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# AI-Driven Platform for Mental Health Prediction and Support

Aarti Agarkar[1], Divya Mahajan[2], Himaja Pujari[3], Kashish Meshram[4] and Meenal Bharsakle[5]
[1-5]Vishwakarma Institute of Technology/Computer Engineering, Pune, India
Email: {aarti.agarkar, divya.mahajan21, himaja.pujari21, kashish.meshram21, meenal.bharsakle21}@vit.edu

***Abstract*—Mental health is a critical aspect of overall well-being, yet early detection and continuous monitoring remain challenges in providing effective care. This project addresses these gaps by developing an AI Mental Health Prediction and Support designed to predict mental health challenges, monitor progress, and offer personalized support. The proposed system integrates advanced machine learning techniques, natural language processing, and diary analysis to deliver tailored insights. By enabling proactive engagement and tracking mental health trends, the platform empowers users to manage their well-being while offering therapists valuable data for enhanced treatment. This solution prioritizes user privacy, scalability, and compliance with data protection regulations, setting a foundation for the future of digital mental health support. Logistic Regression achieved accuracy of 76.32%, which suggests it as the best algorithm for prediction.**

***Index Terms*—AI Mental Health Prediction, Natural Language Processing (NLP), Machine Learning and Mental Health Monitoring.**

## I. INTRODUCTION

In healthcare, mental health has become a crucial area of concern, with its impact extending across personal, social, and professional spheres. The rise in mental health challenges across all age groups has underscored the need for timely intervention and consistent support. However, existing mental health solutions often lack personalization, early detection capabilities, and continuous engagement, leaving significant gaps in care.

This project seeks to close these gaps by utilizing state-of-the-art technologies including artificial intelligence (AI)-driven analytics, machine learning, and natural language processing (NLP). The system is designed to empower users to better understand and manage their mental well-being through three primary features: a) Predictive Modelling: Early detection of mental health challenges based on behavioural and environmental data. b) Diary Analysis: Analysis of user-generated content to track emotional trends and provide actionable insights. By integrating these components, the system provides a proactive and holistic approach to mental health care. Unlike traditional self-assessment tools, this AI-based platform offers continuous monitoring, enabling users to reflect on their mental health journey and take informed actions. Additionally, therapists can benefit from data-driven insights to tailor interventions, improving the overall quality of care.

Automated QA systems also contribute to text summarization by identifying key points in a passage and creating questions that address these points. This process helps in generating concise summaries that capture the essence of the text, making it easier for users to understand the main ideas without reading the entire passage.

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With its scalable and user-friendly design, the system aims to revolutionize mental health support, particularly in academic and professional settings, where accessibility and engagement are crucial.
In essence, this project represents a step forward in digital mental health innovation, bridging the gap between traditional therapy and modern, AI-driven solutions.

## II. Literature Review

Jyoti Agarwal, Shaurya Bhatnagar and Ojasvi Rajeev Sharma aimed to discuss the extent of anxiety, and its effects as observed in engineering students in universities. Among 127 engineering students the questions were distributed, as a result, anxiety level was measured, and its causes along with effects were also identified, a series of statistical reliability and validity tests were performed [1].
Aditi Singh et, al. investigated to determine the mental health state from a text message. A variety of supervised classifier techniques were thoroughly examined, together with natural language processing (NLP). With a 93 percent accuracy rate, the suggested model was demonstrated to be efficient [2].
Using online text data, Xuhai Xu, Yuanzhe Dong and Bingsheng Yao conducted a thorough assessment of several LLMs on a range of mental health prediction tasks, such as Alpaca, Alpaca-LoRA, GPT-3.5, FLAN-T5 and GPT-4. Also conducted a broad range of experiments, covering zero-shot prompting, few-shot prompting, and instruction fine-tuning [3].
Sheikh Afaan Farooq, Iqra Altaf Gillani and Wajid Ali, suggested a machine learning-based method that uses a response-based classifier and a brief questionnaire to identify and predict the early onset of depression in a person undergoing screening.
The questionnaire used in this approach has been designed strictly based on the Diagnostic and Statistical Manual of Mental Disorders [4].
The study by Ali Sorourkhan Alireza Pourkeyvan, and Ramin Safa, investigates how user-generated data can predict symptoms of mental disorders using social media and language models that have already been trained. It compares four different BERT models of Hugging Face with standard machine learning techniques used in automatic depression diagnosis in recent literature [5].
The study looks at the various factors affecting mental health service utilization among college students in California. It emphasizes that despite the availability of mental health services, a sizable percentage of students endure severe psychological anguish and do not seek them out.
Key factors influencing service usage include supportive campus environments, formal networks of mental health clinics, and students' coping skills [6].
The paper reviews the application of artificial intelligence tools in detecting anxiety and depression, which are significant contributors to suicidal ideation in adolescents. It investigates several AI approaches, such as deep learning and machine learning models for analysing biological, behavioural, and linguistic markers. The study identifies the advantages of AI in overcoming limitations of traditional screening methods and suggests integrating multimodal data for more effective early detection and intervention [7].
The application of machine learning (ML) approaches for the detection, prediction, and monitoring of mental stress and related diseases such as depression and anxiety is highlighted in this scoping review. It identifies Support Vector Machines, Neural Networks, and Random Forests as the most effective models. Physiological data (e.g., heart rate, skin response) and advanced preprocessing techniques are central to improving ML outcomes [8].
The study uses ML algorithms to predict anxiety, depression, and stress using data collected via the DASS-21 questionnaire. Random Forest emerged as the most accurate model. It emphasizes handling imbalanced datasets and fine-tuning models for better specificity and overall performance [9].
This paper explores AI tools, including ML and deep learning (DL), for mood analysis, depression detection, and suicide risk management.
It reviews AI's potential in analysing facial features, behaviour, and other indicators in real-time, suggesting its utility in mitigating suicide risks and improving mental health outcomes [10].
Other papers on AI-based mental health prediction and related topics, including [11], [12], [13], [14], [15] and [16] were reviewed to highlight the advancements in integrating AI into personalized mental health care.

## III. Methodology

Fig. 1 and Fig. 2 show the system architecture and use case diagram, respectively, illustrating the interactions between users, app, and the AI Analyzer System.

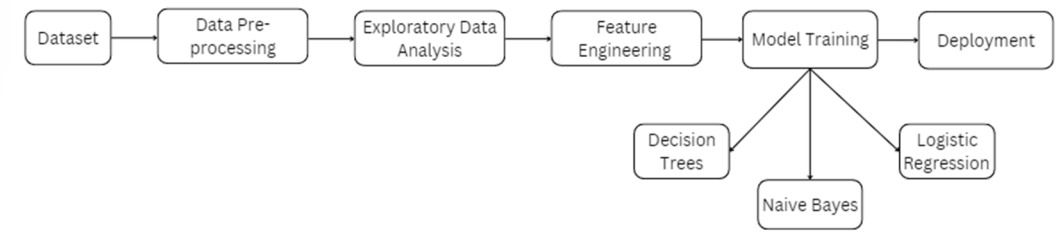


Figure 1. System Architecture


Figure 2. Use Case Diagram

A multi-layered application is designed to provide users with information about their mental health.
Users interact directly with the front-end built using React. These devices play a key role in connectivity, providing users with a single point of access to daily records, viewing mental health records, and providing personalized information.
The main role of the React front-end is to collect diary records and communicate with the back-end via RESTful API to process it. It uses charting libraries (Chart.js) to visualize user data. The Flask backend exposes various API endpoints that interact with the React frontend. It also incorporates machine learning models for text analysis to store user information and interacting with data storage.
The model is a classifier model that processes text, determines mood, and classifies users' mental health using various techniques.
The results of this analysis are then sent to the Flask backend for storage and then returned from the frontend. The system is implemented in the Flask backend to manage user registration, login, and access control. The JWT validator interacts with the React frontend during login and validates the token on every API request for security. This application allows users and their therapists to easily understand patient's progress and identify patterns in their brains.

## IV. RESULT

The web application comprises five main pages, including a Login/Authorization page (Fig, 3 and Fig. 4) and a Dashboard (Fig. 5). Upon signing in, users can create diary entries (Fig. 6), which will be analyzed by a machine learning model.
The generated insights will contribute to a personalized user analysis. Additionally, users can browse and view nearby therapists (Fig. 7), and upon initiating a consultation, the user's data will be securely shared with the selected therapist.

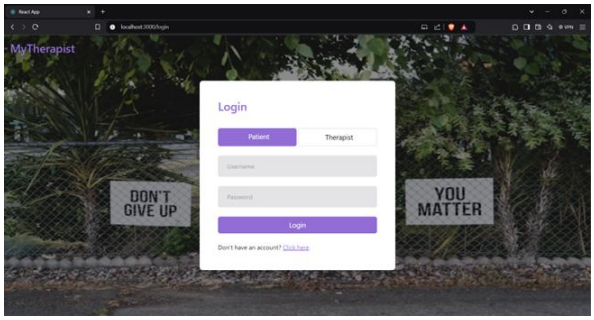


Figure 3. User Login

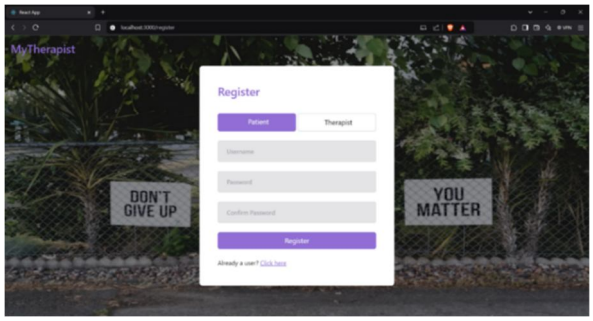


Figure 4. User Registration

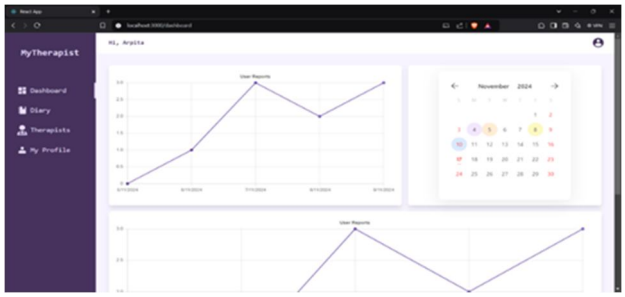


Figure 5. User Dashboard

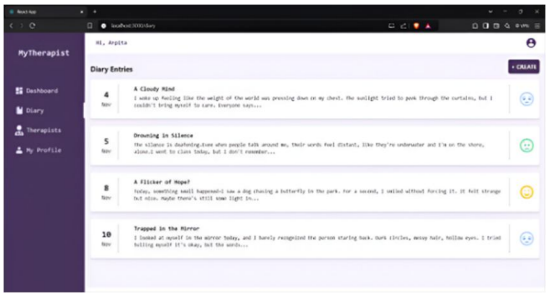


Figure 6. Diary Entries

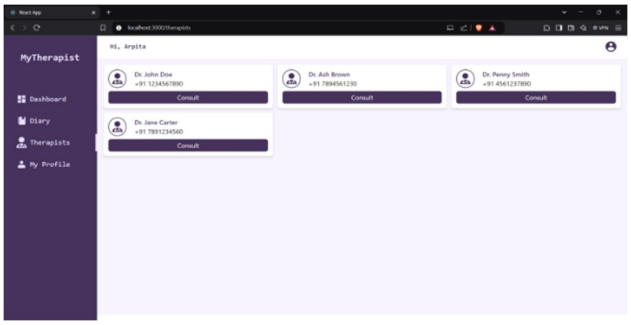


Figure 7. View Therapists and Consultation

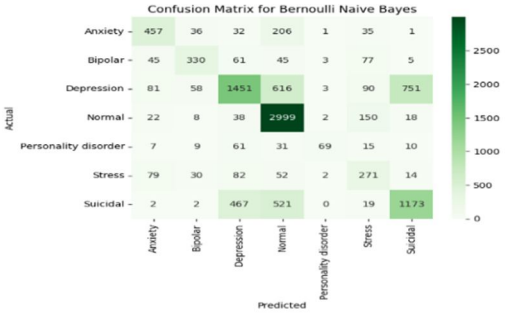


Figure 8. Confusion Matrix for Bernoulli Naïve Bayes

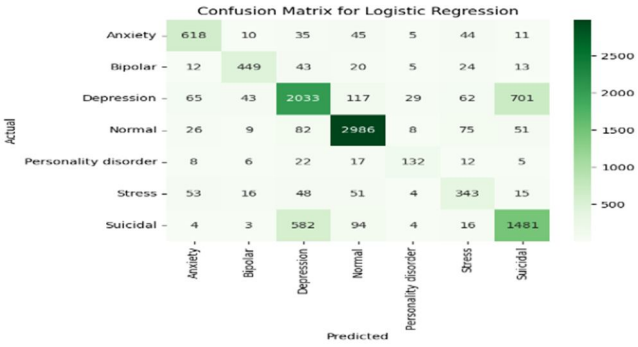


Figure 9. Confusion Matrix for Logistic Regression

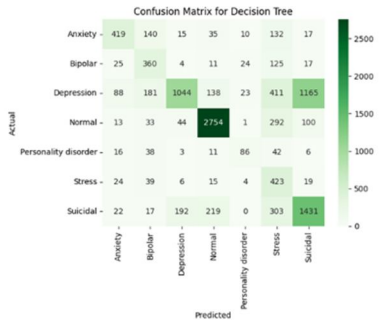


Figure 10. Confusion Matrix for Decision Tree

The machine learning models used for analyzing mood data were evaluated for their accuracy to determine the most suitable approach for the platform. Logistic Regression emerged as the best-performing model, achieving an accuracy of 76.32% (Fig. 9), indicating its effectiveness in capturing patterns within user entries and providing reliable mood predictions. Bernoulli Naive Bayes achieved a moderate accuracy of 64.06% (Fig. 8), reflecting partial alignment with the data structure due to its assumptions of feature independence and binary inputs. The Decision Tree model, with an accuracy of 61.85% (Fig. 10), exhibited the lowest performance, likely due to its sensitivity to noise and a tendency to overfit the training data. Given these results, Logistic Regression

was selected as the primary model for mood analysis, ensuring accurate and consistent outcomes for users. These findings underline the robustness of the data analytics pipeline and offer opportunities for further refinement using ensemble methods or advanced.

## V. Conclusions

In conclusion, this project successfully addresses the need for a digital platform that can analyze users' diary entries to support mental health monitoring and therapeutic interventions. By leveraging AI-driven sentiment and keyword analysis, the system provides valuable insights into users' emotional states and behavioral trends, enabling therapists to offer more personalized and effective treatment. Throughout the project, we developed and implemented four core functionalities: user authentication, diary entry submission and analysis, therapist profile viewing, and session management. These features work together to create a seamless experience for users and therapists, prioritizing user privacy, data security, and accessibility. With the ability to track changes over time, the platform offers users a structured way to reflect on their mental health journey.

## Future Scope

The AI Mental Health Prediction and Support has significant potential for future enhancements that can broaden its scope and impact. Refining the AI models to better interpret complex and nuanced emotions while improving sentiment and keyword analysis is a key area of focus. The highest accuracy achieved is 76.32% with use of logistic regression. Enduring trend analysis can be expanded to identify seasonal or recurring mental health patterns and predict potential crises using advanced analytics. Incorporating additional resources such as tailored coping strategies can enhance the platform's utility for users. Feedback from users and therapists will be vital to making the system more user-friendly.

## Acknowledgment

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