard*** is a comprehensive web application designed to empower women by providing insights and predictions related to maternal health, menstrual cycles, mental well-being, BMI, and hydration tracking. The project aligns with the hackathon's problem statement by leveraging data analytics and machine learning to improve awareness and healthcare access for women. The dashboard integrates predictive models, interactive visualizations, and personalized recommendations to address critical health concerns.

Key Features:

The dashboard offers the following features:

1. Maternal Health Predictor:

- Predicts maternal health risks based on age, blood pressure, blood sugar, body temperature, and heart rate.
- Provides personalized recommendations for low, mid, or high-risk levels.

2. Menstrual Cycle Predictor:

- Predicts menstrual cycle regularity, ovulation date, and next cycle date.
- Offers symptom-based recommendations for menstrual health.

3. Mental Well-being Predictor:

- Assesses mental well-being based on factors like age, family history, work interference, and mental health benefits.
- Delivers tailored recommendations for improving mental health.

4. BMI Calculator:

- Calculates Body Mass Index (BMI) based on height and weight.
- Provides personalized recommendations based on BMI category.

5. Hydration Tracker:

- Tracks daily water intake and sets hydration reminders.
- Offers hydration tips to stay healthy.

6. Data Analytics:

- Visualizes maternal health risk factors, menstrual cycle length distribution, and mental health trends.

3. Methodology

Data Preprocessing

1. Handling Missing Values:
 - Dropped rows with missing values.
2. Encoding Categorical Variables:
 - Used OneHotEncoding for categorical features like `family_history`, `work_interfere`, etc.
3. Feature Scaling:
 - Normalized numerical features like `Age`, `Blood Pressure`, etc.

Model Development

1. Maternal Health Model:

- Algorithm: Random Forest Classifier.
- Input Features: Age, Systolic BP, Diastolic BP, Blood Sugar, Body Temperature, Heart Rate.
- Output: Risk Level (Low, Medium, High).

2. Menstrual Cycle Models:

i) Cycle Regularity Model:

- Algorithm: Logistic Regression.
- Input Features: Age, Cycle Length, Symptoms, Stress Level.
- Output: Regularity (Regular/Irregular).

ii) Ovulation Prediction Model:

- Algorithm: Linear Regression.
- Input Features: Age, Cycle Length, Cycle Start Date.
- Output: Ovulation Date.

3. Mental Well-being Model:

- Algorithm: Random Forest Classifier.
- Input Features: Age, Stress Level, Sleep Hours, Social Support, Mood.
- Output: Mental Health Score (Yes/No for seeking help).

Evaluation Metrics

- Accuracy: Used to evaluate classification models.
- Mean Squared Error (MSE): Used to evaluate regression models.
- Classification Report: Precision, Recall, F1-Score.

4. Technical Implementation

The project is built using the following technologies:

Frontend:

- Streamlit: For building the interactive web application.
- HTML/CSS: For custom styling and layout.

Backend:

- Python: For backend logic and data processing.
- Pandas: For data manipulation and analysis.
- NumPy: For numerical computations.

Machine Learning:

- Scikit-learn: For training and deploying machine learning models.
- Joblib: For saving and loading trained models.

Data Visualization:

- Matplotlib: For creating static visualizations.
- Seaborn: For enhanced data visualizations.

Deployment:

- Streamlit Sharing: For deploying the app live.

5. Design and Architecture

The project follows a modular and user-centric design approach:

1. User Interface (UI):

- The dashboard is designed with a clean and intuitive interface.
- Custom CSS is used to style the sidebar and navigation menu for better user experience.
- Interactive input fields and buttons allow users to input data and receive predictions.

2. Data Flow:

- User inputs are collected through Streamlit widgets.
- Input data is processed using Python and passed to the respective machine learning models.
- Predictions and recommendations are displayed dynamically on the dashboard.

3. Machine Learning Models:

- Maternal Health Model: Predicts risk levels based on health metrics.
- Menstrual Cycle Models: Predict regularity and ovulation dates.
- Mental Health Model: Assesses mental well-being based on survey data.

4. Data Visualizations:

- Visualizations are created using Matplotlib and Seaborn.
- Graphs include box plots for maternal health factors, histograms for menstrual cycle lengths, and count plots for mental health trends.

6. Implementation

Streamlit App Workflow**1. Home Page:**

- Overview of the dashboard and navigation options.
- Graphs and analytics of women's health.

2. Maternal Health Page:

- Input fields: Age, Blood Pressure, Blood Sugar, Body Temperature, Heart Rate.

- Output: Risk Level and Recommendations.

3. Menstrual Cycle Page:

- Input fields: Age, Cycle Length, Cycle Start Date, Symptoms.
- Output: Cycle Regularity, Ovulation Date, and Recommendations.

4. Mental Well-being Page:

- Input fields: Age, Stress Level, Sleep Hours, Social Support, Mood.
- Output: Mental Health Score and Recommendations.

5. BMI Calculator Page:

- Input fields: Height, Weight.
- Output: BMI and Recommendations.

6. Hydration Tracker:

- Input fields: Weight, Activity level
- Output: Optimal water level, progress bar and recommendations.

7. Results

Maternal Health Model

- Accuracy: 92%
- Recommendations:
 - Low Risk: Maintain a healthy lifestyle.
 - Medium Risk: Monitor health closely.
 - High Risk: Consult a doctor immediately.

Menstrual Cycle Models

- Cycle Regularity Model Accuracy: 88%
- Ovulation Prediction MSE: 2.5
- Recommendations:
 - For cramps: Drink herbal tea, practice yoga.
 - For irregular cycles: Track symptoms and consult a doctor.

Mental Well-being Model

- Accuracy: 85%
- Recommendations:
 - If `Yes`: Practice mindfulness, seek professional help.
 - If `No`: Positive affirmations and self-care tips.

BMI and Hydration

- The BMI calculator provides personalized recommendations based on user inputs.
- The hydration tracker helps users stay hydrated with reminders and tips.

8. Impact

The Women's Health Dashboard addresses the hackathon's problem statement by:

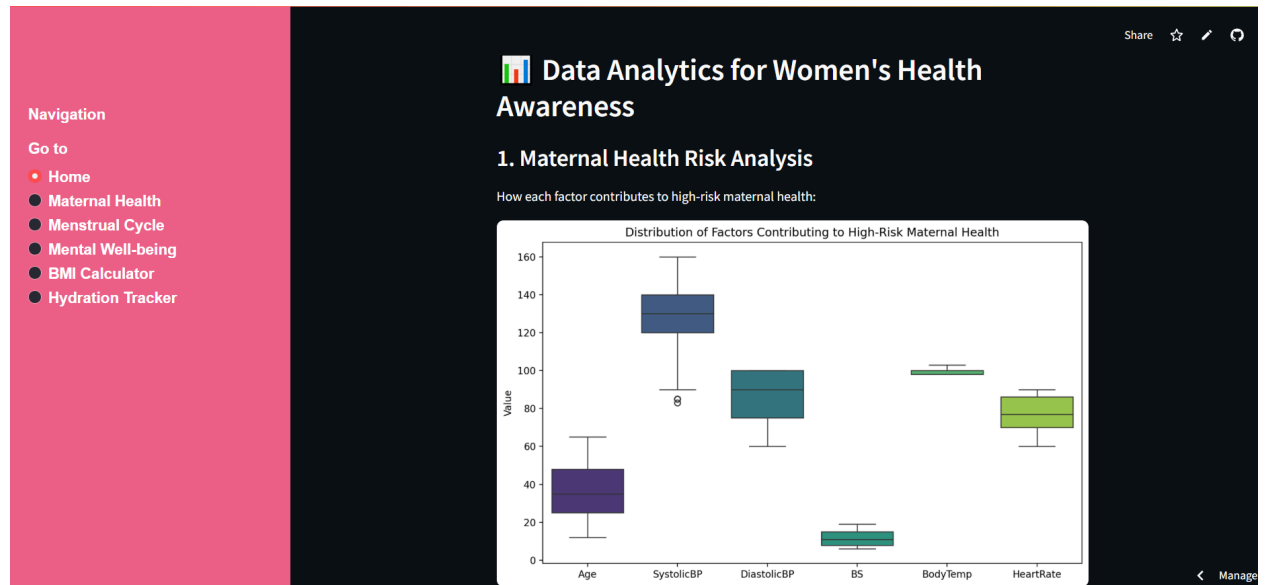
- Providing actionable insights and predictions to improve women's health awareness.
- Offering personalized recommendations to enhance healthcare access.
- Visualizing data to highlight trends and risk factors.

9. Appendix

Screenshots of the Prototype

Home Page:





Maternal Health page:

Navigation

Go to

- Home
- Maternal Health
- Menstrual Cycle
- Mental Well-being
- BMI Calculator
- Hydration Tracker

Maternal Health Predictor

Enter your details to predict maternal health risks.

Age

25

-

+

Systolic Blood Pressure

120

-

+

Diastolic Blood Pressure

80

-

+

Blood Sugar Level

5.00

-

+

Body Temperature

98.00

-

+

Heart Rate

80

-

+

Predict

< Manage

Menstrual Cycle Page:

Navigation

Go to

● Home

● Maternal Health

● Menstrual Cycle

● Mental Well-being

● BMI Calculator

● Hydration Tracker

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Menstrual Cycle Predictor

Enter your details to predict menstrual cycle regularity, ovulation date, and next cycle date.

Age

25

− +

Cycle Length (in days)

28

− +

Cycle Start Day

15

− +

Cycle Start Month

5

− +

Cycle Start Year

2023

− +

Select your symptoms

Cramps ×

Fatigue ×

Vomiting/Nausea ×

⊕ ▼

Predict

Manage app

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2023

− +

Select your symptoms

Cramps ×

Fatigue ×

Vomiting/Nausea ×

⊕ ▼

Predict

Cycle Regularity: It is regular.

Ovulation Date: 2023-05-29

Next Cycle Date: 2023-06-12

Recommendations:

• Cramps: Drink herbal teas like chamomile or ginger. Use a heating pad and practice yoga poses like Child's Pose.

• Fatigue: Get adequate sleep and eat iron-rich foods like spinach and lentils.

• Vomiting/Nausea: Sip on ginger tea and avoid greasy or spicy foods.

Manage app


Mental Well-being Page:

Navigation

Go to

- Home
- Maternal Health
- Menstrual Cycle
- Mental Well-being
- BMI Calculator
- Hydration Tracker

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Mental Well-being Predictor

Enter your details to assess your mental well-being.

Age

30 - +

Do you have a family history of mental health issues?

No ▾

Does work interfere with your mental health?

Never ▾

Do you have mental health benefits?

No ▾

Do you seek help for mental health?

No ▾

Is anonymity protected in your mental health programs?

No ▾

< Manage app


BMI Page:

Navigation

Go to

- Home
- Maternal Health
- Menstrual Cycle
- Mental Well-being
- BMI Calculator
- Hydration Tracker

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BMI Calculator

Calculate your Body Mass Index (BMI) and get personalized recommendations.

Select height unit:

☒ Centimeters (cm)

☐ Meters (m)

Enter your height (in cm):

160 - +

Select weight unit:

☒ Kilograms (kg)

☐ Pounds (lbs)

Enter your weight (in kg):

60 - +

Calculate BMI

Your BMI is: 23.44

Category: Normal Weight

< Manage app

Hydration Page:

Navigation

Go to

- Home
- Maternal Health
- Menstrual Cycle
- Mental Well-being
- BMI Calculator
- Hydration Tracker

Daily Water Intake Recommendation

Enter your weight (in kg): 60

Select your activity level: Sedentary

Your recommended daily water intake is 1800 mL.

Track Your Water Intake

Log how much water you've consumed today:

Enter the amount of water consumed (in mL): 1000

Remaining water to drink today: 800 mL.

You've consumed 55.6% of your daily goal.

Hydration Tips

- Start your day with a glass of water.
- Carry a reusable water bottle with you.
- Set reminders to drink water throughout the day.
- Eat water-rich foods like cucumbers, watermelon, and oranges.
- Avoid sugary drinks and opt for water instead.

Set a Hydration Reminder

How often would you like to be reminded to drink water? Every 30 minutes

Set Reminder

Reminder set: Drink water every 30 minutes!

Stay consistent and keep hydrating! 💧

9. Future Enhancements

1. Expand Datasets:

- Include more features like diet, exercise, and medical history.

2. Real-time Data Integration:

- Connect with wearable devices for real-time health monitoring.

3. Multilingual Support:

- Add support for multiple languages to improve accessibility.

4. Mobile App:

- Develop a mobile version for easier access.

5. LLM Based Chatbots:

- Add interactive chatbots to enhance user experience and better interaction.

6. User Accounts:

- Allow users to create accounts and track their health over time.

10. Conclusion

The Women's Health Dashboard is a powerful tool that leverages data analytics and machine learning to improve women's health awareness and access to healthcare. By providing personalized predictions, recommendations, and visualizations, the dashboard empowers women to take control of their health. The project aligns perfectly with the hackathon's problem statement and demonstrates the potential of technology to drive positive change in healthcare.

11. References

1. Scikit-learn Documentation: <https://scikit-learn.org/>
2. Streamlit Documentation: <https://docs.streamlit.io/>
3. Kaggle Datasets: <https://www.kaggle.com/datasets>

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