An AI-Enabled Framework for Mood Analysis and Mental Health Support Using User Interaction Data

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Abstract - The prevalence of mental health challenges such as anxiety, depression, and stress is steadily increasing, yet traditional diagnostic methods often remain limited in terms of accessibility, personalization, and the ability to provide real-time insights. To address these gaps, an AI-driven mental health diagnostic platform, has been developed to offer a more effective, data-centric solution. By leveraging advanced machine learning algorithms and behavioral analytics, this platform assesses users' mental well-being with precision and responsiveness. The platform integrates mood pattern analysis, user interaction monitoring, and self-reported data to deliver personalized diagnostics and tailored mental health recommendations. Through actionable insights, coping strategies, and curated mental health resources, it empowers users to better understand and manage their mental health proactively. Designed for accessibility and ease of use, this framework represents a significant step toward redefining mental health care with a user-centric, real-time, and technology-enabled approach.

Key Words: Mental Health Diagnostics, Artificial Intelligence, Behavioral Analytics, Mood Pattern Analysis, Personalized Recommendations,

1.INTRODUCTION

Mental health is a critical yet frequently overlooked aspect of human well-being. In recent years, particularly following the COVID-19 pandemic, the global incidence of mental health issues such as stress, anxiety, and depression has escalated significantly. Despite this growing concern, traditional mental health care systems remain constrained by persistent challenges including social stigma, high treatment costs, limited geographic access, and insufficient infrastructure. These barriers are especially pronounced among vulnerable groups such as students, young professionals, and individuals living in remote or underserved areas. Furthermore, conventional mental health services tend to adopt a reactive approach, often requiring individuals to recognize their own distress, seek professional help, and navigate complex appointment systems—an expectation that is unrealistic for many experiencing emotional turmoil.

The rise of digital lifestyles and the decline of face-to-face social interactions have further compounded the issue, making emotional well-being an increasingly pressing health frontier. While several mobile applications and AI-powered tools have emerged in response, many existing solutions remain fragmented, offering isolated features like journaling, chatbots, or emergency contacts without seamless integration. These disjointed platforms often fail to promote sustained user engagement or provide holistic mental health support. Moreover, the lack of real-time mood tracking and proactive self-assessment tools limits early intervention opportunities, ultimately leaving users underserved.

In response to these challenges, the framework has been developed as a comprehensive, AI-driven mental health self-care platform aimed at bridging the gap between emotional distress and timely support. The primary objective of this work is to offer an accessible, user-friendly, and interactive space where individuals can monitor their mental well-being, engage in daily and weekly self-assessments, and receive empathetic conversational support without the barriers typically associated with formal mental health services.

The project is designed to address the limitations of current systems through the following core features:

- **Integrated Mental Health Assessments:** Regular mood tracking and weekly surveys based on clinically inspired questionnaires provide users with personalized insights into their emotional patterns.

- **AI-Powered Conversational Support:** A Landbot-based chatbot facilitates real-time, goal-oriented interactions, offering a comforting and non-judgmental digital presence.

- **Emergency Resource Accessibility:** Immediate access to verified national and international mental health helplines ensures users can seek professional help when needed.

- **Community Engagement:** An anonymous discussion forum fosters peer support and shared healing experiences.

- **Secure and Private Infrastructure:** All user data is securely stored and anonymized, ensuring confidentiality and trust.

2. RELATED WORK

Mental health applications (MHAs) represent an innovative approach to improving psychological well-being by leveraging technology for accessible, user-friendly interventions. These applications typically focus on areas such as stress management, anxiety reduction, mood tracking, therapy facilitation, and psychoeducation. Many employ evidence-based techniques, including cognitive behavioral therapy (CBT), mindfulness practices, and behavioral tracking, which are supported by research showing their efficacy in enhancing mental health

outcomes MHAs offer features such as daily mood journaling, guided meditation exercises, cognitive restructuring activities, and even connections to licensed therapists, making them highly versatile [1].

The study investigates how AI algorithms can be combined with wearable and mobile sensors to monitor mental health indicators like stress, anxiety, and depression in real-time. The research utilizes data from various activities, skin conductance, and heart rate variability to predict mental health states. Several well-known algorithms are assessed for their performance in predicting mental health disorders from sensor data. These include: Recurrent Neural Networks (RNN): Particularly Long Short-Term Memory (LSTM) networks, which are noted for their reliable long-term prediction capabilities. Convolutional Neural Networks (CNN): Found to perform best with multi-dimensional time-series data, achieving up to 92% accuracy. Random Forests (RF): Effective for real-time applications due to their balance of efficiency and accuracy. Support Vector Machines (SVM): While effective for non-linear relationships, they struggle with large datasets typical of wearable devices. Hybrid Models: The study suggests that combining CNNs and RNNs can enhance prediction accuracy by capturing both spatial and temporal data. Data Augmentation is used to address the challenge of limited labeled data, the integration of Generative Adversarial Networks (GANs) for data augmentation is proposed [2].

Limitations of this system are Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks, require significant processing power, which may limit their use in real-time applications. Support Vector Machines (SVMs) face difficulties in processing the large datasets generated by wearable devices, which can hinder their effectiveness in practical scenarios. The study also highlights a challenge in mental health monitoring due to the scarcity of labeled data, which is crucial for training accurate models. This limitation can affect the overall performance of the AI algorithms. While CNNs show high accuracy, the performance of other algorithms like SVMs can vary significantly based on the nature of the data and the specific mental health indicators being monitored. Although hybrid models combining CNNs and RNNs can improve prediction accuracy, they also introduce complexity in implementation and may require more resources for training and deployment.

The authors in [3] examines the integration of AI in mental healthcare, discussing applications such as personalized care, remote access to therapy, and predictive capabilities using electronic health records and brain imaging. It also addresses the challenges of data collection and AI training, underlining the technology's potential and limitations in improving mental health outcomes.

AI-powered mental health care diagnostics leverage technologies such as machine learning, natural language processing, and deep learning to enhance diagnostic accuracy and personalize treatment. These tools are applied across various psychiatric disorders, including depression, anxiety, and schizophrenia. However, challenges such as data privacy, model bias, and the need for clinical validation persist. Ethical and regulatory considerations are crucial for responsible implementation, emphasizing the importance of collaboration between AI systems and human clinicians in transforming psychiatric practice [4].

AI-powered mental health care diagnostics enhance the accuracy and personalization of care by utilizing advanced algorithms to analyze patient data. These tools facilitate early detection of mental health issues through real-time monitoring and data analysis, allowing for timely interventions. By integrating AI with IoT-enabled wearable devices, mental health professionals can develop personalized treatment plans, including virtual therapists and cognitive behavioral therapy (CBT) interventions, tailored to individual needs, ultimately improving patient outcomes and support [5][6].

AI-powered mental health care diagnostics utilize machine learning techniques to enhance the accuracy of diagnoses and treatment recommendations. The research highlights the application of algorithms like Random Forest, which achieved 98.7% accuracy, to analyze diverse data sources such as electronic health records and neuroimaging. These AI approaches not only improve diagnostic precision but also facilitate personalized treatment suggestions and early relapse detection, ultimately promoting proactive management of mental health conditions while addressing ethical considerations like patient privacy and data security [7].

AI-powered mental health care diagnostics leverage machine learning to analyze diverse datasets, including MRI scans, EEG, facial expressions, and social media posts, to enhance the accuracy of diagnosing neuropsychiatric disorders. The integration of AI tools addresses the challenges of subjective assessments by physicians, potentially leading to timely and precise diagnoses. The review highlights the feasibility of these technologies in clinical settings and emphasizes the need for future trials to establish guidelines and improve adaptability for better patient outcomes [8].

The paper [9] presents an AI-powered mental health care diagnostic tool that integrates the Mini-International Neuropsychiatric Interview (M.I.N.I.) with finite state machines for systematic patient information collection. It employs optimized retrieval algorithms and a fine-tuned RoBERTa model for deep semantic matching, achieving a semantic-matching degree of 0.9 and an accuracy of 0.87. This innovative approach enhances diagnostic efficiency and personalizes medical advice, ultimately improving the allocation of medical resources in mental health care.

3. METHODOLOGY

The development of the proposed framework followed a structured and modular approach, prioritizing user accessibility, privacy, and system scalability. The system was designed using a three-tier architecture, as illustrated in Fig. 1.

The presentation layer was developed using HTML, CSS, Bootstrap, and JavaScript to offer an intuitive, responsive, and user-friendly interface. The application layer, which handles backend processing, was powered by PHP and was responsible for key functionalities such as survey scoring, mood logging, and session management. The data layer was managed by MySQL, ensuring the secure storage of user data, mood logs, survey results, feedback, and emergency contact information.
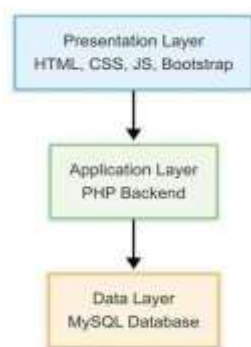
Fig-1: System Architecture

The platform integrates multiple functional modules to support its objectives. It includes a secure user authentication system that manages login and registration with encrypted credentials. The mood tracker allows users to log their mood on a daily basis while receiving real-time feedback based on their inputs. A weekly mental health survey, utilizing a Likert scale, was incorporated to assess emotional wellness. To enhance user engagement and support, an AI-powered chatbot was integrated via Landbot, offering empathetic and goal-oriented interactions. Additionally, a community forum was provided as an anonymous space for peer discussions. The admin dashboard plays a vital role by offering system-wide analytics, user management controls, emergency contact updates, and feedback monitoring.
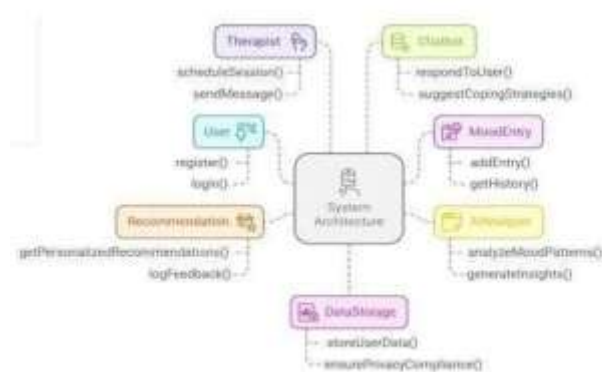

Fig-2: Functional Modules

The methodology involved a combination of data collection, algorithm design, privacy assurance, and comprehensive system testing. Data was primarily collected through self-reported mood logs, weekly surveys, and chatbot interactions. The scoring algorithms were carefully designed to categorize user stress levels as low, moderate, or high, with time-based logic incorporated to prevent survey retakes within a designated cooldown period. The framework emphasized privacy and security through the use of data encryption, secure session management, and anonymization of user records to safeguard confidentiality. Rigorous testing was conducted at multiple levels, including unit testing, integration testing, system testing, and user acceptance testing, to ensure the system's reliability, usability, and smooth interaction across all modules.

4. IMPLEMENTATION

The implementation phase of AI-Enabled Framework for Mood Analysis and Mental Health Support Using User Interaction Data was carried out through a structured transition from system design to a fully functional web-based platform.

This phase focused on developing an intuitive user interface, establishing reliable backend processes, embedding external chatbot services, and ensuring data security and privacy throughout the system.

System Development Environment

The framework was developed and deployed on a local XAMPP server to facilitate controlled testing and demonstration. The use of XAMPP provided an integrated development environment, combining Apache server, MySQL database, and PHP execution support. The project structure was organized within the XAMPP htdocs directory, allowing efficient handling of server-side requests and database interactions.

Technologies Utilized

The front-end of the system was built using HTML5, CSS3, Bootstrap 4, and JavaScript, ensuring a responsive and user-friendly interface across various devices. The backend was implemented using PHP to manage server-side logic, user authentication, session management, survey scoring, and feedback processing. MySQL served as the database management system for securely storing user credentials, mood logs, survey results, chatbot session data, and feedback submissions. The AI-powered chatbot was integrated using Landbot via an iframe, which enabled real-time conversational support without the need for in-house natural language processing development. Chart.js was employed in the admin dashboard to visually present user engagement trends and survey statistics.

Module-Wise Implementation

A. User Authentication Module: The authentication module facilitated secure user registration and login. Password encryption and session-based validation were incorporated to ensure secure access to user-specific data and functionalities. Separate session management was implemented for user and admin accounts to prevent unauthorized access to restricted areas.

B. Mood Tracker Module: The mood tracker enabled users to log their mood daily using a simple and intuitive selection interface. Each entry was time-stamped and stored in the database, contributing to a longitudinal record of the user's emotional state. These records were later visualized for both users and administrators to identify mood patterns over time.

C. Mental Health Survey Module: A weekly mental health survey, consisting of ten Likert-scale questions, was implemented to assess the user's emotional well-being. Upon survey completion, the system calculated the cumulative score and classified the user's stress level into low, moderate, or high categories. A cooldown mechanism was introduced to restrict survey retakes within a seven-day interval, ensuring the temporal validity of assessments.

D. Chatbot Integration: The chatbot, designed using Landbot, was seamlessly embedded within the web application. It followed a pre-defined decision tree structure, guiding users through empathetic, goal-oriented conversations related to stress, anxiety, and coping mechanisms. This chatbot offered instant,

human-like interaction, contributing to user engagement and emotional support.

E. Admin Dashboard and Analytics: The administrator panel provided system-level controls, including the ability to manage emergency contact listings and monitor user activity. Chart.js was utilized to generate dynamic visualizations of survey results and mood trends, offering insights into user engagement and system utilization patterns.

F. Community Forum and Feedback Module: An anonymous community forum was incorporated to encourage peer-to-peer discussions, promoting shared experiences and emotional support among users. Additionally, a feedback system allowed users to submit comments and suggestions, which were accessible to the administrator for continuous system improvement.

G. Emergency Contact Management: The framework provided an emergency contact module, where administrators could update national and international mental health helpline numbers. These resources were made readily accessible to users in case of urgent psychological needs.

5. RESULTS AND DISCUSSION

The AI-Enabled Framework for Mood Analysis and Mental Health Support Using User Interaction Data was successfully deployed on a local XAMPP server and demonstrated effective performance across all core modules. Throughout the testing and evaluation phases, the system consistently processed user inputs in real time with minimal latency, ensuring stable performance across a range of devices. The mental health categorization, derived from survey responses and mood tracking, proved to be accurate, consistent, and reliable in assessing users' emotional wellness.

User feedback highlighted the platform's high level of usability. Users found the proposed framework intuitive, easy to navigate, and visually calming, which contributed to a positive user experience. The integrated AI-powered chatbot provided meaningful, timely, and empathetic support, significantly enhancing user engagement and satisfaction. From a security perspective, the framework adhered to strong data protection practices, incorporating encrypted storage, secure authentication mechanisms, and strict compliance with privacy guidelines to safeguard user information.

When compared with existing mental health applications, the proposed framework demonstrated clear advantages. Unlike many traditional, fragmented solutions, this system provided a comprehensive, all-in-one platform that seamlessly integrated mood tracking, real-time conversational support, peer engagement through community forums, and detailed admin-level analytics. Unlike static systems that offer generic advice, the framework delivered personalized, adaptive feedback and proactive emotional support, setting it apart from conventional approaches.

6. CONCLUSION

The developed AI-Enabled Framework for Mood Analysis and Mental Health Support serves as a comprehensive digital platform for promoting mental wellness through self-assessment, AI-powered conversational support, and peer-driven community engagement. The system's modular design enabled the seamless integration of core features such as mood tracking, weekly mental health surveys, empathetic chatbot interactions, access to emergency support, and anonymous community forums. The framework provided a secure, user-friendly interface for individuals and an efficient, data-driven control panel for administrators, fostering both accessibility and effective system management.

The successful deployment of the framework on a local XAMPP server demonstrated the practicality of utilizing open-source technologies to deliver meaningful mental health support, particularly in resource-constrained environments. All functional modules performed reliably during rigorous manual testing, validating both the stability and usability of the platform across user and administrative workflows. The results emphasize that carefully designed, user-centric digital tools can foster emotional awareness and encourage proactive mental health management outside of traditional clinical settings.

Looking forward, several enhancements are planned to expand the platform's capabilities and impact. Future developments will include the integration of multimodal emotion recognition using voice analysis, facial expression tracking, and biometric data such as heart rate variability and sleep patterns to achieve deeper diagnostic accuracy and contextual responsiveness. Additionally, a therapist-facing dashboard will be introduced to support secure collaboration, remote monitoring, and real-time professional intervention, effectively bridging self-care with clinical oversight.

To further improve accessibility, offline functionality and a low-data mode are under development, targeting users in low-connectivity or rural regions. Integration with Electronic Health Records (EHR) is also envisioned to facilitate holistic, clinically aligned mental health care. Multilingual support and cultural customization will be prioritized to promote inclusivity and ensure relevance across diverse global populations. An intelligent emergency response system is being considered to detect signs of severe mental health crises and automatically alert designated caregivers or emergency contacts.

Finally, the inclusion of gamified mental fitness modules and personalized wellness challenges is planned to encourage daily engagement, habit formation, and the development of long-term emotional resilience. These future enhancements aim to position the proposed framework as a comprehensive, intelligent, and inclusive solution for proactive, accessible, and sustainable mental health management.

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