

# Women's Wellness Guide Using Machine Learning

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**Abstract**—Women's mental health is a critical yet often overlooked aspect of well-being. In this project, Women's Wellness Guide, we have developed a comprehensive application designed to provide mental health support for women through innovative AI-driven features. Our system integrates machine learning models, utilizing logistic regression for sentiment analysis on journal entries, generating weekly mental health reports based on users' emotional patterns. Additionally, a personalized recommendation system employs decision tree models to provide tailored suggestions based on age group (15–19, 20–24, 25–30), mental state, daily routine, and severity of mental distress. The application incorporates real-time communication via Socket.IO, enabling seamless chat-based support. Furthermore, we offer professional consultation services and helpline support to assist users in distress. To enhance mental well-being, our platform provides curated content, including therapeutic music, informative articles, and guided exercises. This integrated approach leverages machine learning and real-time interaction technologies to offer personalized, accessible, and effective mental health support for women.

**Keywords** - Mental health, Sentiment analysis, Machine learning, Logistic regression, Decision tree, Real-time communication, Socket.IO, Consultation, Helpline, Personalized support.

## I. INTRODUCTION

Mental health is an essential component of overall well-being, yet it is often overlooked, especially among women. Despite the increasing awareness of mental health issues, many women still face barriers in seeking help due to societal stigma, lack of awareness, and limited access to personalized mental health resources. Stress, anxiety, depression, and other mental health conditions can significantly impact daily life, relationships, and productivity, making it crucial to develop accessible and effective support systems. Addressing these concerns, we propose Women's Wellness Guide, an AI-driven application designed to provide personalized mental health support through machine learning, sentiment analysis, real-time communication, and recommendation systems. Our platform aims to empower women by enabling them to track,

analyze, and manage their mental well-being efficiently. One of the core functionalities of the system is sentiment analysis, which leverages logistic regression to analyze users' journal entries. By extracting insights from their writing, the system can detect emotional patterns, generating weekly mental health reports that help users monitor their mental state over time. These reports provide valuable feedback, allowing users to reflect on their emotional well-being and take proactive steps toward self-care.

To further enhance mental health management, Women's Wellness Guide incorporates a decision tree-based personalized recommendation system. This system considers key factors such as age group (15–19, 20–24, 25–30), mental state, daily routine, and distress severity to offer tailored recommendations. Whether a user is experiencing mild stress or severe emotional distress, the application suggests suitable interventions, including relaxation techniques, mindfulness exercises, lifestyle adjustments, and professional consultation when necessary.

Recognizing the importance of real-time support, our application integrates Socket.IO-powered chat spaces, allowing users to engage in instant communication with mental health professionals and peer support groups. This feature provides a safe and supportive environment where users can seek guidance, share experiences, and receive immediate emotional support. Additionally, we have incorporated consultation services and helpline support, ensuring that users have access to professional assistance whenever required.

Beyond emotional tracking and consultation, Women's Wellness Guide offers a comprehensive set of well-being resources, including therapeutic music, informative articles, and guided exercises. These resources are curated to promote

relaxation, stress management, and self-improvement, fostering a holistic approach to mental health care. By integrating multiple support mechanisms, our platform ensures that users receive both proactive and reactive mental health aid, bridging the gap between self-care and professional intervention.

## II. LITERATURE REVIEW

Namli et al. [3] investigated the impact of bipolar disorder (BD) on spouses, focusing on sexual functions, alexithymia, marital satisfaction, and perceived burden. Their study of 81 BD type 1 patients, their spouses, and 78 healthy controls found that BD patients and their spouses had lower marital satisfaction and higher sexual dysfunction. Regression analysis indicated that alexithymia, depression, and sexual dysfunction influenced marital adjustment in BD patients, while burden and alexithymia affected their spouses' adjustment. The study emphasized the necessity of psychosocial interventions to support caregivers and improve relationship dynamics. Similarly, M. Klose and F. Jacobi [5] explored gender differences in mental health, noting that while women experience higher rates of mood and anxiety disorders, men show higher rates of substance abuse and antisocial disorders. Their study concluded that sociodemographic variables alone do not fully explain the higher prevalence of mental disorders in women.

Verónica Martínez-Borba et al. [1] studied the feasibility and user satisfaction of web-based and mobile platforms for perinatal depression screening via the HappyMom program. Assessments were conducted on 348 web users and 175 app users during pregnancy and postpartum. The study found that web users had higher individual response rates, while app users demonstrated better long-term retention. Although both platforms had high satisfaction, dropout issues remained. Similarly, Martínez [2] analyzed mental health apps like Happify, Shine, Sanvello, and Talkspace, concluding that while these apps provide real-time monitoring and therapeutic support, they do not replace traditional therapy but help reduce stigma and enhance mental health awareness. In a related study, Aktar et al. [9] examined how mobile apps, AI-powered assessments, and virtual support groups improve mental well-being, emphasizing the need for further research to optimize healthcare interventions for women.

De and Mishra [6] explored sentiment analysis in mental health, particularly through emotion detection via facial expressions and social media analytics. They highlighted sentiment analysis as a tool for understanding mental health trends, especially post-COVID-19, but acknowledged the accuracy challenges of existing algorithms. Similarly, Sriteja Kataru et al. [13] explored ML for early mental health detection in children, achieving up to 94.5% accuracy in identifying students needing intervention. Their findings underscore ML's potential in integrating technology into

mental health services. Furthermore, Sayeda Farzana Aktar et al. [12] conducted a survey on technology's role in addressing women's health challenges, including reproductive health, mental well-being, and preventative care, providing a broad perspective on the field's advancements and gaps.

McGranahan et al. [8] examined factors affecting adolescent girls' sexual and reproductive health rights (SRHR) in Ugandan slums, identifying barriers like stigma and breaches of confidentiality. Their study stressed the need for targeted interventions to improve awareness and access to SRHR. Meanwhile, Pinto-Foltz, Hines-Martin, and Logsdon [4] analyzed adolescent girls' perceptions of peers with depression, finding that while they understood mental health similarly to adults, their emotional responses varied. This study underscored the importance of tailored mental health education to reduce stigma and encourage help-seeking.

Abdulaziz Almaleh et al. [15] applied ML techniques to develop predictive models for workplace mental health, utilizing classification algorithms like Random Forest, Logistic Regression, and Gradient Boosting to enhance accuracy. Syed Azizur Rahman et al. [14] examined the Kalman Filter's applications in mental health, discussing its role in mood tracking and cognitive interventions while addressing challenges like data privacy and behavior modeling. Finally, Sathya A et al. [11] developed a Health and Wellness Recommendation System that personalizes fitness and diet guidance using the TF-IDF algorithm for customized meal and exercise recommendations, offering a holistic wellness approach.

### Advantages of Technology on Mental Health:

- Web-based and mobile platforms like the HappyMom program provide convenient and scalable methods for perinatal depression screening, improving accessibility and user satisfaction.
- Apps such as Happify, Shine, Sanvello, and Talkspace offer real-time monitoring and therapeutic support, helping reduce stigma and promoting mental health awareness.
- Findings emphasize the need for psychosocial interventions to support spouses and caregivers, improving marital satisfaction and reducing perceived burden.
- Understanding adolescent perceptions of mental health and providing tailored education can encourage help-seeking behaviors and reduce stigma.
- While women face higher mood and anxiety disorders, and men struggle with substance abuse, sociocultural factors impact both differently, highlighting the need for gender-sensitive approaches.
- We have proposed a system by leveraging machine learning to recommend women things they could inculcate into their lifestyle to help them improve their mental health.

### III. PROPOSED SYSTEM

The Women's Wellness Guide is an AI-driven wellness platform designed to provide personalized mental health support for women through sentiment analysis, AI-powered recommendations, real-time communication, and curated self-care content. The system consists of three key modules:

#### A. Machine Learning – Sentiment Analysis and Personalized Recommendations

We compare the performance of three machine learning models—Random Forest, Logistic Regression, and Decision Tree—on the given dataset. Each model is trained using TF-IDF vectorized features, and accuracy scores are calculated for evaluation. The results provide insights into the effectiveness of different classification algorithms for the given task.

```
from sklearn.ensemble import RandomForestClassifier
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score

# Define models
models = {
    "Random Forest": RandomForestClassifier(n_estimators=100, random_state=42),
    "Logistic Regression": LogisticRegression(random_state=50, max_iter=500),
    "Decision Tree": DecisionTreeClassifier(random_state=50)
}

# Train, predict, and calculate accuracy for each model
for name, model in models.items():
    model.fit(X_train_tfidf, y_train)
    predictions = model.predict(X_test_tfidf)
    accuracy = accuracy_score(y_test, predictions)
    print(f"{name} Accuracy: {accuracy:.2f}")

✓ 53s

Random Forest Accuracy: 0.77
Logistic Regression Accuracy: 0.80
Decision Tree Accuracy: 0.71
```

Fig. 1. ML Models Comparison

#### Key Technologies & Components:

- Sentiment Analysis – Logistic Regression & NLP: Uses tokenization, stop word removal, and lemmatization for text processing. Classifies emotions as positive or negative using a Logistic Regression model.
- AI-Based Personalized Recommendations – Decision Tree Algorithm: Considers age group (15–19, 20–24, 25–30), sentiment trends, and activity levels to suggest self-care activities. Recommends breathing exercises, meditation, journaling prompts, and relaxation techniques.
- Data Security – Fernet Encryption (Cryptography Library): Ensures end-to-end encryption of journal entries before processing. Uses symmetric key encryption, ensuring data remains confidential and tamper-proof.
- Data Visualization – Matplotlib/Plotly: Generates weekly mood reports with visual graphs to track emotional trends.
- Alert System – Rule-Based Triggers: Detects consecutive negative journal entries and suggests interventions or directs users to support services.

#### B. Web Application – User Interface and Backend

This module focuses on the frontend and backend infrastructure of the web application, ensuring a seamless user experience and secure interaction with ML components.

#### Key Technologies & Components:

- Frontend – HTML, CSS, JavaScript (React/Angular): Provides an intuitive and responsive interface for user interaction.
- Backend – Python (Flask/Django) or Node.js: Manages communication between ML models and frontend for real-time analysis.
- Database – MySQL: Stores user data, journal entries, sentiment trends, and recommendation history.

#### C. Real-Time Communication and Support System

To provide instant emotional support, the system integrates Socket.IO-powered chat spaces, enabling users to connect with registered users, including peer groups and mental health professionals.

#### Core Functionalities:

- User-Based Chat System: Enables registered users to engage in discussions with their names displayed, fostering a sense of community and accountability.
- Journal-Based Sentiment Analysis: Uses journal entries to assess emotional well-being and provide support accordingly.
- Peer Support Groups: Users can join topic-based discussions and share their experiences.
- Professional Consultation: Direct access to mental health professionals for one-on-one guidance.
- Emergency Help & Crisis Support: The system suggests contacting a helpline if a user exhibits prolonged distress.

#### D. Additional Features

- Curated Self-Care Content: Includes therapeutic music, guided relaxation, informative articles, and breathing exercises.
- User Dashboard: Displays emotional trends, recommendations, and upcoming consultations.

#### E. System Workflow

The system follows the workflow outlined below:

- 1) User Writes Journal Entry → Sentiment analysis classifies it as positive or negative.
- 2) Emotional Trends Analyzed → Generates weekly reports based on mood patterns.
- 3) Decision Tree Matches User Profile & Sentiment → Suggests personalized self-care activities.
- 4) Registered Users Engage in Real-Time Chat → Connects users with peer support or professionals for guided discussions.
- 5) Crisis Detection & Alert System → Prompts self-care tips or emergency support in case of prolonged negative sentiment.

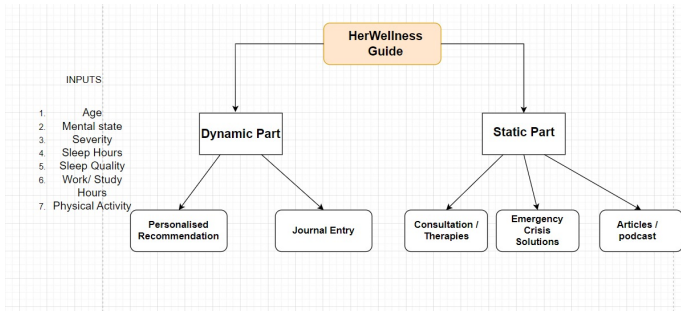


Fig. 2. Flowchart

By combining machine learning, real-time support, and personalized recommendations, the Women's Wellness Guide aims to create a safe, accessible, and stigma-free environment for women to track and enhance their mental well-being.

#### IV. EXPERIMENTAL RESULTS

The Proposed Women's Wellness Health Web Application has been implemented using Machine Learning technology.

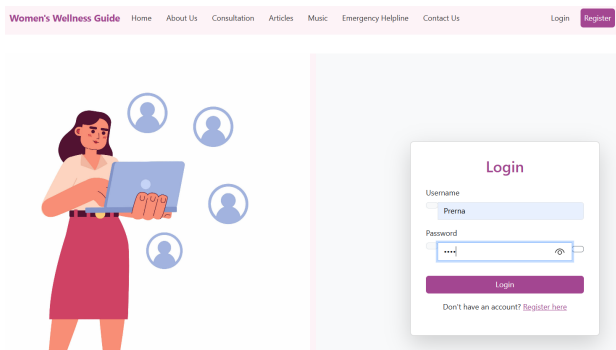


Fig. 3. Login Page

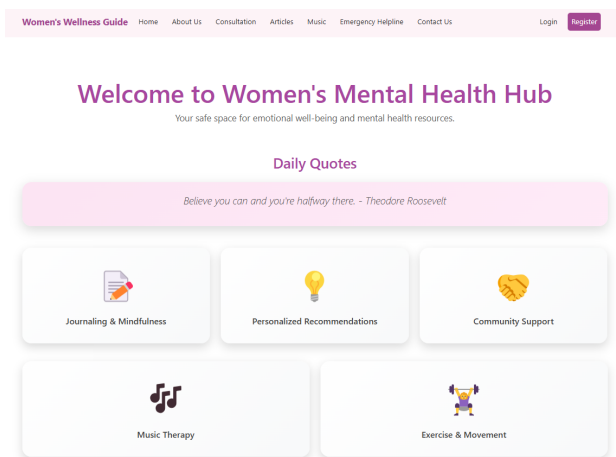


Fig. 4. Home Page

Figure 2 and 3 shows user's first login with username and password and displays home page which contains five tabs with different functionalities.

### Women's Mental Health Application

Select your age group:

Fig. 5. Age Selection

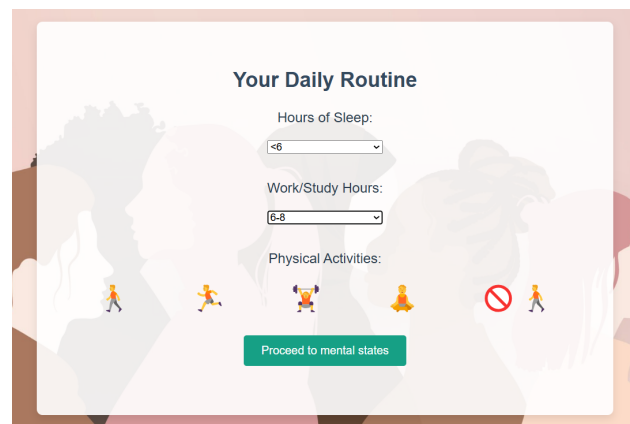


Fig. 6. Daily Routine Selection

Personalized recommendation tab where users input their age as in figure 4 and in figure 5 user will enter their sleep hours, work/study hours and physical activity. Users choose their mental state based on their symptoms as in figure 6. Based on the chosen mental state user needs to answer some questions to calculate severity as in figure 7.

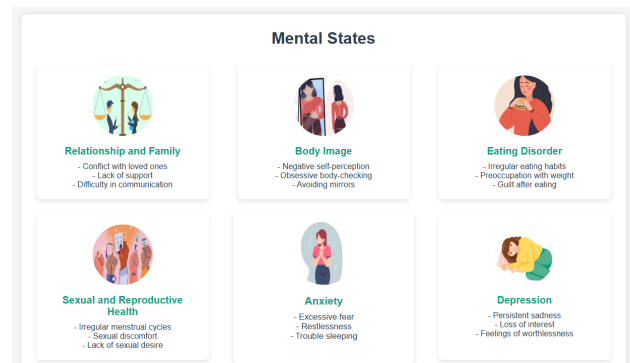


Fig. 7. Mental State Selection

The user begins by logging in with their username and password. After logging in, they are directed to the homepage,

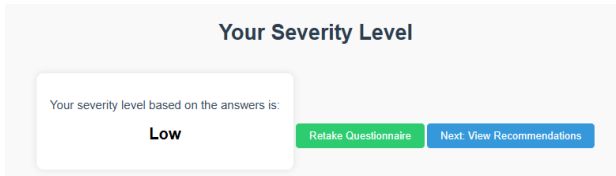


Fig. 8. Severity Level

which consists of five sections. When the user selects the "Personalized" section, they are taken to a page displaying various mental health conditions. The user chooses a condition based on their symptoms and provides additional details such as age, exercise habits, sleep duration, and working hours. Next, they complete a questionnaire. Based on their responses, the system evaluates the severity of their condition. Finally, personalized recommendations are provided based on the severity level and the user's previously entered information.

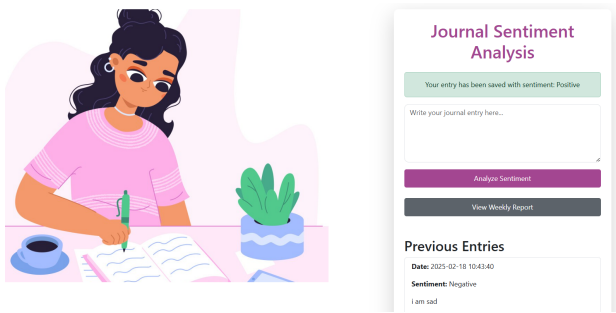


Fig. 9. Journal Entries with Sentiment

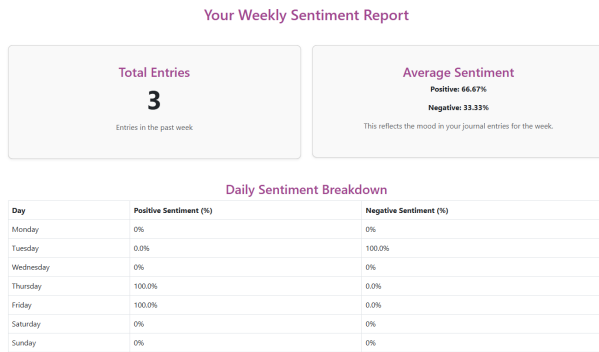


Fig. 10. Weekly Sentiment Analysis

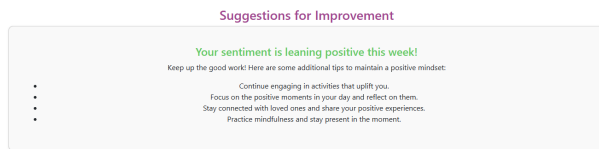


Fig. 11. Suggestions

The Journal Entry section allows users to record their daily thoughts and experiences. For current week, the system an-

## Sentiment Distribution for This Week

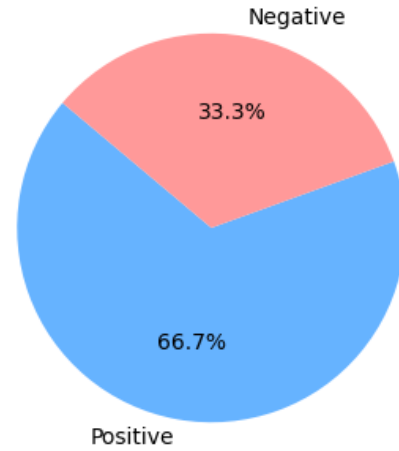


Fig. 12. Sentiment Distribution

id	username	email	birthdate	password
1	Prerna	mumbalkarprerna@gmail.com	2003-05-24	pbkdf2:sha256:68000058bfc1r11100qddx5685df56daebdaf4c7da3f456
2	Janhavi	janhavi.mugallikar@gmail.com	2003-08-24	pbkdf2:sha256:68000058bfc1r11100qddx5685df56daebdaf4c7da3f456
3	Tanuja	tanuja@gmail.com	2003-06-11	pbkdf2:sha256:68000058bfc1r11100qddx5685df56daebdaf4c7da3f456

Fig. 13. User Database

alyzes their journal entries to assess overall sentiment. A graphical representation of their weekly emotional trends is displayed, along with recommendations based on the sentiment analysis.

id	content
1	gAAAAABntGrhR3Z00KobT2BxofdcM7SA3kydSHKvcl62mzrxbwQC0hIA7R3EKlyRVI2T9xrG047H4z2bJq8QcTPJk1uq---
2	gAAAAABnt1HVEPRK1KamzdmEXPUerTg18Vb0rk6xLYDgheagkR0S21FpaBTV5SHHf6CEVJ3GgML75LowdCy_Ag8n5-XepoSUm77-XR51x681j5
3	gAAAAABnt2yr59w6jCuWdZCFx42npkq_cM4m0e95Uf-6u42Pe0xby6d6f9AFN0BCE75FjK_A89h-XCTVqurvjGrNY-P95FRQly6dTG147r0
4	gAAAAABnt2zvRv1TKdFPAU7b1VYV56_Zoqu026G0AF0vFh0CFg8kHd0p3gU2XSL17P6BdWtPS1HwUp-PG8hWKNH1218-ARQ5jPPJkryd
5	gAAAAABnt2zj7z8DM_y5W-HQ1xaluhnaoCMBA25kav0x0P77h8pWGP7G_37jdtV2B1F3GQKCT-QsCU4WAbBtsm0ptj09EQ---
6	gAAAAABnt05ARTD21V0XQhpzQ0K7av1HT3cLEK0XutJ739uQ0B8esP-thdCL3BP106OKP5L1F2AE1A3E81G1ZVT9yortJal6URVxq0urr

Fig. 14. Encrypted Journal Entries Database

## V. CONCLUSION

Understanding women's mental health across different age groups is crucial, as their challenges and needs evolve over time. By integrating data analysis, personalized recommendations, peer support, and technology, this approach provides comprehensive and effective mental health resources tailored to individual experiences. Sentiment analysis of journal entries helps identify emotional patterns, deepening insights into age-specific mental health issues. The goal is not only to improve individual well-being but also to drive broader societal change in the perception and support of women's mental health.

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