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NaariCare: AI-Powered Women's Health Platform

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Abstract - *Women today face many health problems like irregular periods, PCOS (Polycystic Ovary Syndrome), menopause, and a lack of awareness about hygiene and healthcare. Most existing apps focus only on one issue such as period tracking without offering complete and personalized support. To address this gap, we developed NaariCare, an intelligent web-based platform that helps women manage their overall health using Artificial Intelligence (AI) and Machine Learning (ML). The system includes features such as menstrual cycle tracking, PCOS prediction, menopause awareness, personalized diet and fitness recommendations, and a 24/7 AI chatbot for health queries. It also connects users with nearby doctors, NGOs, and government health schemes to make healthcare more accessible. By analyzing user data through ML models, NaariCare predicts health risks early and offers preventive guidance.This approach empowers women with accurate insights, continuous awareness, and convenient access to healthcare support all in one smart and easy-to-use platform*

Key Words: Menopause, PCOS, Menstrual Tracking, AI Chatbot, Machine Learning.

1. INTRODUCTION

Women's health is an important part of society's overall well-being, but it is often not given enough attention. Many women today face health problems such as irregular periods, Polycystic Ovary Syndrome (PCOS), menopause issues, and a lack of awareness about hygiene and preventive care. Because of busy lifestyles, limited access to doctors, and social hesitation, these problems are often ignored or diagnosed very late. Although there are many mobile and web applications that help track menstrual cycles, most of them focus only on period tracking or fertility windows. They do not provide complete health support, such as predicting possible health risks, giving lifestyle suggestions, or connecting users with medical help.

As a result, women still find it difficult to get accurate, timely, and reliable health guidance. To solve this problem, we developed NaariCare, an AI-based women's health and wellness platform. NaariCare uses Artificial Intelligence (AI) and Machine Learning (ML) to understand a woman's health data and give personalized advice. It helps in tracking menstrual cycles, predicting PCOS and menopause, and providing custom diet and exercise recommendations. The platform also includes an AI chatbot that answers health-related questions instantly and connects users to doctors, NGOs, and government health schemes when needed. NaariCare aims to make healthcare simpler, smarter, and more accessible for every woman. It not only promotes early detection of health problems but also spreads awareness and encourages women to take better care of their physical and mental well-being. In short, NaariCare is a step toward empowering women through intelligent and easy-to-use digital healthcare.

2. PROBLEM STATEMENT

Development of an integrated women's healthcare system that enables accurate menstrual cycle tracking, PCOS and menopause prediction using ML-based analytics. The system will provide personalized diet and hygiene recommendations, AI chatbot assistance, nearby gynecologist suggestion, NGOs, and government health schemes to improve women's health management and awareness.

3. LITERATURE SURVEY

In recent years, the integration of machine learning techniques for PCOS detection and menstrual health support has gained significant attention. Jyoti Choudhary and Madhuri Thakur [1] proposed an integrated system combining XGBoost for PCOS prediction with an NLP-based chatbot to assist women with menstrual health queries. Their approach enhances accessibility to healthcare support through automation. However, the model faces limitations in generalizability and real-world applicability due to dataset constraints.

Md Mahbubur Rahman et al. [2] developed a web-based machine learning system aimed at early detection of PCOS using multiple classification algorithms. Their model demonstrated high accuracy and efficiency in predicting PCOS at an early stage, making it suitable for preventive healthcare. Despite its effectiveness, the study relies on limited datasets and lacks extensive clinical validation, which may reduce its applicability in real-world scenarios.

Vasu Avashti, Ashish Kumar, and Aditya Bhardwaj [3] presented a machine learning-based approach using

XGBoost to detect PCOS with an accuracy of approximately 96%. Their model utilized clinical and metabolic features to improve prediction performance. While the results are promising, the study does not fully capture diverse symptomatic variations of PCOS, which may affect its generalization across different populations.

Aliaksandra Shauchuk [4] explored personalization techniques in mobile period tracker applications, emphasizing user-centered design for improving user engagement and accuracy. The study highlighted how tailored recommendations can enhance user experience and health awareness. However, the research is limited by a small and homogeneous sample size within a narrow age group, restricting broader applicability.

Dalton C. G. Valadares and Angelo Perkusich [5] proposed a Flask and MySQL-based web application that incorporates machine learning for menstrual tracking and gynecological query handling. The system also provides doctor recommendations, improving user interaction with healthcare services. However, the application primarily focuses on menstrual tracking and does not comprehensively address other women's health conditions.

4. MOTIVATION

The rapid advancement of digital healthcare technologies has created new opportunities to improve women's health management. However, existing systems often focus on isolated functionalities such as period tracking or general fitness, lacking a comprehensive and intelligent approach..

A. Bridging the Healthcare Gap

A significant challenge in women's healthcare is the lack of accessibility to reliable medical support, particularly in rural and underserved regions. Many women face difficulties in connecting with qualified healthcare professionals, NGOs, and government health schemes due to fragmented systems and lack of awareness. Naaricare aims to address this issue by providing a unified platform that integrates healthcare services, enabling seamless communication and access to support.

B. Early Detection of Health Issues

Early diagnosis plays a crucial role in preventing severe health complications. Conditions such as Polycystic Ovary Syndrome (PCOS), menstrual irregularities, and menopause-related disorders are often detected late due to lack of monitoring and awareness. The motivation behind Naaricare is to leverage machine learning and deep learning models to analyze user data and identify early warning signs of such conditions

C. Personalized Wellness Guidance

Traditional healthcare solutions often provide generalized recommendations that may not be suitable for every individual. Women's health is highly personalized and influenced by factors such as age, hormonal changes, lifestyle, and medical history. Naaricare is designed to deliver customized health recommendations, including diet plans, exercise routines, hygiene practices, and mental wellness strategies. This personalized approach enhances user engagement and ensures more effective health management.

D. Promoting Awareness and Education

Lack of awareness regarding reproductive health, menstrual hygiene, and preventive care remains a major concern. Many women do not have access to accurate and reliable information, leading to misconceptions and poor health practices. Naaricare addresses this gap by providing educational content such as articles, videos, and interactive chatbot support. The platform empowers women with knowledge, enabling them to make informed decisions about their health and well-being.

E. Ensuring Privacy and Trust

Privacy and data security are critical factors in the adoption of digital health applications. Women often hesitate to share personal health information due to concerns about data misuse and lack of confidentiality. Naaricare is motivated to build a secure and trustworthy environment by implementing robust security measures, including data encryption, secure authentication, and role-based access control.

5. SYSTEM ARCHITECTURE

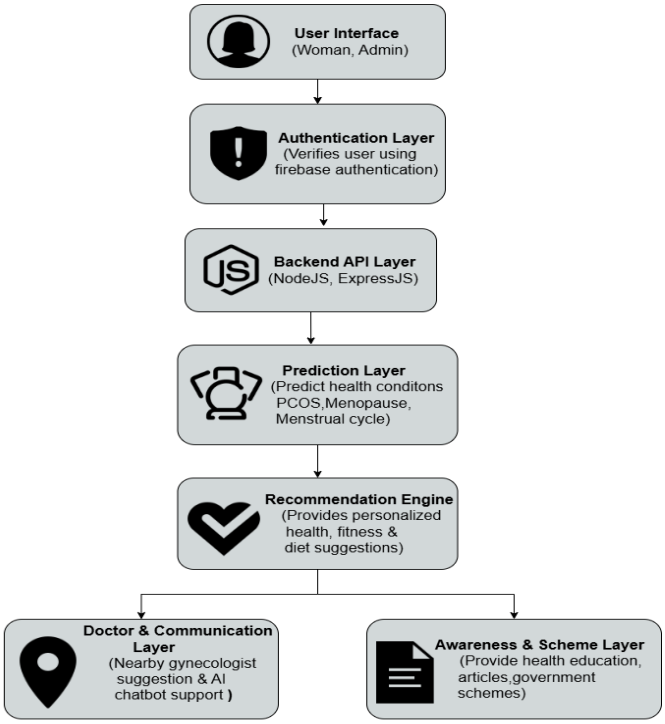

Fig 1: System Architecture

1.User Registration & Authentication: Users securely register and log in to access personalized healthcare services.

2. Add Symptoms and Health Records: Users input medical data such as symptoms, menstrual history, and hormonal details for analysis.

3. Disease Prediction: Machine learning models analyze input data to predict conditions like PCOS and menopause stages.

4. Recommendation to User: The system provides personalized diet, exercise, and hygiene suggestions based on prediction results.

5. Access to Other Health Systems: Users are connected to doctors, NGOs, and government health schemes for further support and treatment.

6. PROPOSED ALGORITHMS

Algorithm 1: Random Forest

Random Forest is an ensemble machine learning algorithm that uses multiple decision trees to improve prediction accuracy and reduce overfitting. It works by creating several trees using random subsets of data and features, and each tree makes its own prediction. The final output is determined by majority voting in classification problems. In the NaariCare system, Random Forest is used to analyze user health data such as symptoms, menstrual history, and hormonal details to predict conditions like PCOS and menopause stages.

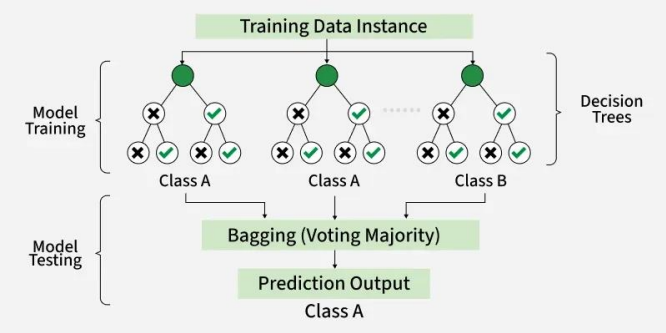

Fig -2: Random Forest

Explanation of Random forest:

1. Input: User enters health data such as age, symptoms, menstrual cycle details, and hormonal information into NaariCare

2.Dataset and preprocessing: The system uses existing labeled patient data and processes it by cleaning, handling missing values, and converting it into numerical form.

3. Model building: Multiple decision trees are created using random subsets of data and features.

4. Prediction process: The user's data is passed through all decision trees and each tree gives its own prediction.
5.Output decision: Final result is obtained using majority voting among all tree predictions.

6.Result and recommendation: Based on the prediction, NaariCare provides disease risk analysis and personalized suggestions like diet, exercise, and medical consultation.

Algorithm 2: K-Nearest Neighbors (KNN)

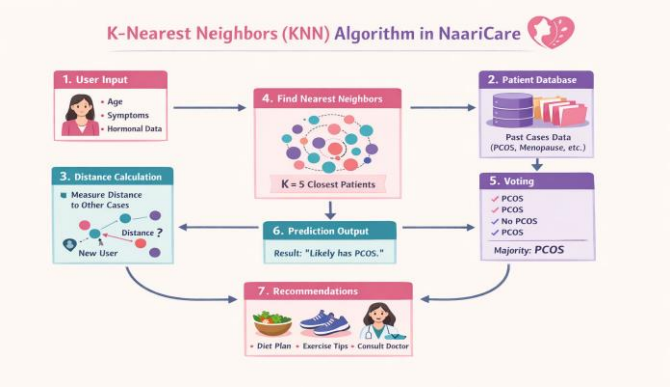

Fig -3: K-Nearest Neighbors (KNN)

Explanation of KNN:

1.Input: User enters health data such as age, symptoms, menstrual cycle details, and hormonal information into NaariCare.

2.Dataset and preprocessing: The system uses existing labeled patient data and processes it by cleaning, handling missing values, converting it into numerical form, and normalizing the values.

Model building: The system stores all processed data points and selects a value of K to determine how many nearest neighbors to consider.

Prediction process: The user's data is compared with all existing data points by calculating distances to find the K closest neighbors.

Output decision: The most common class among the K nearest neighbors is selected as the final prediction.

Result and recommendation: Based on the prediction, NaariCare provides disease risk analysis and personalized suggestions like diet, exercise, and medical consultation

Algorithm 3: XGBOOST

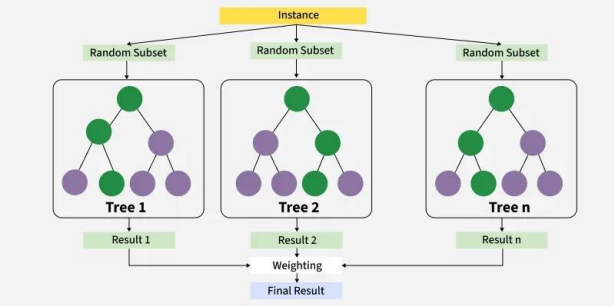

Fig 4. XGBoost Algorithm

Explanation of XGBOOST:

1.Input: User enters health data such as age, symptoms, menstrual cycle details, and hormonal information into NaariCare.

2.Dataset and preprocessing: The system uses existing labeled patient data and processes it by cleaning, handling missing values, converting it into numerical form, and normalizing features.

3. Model building: Multiple decision trees are built sequentially where each new tree corrects the errors of the previous ones using gradient boosting.

4. Prediction process: The user's data is passed through all boosted trees and each tree contributes to improving the prediction.

5. Output decision: Final result is obtained by combining outputs of all trees to produce a strong and accurate prediction.
6. Result and recommendation: Based on the prediction, NaariCare provides disease risk analysis and personalized suggestions like diet, exercise, and medical consultation.

Algorithm 4: LSTM

1. Input: User enters sequential health data such as menstrual cycle history, symptoms over time, and hormonal changes into NaariCare.

2. Dataset and preprocessing: The system uses time-series health data, cleans it, handles missing values, converts it into numerical format, and structures it as sequences.

3. Model building: An LSTM (Long Short-Term Memory) neural network is created to learn patterns from sequential and time-dependent data.

4. Prediction process: The user's sequential data is passed through LSTM layers which capture long-term dependencies and temporal patterns.

5. Output decision: The model predicts the health condition based on learned sequence patterns (e.g., cycle irregularities or hormonal trends).

6. Result and recommendation: Based on the prediction, NaariCare provides disease risk analysis and personalized suggestions like diet, exercise, and medical consultation.

I.Accuracy

• Random Forest Algorithm: Random Forest provides high accuracy by combining multiple decision trees, reducing overfitting and capturing complex patterns in health data, making it effective for predicting conditions like PCOS.

• KNN Algorithm: KNN offers good accuracy depending on the choice of K and data quality, but it may be affected by noisy or irrelevant features in the dataset.

• XGBoost Algorithm: XGBoost provides very high accuracy by sequentially correcting errors of previous trees and capturing complex relationships in structured healthcare data.

• LSTM Algorithm: LSTM offers high accuracy for time-series data by learning long-term dependencies in menstrual cycles and hormonal patterns.

II. Computational complexity

• Random Forest Algorithm: Random Forest has high computational complexity due to the construction and evaluation of multiple decision trees, especially during training.

• KNN Algorithm: KNN has low training cost but high computational complexity during prediction, as it calculates distance with all data points.

• XGBoost Algorithm: XGBoost has high computational complexity due to sequential tree building and optimization, but it is efficient compared to other boosting methods.

• LSTM Algorithm: LSTM has very high computational complexity as it involves deep neural network layers and requires more training time and resources.

III. Real-Time Performance

• Random Forest Algorithm: Random Forest provides moderate real-time performance, as predictions are relatively fast once the model is trained, but training itself is time-consuming.

• KNN Algorithm: KNN has poor real-time performance because it requires distance calculations with the entire dataset for every new input.

• XGBoost Algorithm: XGBoost provides moderate real-time performance with relatively fast predictions after training, making it suitable for practical applications.

• LSTM Algorithm: LSTM has lower real-time performance due to complex computations, especially when handling long sequences.

IV. Generalization to New Data

• Random Forest Algorithm: Random Forest generalizes well to new data and handles unseen cases effectively due to its ensemble nature.

• KNN Algorithm: KNN has moderate generalization ability and may struggle with new data if the dataset is noisy or not well-distributed.

• XGBoost Algorithm: XGBoost generalizes very well to new data due to regularization techniques, reducing overfitting and improving robustness.

• LSTM Algorithm: LSTM generalizes well for sequential data but may require large datasets and retraining if data patterns change significantly.

In conclusion, Random Forest and XGBoost provide high accuracy and strong performance for structured healthcare data in NaariCare. KNN is simple and useful for basic predictions but is less efficient for large datasets and real-time use. LSTM is best suited for time-series data like menstrual cycles, capturing long-term patterns effectively. Combining these algorithms improves overall prediction accuracy and system reliability.

7. METHODOLOGY

The proposed NaariCare system is designed to predict women's health conditions such as PCOS and menopause stages using machine learning techniques like Random Forest and K-Nearest Neighbors (KNN). The system processes user health data and provides personalized healthcare recommendations. The architecture is divided into several stages as described below:

I. Data collection and Input

User health data is collected through the NaariCare interface:
• Users enter details such as age, menstrual cycle history, symptoms (acne, weight gain, irregular periods).
• Data is stored securely for further processing and analysis.

II. Data Preprocessing

The collected data undergoes preprocessing to ensure quality.
• Data Cleaning: Handling missing or inconsistent values
• Encoding: Converting categorical data into numerical format
• Normalization: Scaling values to a uniform range for better model performance

III. Feature Selection and Dataset Preparation

Relevant features are selected to improve prediction accuracy:
• Important attributes like cycle regularity, BMI, and symptoms
• Dataset is divided into training and testing sets
• Helps in reducing noise and improving model efficiency

IV. Model Training Using Random Forest and KNN

Machine learning models are trained using prepared datasets:
• Random Forest: Multiple decision trees are built using random subsets of data and features
• KNN: Stores all data points and classifies based on similarity.
• Models learn patterns between symptoms and diseases.

V.Prediction & Classification

The trained models are used to predict user health conditions:
•New user input is passed into the models
• Random Forest uses majority voting from multiple trees
• KNN identifies nearest neighbors and assigns the most common class.
• Output is generated as predicted condition (e.g., PCOS risk level).

VI. Result Generation and Recommendation

Based on prediction results, the system provides actionable insights:
•Displays disease risk analysis to the user
• Suggests personalized diet plans, exercise routines, and hygiene.
• Recommends medical consultation if necessary

VII. System Integration and Continuous Learning

The complete model is integrated into the NaariCare platform:
• Enables real-time prediction and user interaction
• New user data can be added to improve model accuracy overtime.
• Ensures scalability and continuous system enhancement

8. RESULTS

a.PCOS

Model	Type	Accuracy (%)	Real time capability	Comments
Random Forest	Ensemble Learning	92	Medium	Handles complex symptom well
XGBoost	Gradient	93	Medium	Efficient

	Boosting Model			but slightly complex
KNN	Instance-Based Learning	90	Low	Slower in real-time

b.Menopause

Model	Type	Accuracy (%)	Real time capability	Comments
Random Forest	Ensemble Learning	98	Medium	Handles complex symptom patterns well
XGBoost	Gradient Boosting Model	99	Medium	Efficient, robust but slightly complex
KNN	Instance-Based Learning	90	Low	Slower in real-time

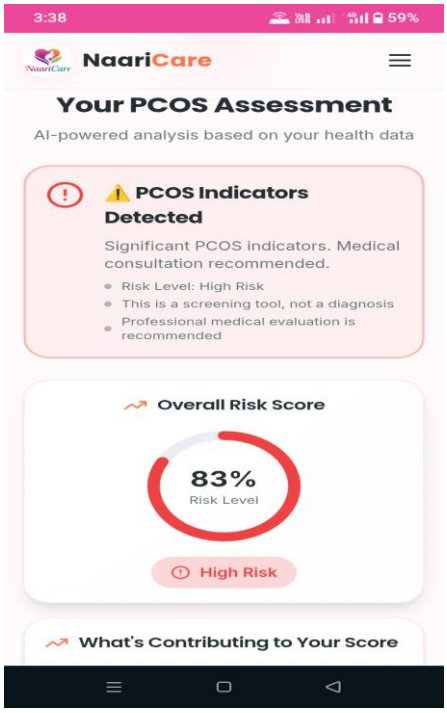

Fig 5. PCOS Result

c.Menstrual Cycle

Model	Type	Accuracy (%)	Real time capability	Comments
LSTM	Recurrent Neural Network	91	High	tracking cycle irregularities
KNN	Instance-Based Learning	80	Low	Slower in real-time due to distance

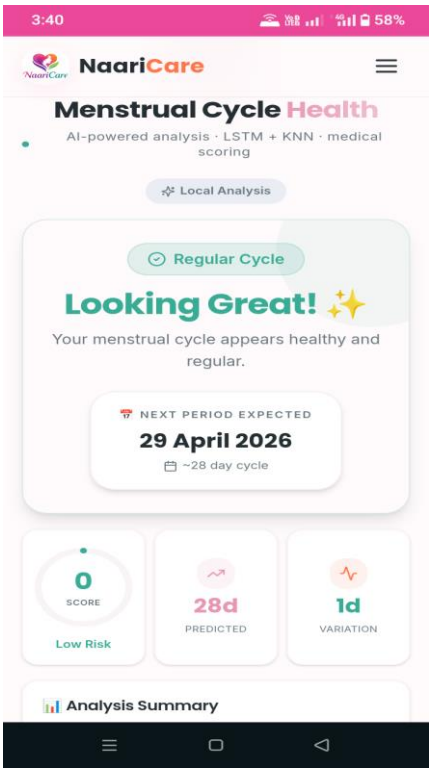

Fig 6. Menstrual Result

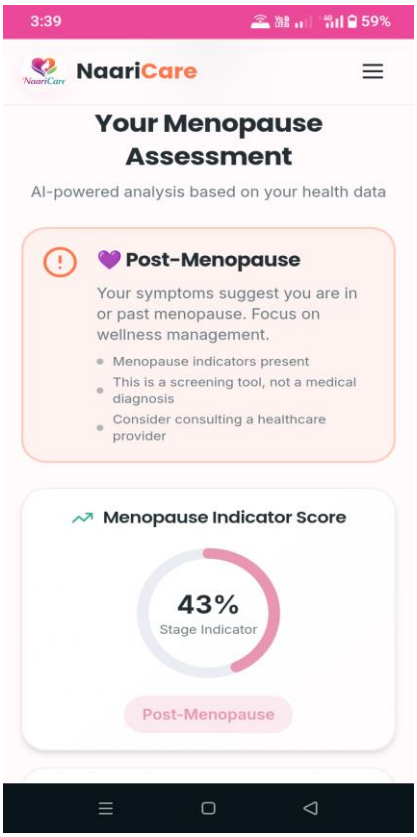

Fig 6. Menopause Result

9. CONCLUSION

The proposed NaariCare system represents a significant step toward transforming women's healthcare through the integration of modern technologies such as Machine Learning (ML) and Artificial Intelligence (AI). By combining predictive analytics with user-friendly design, the system not only enables early detection of critical health conditions like PCOS, menstrual disorders, and menopause-related complications, but also empowers women to take proactive control of their health. In conclusion, NaariCare is not just a technological solution but a comprehensive healthcare support system aimed at improving the quality of life for women. It combines accuracy, accessibility, and personalization to create a reliable and efficient platform for women's health management. With further development and widespread adoption, NaariCare has the potential to contribute significantly to preventive healthcare, early diagnosis, and overall empowerment of women in managing their health effectively.

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