Sakhi – Every Women's Personal Health Assistant

Part 1

Sakhi is a comprehensive women's health application that aims to to support and empower women at every stage of their health and reproductive journey. With Sakhi, you can:

- Track your menstrual cycle with ease and accuracy
- Receive personalized insights and notifications on your fertile days and ovulation
- Record and monitor your symptoms, moods, and overall health
- Get access to information and resources on personal and reproductive health
- Predict your risk of breast cancer based on your personal and family history

The word *Sakhi* is derived from Sanskrit and Hindi, and it means *female friend* or *companion*. This name could convey a sense of support, trust, and companionship, which are essential qualities in a women's health application that aims to provide personalized information and guidance to women. However, this project is more than just a period tracker or fertility app. It aims to become a trusted companion for all the health needs of every woman. It provides women with the support, information, and tools they need to make informed decisions about their health and well-being.

Git Repo - https://github.com/raghavikonda22/SE_Project

Group 4 - Members and Tentative Responsibilities

Srividya Kamakshi Valiveti	- Work on the User interface for menstrual cycle tracking - Contribute towards building an ML model for breast cancer prediction. - Act as Scrum master to ensure project stays on track - Will also work on the code documentation and final reports
Sai Sree Raghavi Konda	- Find all datasets available on Breast cancer - Data preprocessing on the datasets to improve accuracy - Contribute towards building an ML model for breast cancer prediction
Charitha Sree Surineni	- Work on curating an assessment to gather information from the user. - Build the backend APIs for recording dates and predicting cycles. - Establish a database to store all this
Bhavana Nalabothu	- Work on push notifications for the user to remind important dates - Build APIs for analytics, ovulation, and work on the database. - Develop an authentication system for the application
Hemalatha Yella	- Curate all the relevant resources that women will find useful in the application - Work on the UI and showcase these resources in an attractive way - Test the system to find any bugs or gaps

Part 2

Goal

The goal of this project is to provide women with a comprehensive and personalized health management tool [1] that empowers them to take control of their reproductive health and overall well-being. The project will address the following:

- *Lack of information and awareness about reproductive health:* Many women lack access to accurate and reliable information about their menstrual cycles, fertility, and reproductive health. Sakhi aims to bridge this gap by providing accurate information and resources in a user-friendly and accessible format.

- *Inadequate menstrual cycle tracking tools:* Many women struggle to keep track of their menstrual cycles due to irregularities or lack of convenient tracking tools. All solutions currently available in the market either require heavy in app purchases or their UI is covered with unwanted advertisements [2]. Unlike these existing apps, Sakhi incorporates predictive analytics to calculate a woman's risk of breast cancer based on personal and family history. Users can answer a series of questions about their age, menstrual history, and family history to receive personalized guidance on preventative measures and early detection. Also, our project aims to provide an easy-to-use, customizable, and accurate menstrual cycle tracking feature that helps women plan and manage their periods effectively and free of cost.

- *Limited support for women's health issues:* Many women face a variety of reproductive health issues such as PMS, PCOS, and breast cancer. This application provides a safe space for women to receive personalized insights and support for these issues through symptom tracking, risk assessment, and access to relevant resources.

Objectives

- Develop a user-friendly, visually appealing, and intuitive application that enables women to track their menstrual cycles accurately, receive fertility insights, and monitor their overall health and wellness.
- Implement and test the menstrual cycle tracking feature, allowing users to input and visualize their menstrual cycles, symptoms, and mood changes over time.
- Build and test the breast cancer risk assessment tool, using predictive analytics to calculate a user's personalized risk of breast cancer based on personal and family history.
- Create and curate a set of resources for women's reproductive health, including articles, videos, and guides on a variety of topics.
- Conduct rigorous testing to identify areas for improvement and make necessary updates

Each of these objectives is specific, measurable, achievable, relevant, and time-bound, allowing the project team to focus on key areas of development and ensure that the app is ready for launch.

Motivation

Reproductive health issues have become a major concern Nowadays, with an increasing number of women reporting problems with their menstrual cycles, fertility, and overall reproductive health. According to the World Health Organization (WHO) [3], around 10% of women worldwide suffer from endometriosis, a painful condition that can cause infertility and other complications. In addition, rates of polycystic ovary syndrome (PCOS), a common hormonal disorder that can affect fertility, have been increasing in recent years. There are several factors that may be contributing to the rise in reproductive health issues, including changes in diet, lifestyle, and environmental factors. For example, exposure to toxins and pollutants in the environment can disrupt hormonal balance and affect reproductive health. Similarly, changes in diet and lifestyle, such as a lack of exercise or a diet high in processed foods, can also impact reproductive health.

The increasing prevalence of reproductive health issues highlights the need for comprehensive tools and resources to support women's reproductive health [1]. Applications like Sakhi can play an important role in providing women with the information, tools, and support they need to monitor their menstrual cycles, track their symptoms, and make informed decisions about their reproductive health. By empowering women with knowledge and resources, we can help address the growing problem of reproductive health issues and improve health outcomes for women worldwide.

Breast cancer is another significant reproductive health issue that affects women worldwide. Breast cancer is the most prevalent cancer in women worldwide and the second leading cause of cancer-related deaths in women, according to the American Cancer Society. [4]In recent years, the incidence of breast cancer has been increasing, and it is estimated that approximately 1 in 8 women will develop breast cancer at some point in their lives. There are several risk factors that may contribute to the development of breast cancer, including age, family history, certain genetic mutations, and exposure to certain environmental factors. While not all cases of breast cancer can be prevented, early detection and treatment can significantly improve outcomes.

By providing women with a tool to monitor their risk of breast cancer, this application empowers women to take proactive steps to reduce their risk of developing the disease. For example, if a woman is identified as being at high risk of breast cancer, she may be advised to undergo more frequent screening or to consider other preventative measures, such as taking medication or undergoing prophylactic surgery. Secondly, early detection is critical for improving outcomes in breast cancer. By guiding women by providing accurate information on the right way to examine and track changes in their breast tissue over time, the Sakhi app can help women identify potential signs of breast cancer early on, when the disease is most treatable. For example, the information available on the app may help women detect the development of a lump or a change in the texture of the skin, that may indicate the presence of cancer.

Significance

The combination of menstrual cycle tracker and breast cancer detection has significant implications for women's health. Some high impact areas includes:

- *Early Detection of Breast Cancer*: One of the leading causes of cancer-related deaths in women globally is breast cancer. Early detection is critical for successful treatment, and this project can help in identifying breast cancer at an early stage. The machine learning models used in this project can analyze the breast cancer data to identify any signs of the disease and provide timely alerts to the user to seek medical attention.

- *Improved Menstrual Cycle Management:* Menstrual cycle irregularities can affect a woman's health and well-being. The menstrual cycle tracker developed in this project can help women keep track of their menstrual cycle and predict the next period. This can help in planning and managing their daily activities, reducing anxiety, and improving overall health.

- *Appropriate Health Recommendations:* Machine learning models can analyze the data from the menstrual cycle tracker and breast cancer detection to provide personalized health recommendations to the user. For example, if the user has irregular periods or shows signs of breast cancer, the app can suggest lifestyle changes or prompt the user to visit a doctor.

- *User Convenience:* This application will offer a convenient and user-friendly platform for women to monitor their health. It can provide reminders and alerts, store health data, and generate reports that can be shared with healthcare professionals where needed.

- *Addressing barriers to care:* Many women may feel uncomfortable discussing sensitive topics such as menstruation, ovulation, and breast cancer with their healthcare providers. By providing a private and secure platform for monitoring and managing these issues, the app can help women overcome these barriers and take proactive steps to protect their reproductive health.

Features

The menstrual cycle tracker includes a clean and a user-friendly interface which can be used by anyone regardless of their technological expertise. It has the following features:

- *User Authentication:* Users can create an account and log in to access the application. The app will store their personal information, such as name, age, and contact details, securely.

- Period Tracking: The app allows users to track their menstrual cycles, including the start and end dates of each cycle, the duration of each period, and the intensity of bleeding.

- *Ovulation Prediction:* The app uses data on menstrual cycles to predict the most fertile days of the month, providing users with the best days for conceiving.

- *Alerts and Notifications:* The app sends alerts and notifications to remind users of important dates, such as the start of their next period or the date of their next breast self-exam. Users can customize the frequency and notifications for a personalized experience.

Breast Cancer Risk Prediction: The application collects information on the user's height, weight, family history, and other factors to predict their risk of developing breast cancer using an ML model [5]. It includes features like:

- *Assessment:* The app will use a risk assessment tool to provide each user with a personalized assessment of their chance of developing breast cancer.

- *Breast Self-Exam:* The app will provide information on how to perform a breast self-exam and reminders to perform it regularly [6]. The app will also encourage users to report any changes or abnormalities they notice during their self-exams to their healthcare provider.

- *Risk Factors:* The app will collect information on the user's age, weight, height, family history of breast cancer, and any personal history of benign breast conditions to determine their probability of developing breast cancer. It will use the mammogram data or self-examination results as per availability to achieve this.

- *Follow-up Care:* The app will encourage users to follow up with their healthcare provider regularly through push notifications and to report any concerns or symptoms they experience.

Target audience

The target audience of our application are women of reproductive age who are interested in monitoring their menstrual cycles, tracking their symptoms, and monitoring their reproductive health. This includes women who may be trying to conceive, those who are using birth control, and those who simply want to stay informed about their reproductive health. Women who use this application may have different levels of knowledge and experience when it comes to their reproductive health. Some may be well-informed and actively engaged in their care, while others may be new to the concept of menstrual tracking and need more guidance and support. Therefore, this application will be user-friendly and accessible, with a simple interface that makes it easy for users to input their data and access personalized insights. The app also includes some resources on women's reproductive health, which can help educate and inform users about their care.

In addition to women, the Sakhi app may also be useful for healthcare providers who work with female patients. By providing a comprehensive suite of tools and resources, the app can help facilitate communication and collaboration between patients and providers, which can lead to better health outcomes.

References

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[5] Breast Cancer Prediction Using Machine Learning: A Review" by Nourhene Farhat and Chafik Aloulou. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7574947/

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