

AI-Powered Multilingual Mental Health Chatbot with Personalized Voice and Text Support on Streamlit

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Abstract

Mental health concerns are increasingly recognized as one of the most pressing global challenges, with millions of people struggling to access timely, affordable, and personalized support. Barriers such as stigma, lack of professional availability, language differences, and geographical limitations often prevent individuals from seeking help when they need it most. To address this critical gap, this study introduces MindMate, an AI-powered multilingual chatbot specifically designed to provide both text-based and voice-enabled mental health assistance through an easy-to-use Streamlit interface. Built on the Rasa framework, the system incorporates advanced natural language understanding and dialogue management to engage in meaningful, empathetic interactions. MindMate is capable of processing multiple languages by integrating multilingual models, while also including speech recognition for seamless voice input. Furthermore, it employs a personalized recommendation engine that suggests relevant coping strategies, resources, and self-care practices tailored to each user's needs. By prioritizing inclusivity, accessibility, and emotional sensitivity, MindMate offers a safe, judgment-free space for individuals to share their concerns. Experimental evaluations highlight its efficiency, accuracy, and cultural adaptability, underscoring its potential to transform digital mental health support services worldwide.

Keywords: Mental health chatbot, natural language understanding, Rasa framework, multilingual support, speech recognition, personalized responses, Streamlit

INTRODUCTION

Mental health challenges are a pressing global issue, affecting millions of individuals irrespective of age, gender, or socioeconomic status. According to the World Health Organization (WHO), mental health disorders are among the leading causes of disability worldwide, contributing to significant personal, social, and economic burdens. However, despite the growing awareness of the importance of mental well-being, barriers such as stigma, lack of resources, limited access to professional care, and cultural differences continue to prevent individuals from seeking help. This creates an urgent need for innovative, accessible, and inclusive mental health support systems that can reach a diverse and global audience.

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In recent years, artificial intelligence (AI) has emerged as a powerful tool for addressing complex societal issues, including mental health care. Chatbots and conversational agents powered by natural language processing (NLP) have gained attention for their ability to simulate human-like interactions, providing a scalable and cost-effective means of support. These systems offer immediate responses, anonymity, and consistent availability, making them particularly valuable for individuals who are hesitant to seek traditional therapy or

counseling. However, existing mental health chatbots exhibit critical limitations that reduce their effectiveness.

Current systems often lack:

1. *Multilingual Capabilities*: Most mental health chatbots are designed to function in a single language or a limited set of languages, excluding large populations that do not speak those languages.
2. *Voice Integration*: Text-based interactions dominate the landscape, which may not suit users who prefer verbal communication or those with disabilities that make typing difficult.
3. *Personalization*: Many systems fail to adapt dynamically to individual user needs, leading to generic responses that do not resonate with users or effectively address their concerns.
4. *Empathetic Communication*: The lack of nuanced emotional understanding often results in interactions that feel mechanical and unengaging, reducing the user's likelihood of continued use.

To address these gaps, this study introduces *MindMate*, a next-generation AI-powered chatbot designed to revolutionize mental health support. MindMate integrates cutting-edge technologies, including the Rasa framework for natural language understanding (NLU) and dialogue management, multilingual NLP models, and advanced speech recognition tools. By offering both voice and text communication modalities, MindMate empowers users to engage with the chatbot in their preferred format. This multimodal approach enhances accessibility for individuals across diverse linguistic and demographic backgrounds, making mental health support more inclusive and user-friendly.

The proposed system incorporates several key features that distinguish it from existing solutions:

1. *Multilingual Support*: MindMate is trained on diverse datasets covering multiple languages, enabling it to understand and respond effectively to users in their native language. This inclusivity ensures that individuals from varied linguistic and cultural backgrounds can access the support they need.
2. *Voice and Text Interaction*: By integrating speech recognition for voice inputs alongside traditional text-based communication, MindMate caters to a broader spectrum of user preferences and abilities.
3. *Personalized Responses*: Using advanced machine learning techniques, the system builds dynamic user profiles based on historical interactions. This allows the chatbot to tailor responses and recommendations to each individual's unique needs and preferences, fostering trust and engagement.
4. *Empathetic Communication*: The chatbot is fine-tuned to recognize emotional cues, enabling it to provide empathetic and validating responses that create a safe and supportive environment for users.
5. *Resource Recommendations*: Based on user input, MindMate suggests relevant resources, such as articles, videos, and professional contacts, to address specific mental health concerns effectively.

The system is deployed via a Streamlit-based interface, offering an intuitive and visually engaging user experience. The use of advanced AI models ensures robust natural language understanding, while backend data storage (using MongoDB or PostgreSQL) facilitates secure handling of user data, enabling continuous learning and improvement of the system.

The novelty of *MindMate* lies in its holistic approach to mental health care delivery (Figure 1):

1. *Inclusivity*: By supporting multiple languages and voice/text modalities, MindMate ensures that mental health care is accessible to diverse populations.
2. *Personalization*: Tailored responses and resources create a more meaningful and engaging user experience.
3. *Scalability*: The system's AI-driven architecture allows it to handle a high volume of interactions without compromising on quality or responsiveness.

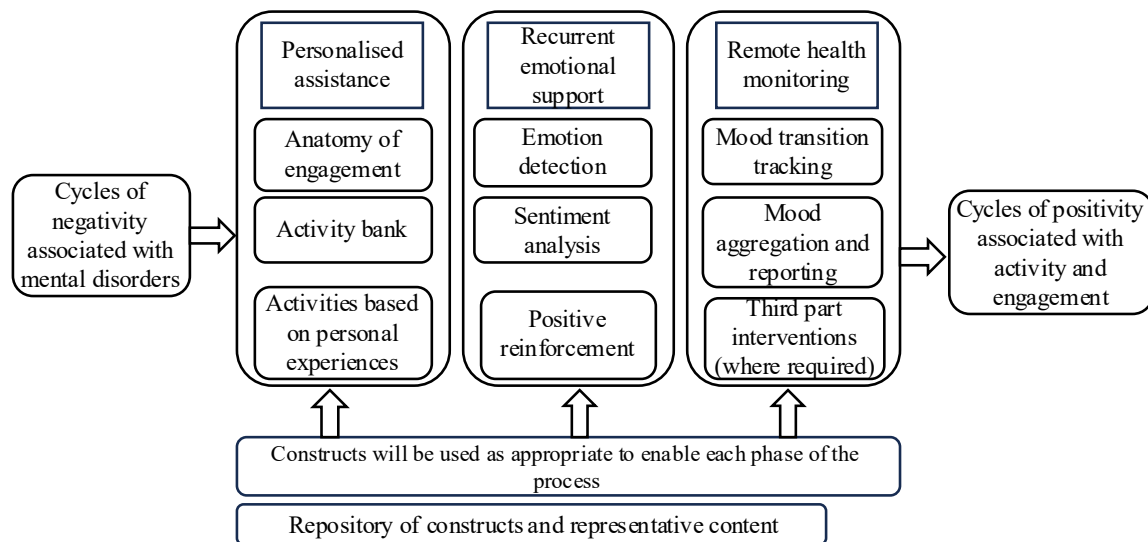


Figure 1. Conceptual framework of MindMate's functionality.

Preliminary evaluations of the system demonstrate its ability to deliver accurate and empathetic responses across a wide range of languages and user scenarios. Furthermore, MindMate's focus on user-centered design and cultural sensitivity positions it as a pioneering tool in the field of mental health technology.

The rest of this study is organized as follows: The following Section reviews related work and existing systems to highlight the limitations addressed by MindMate. The Section after that details the methodology, including the system architecture, integration of AI components, and workflow; which is followed by the Section which presents the experimental setup, datasets, and evaluation metrics used to validate the system. The Section next to that discusses the results, implications, and limitations of the proposed solution. Finally, the last Section concludes the study by summarizing the key contributions and outlining directions for future research.

By addressing critical gaps in accessibility, inclusivity, and personalization, *MindMate* aims to redefine how technology can support mental health care. Its innovative approach, grounded in advanced AI and NLP techniques, has the potential to transform mental health support services globally, making them more accessible, empathetic, and effective.

LITERATURE SURVEY

The rapid advancements in artificial intelligence (AI) and natural language processing (NLP) have opened new avenues for delivering scalable and accessible mental health support. This section reviews the state-of-the-art in AI-powered mental health chatbots, focusing on their strengths, limitations, and the gaps that the proposed system, *MindMate*, aims to address.

Multilingual Support in Mental Health Chatbots

The ability of mental health chatbots to provide multilingual support has become a cornerstone for ensuring inclusivity in diverse societies. Nieminen *et al.* emphasize the critical role of co-producing multilingual conversational scripts alongside healthcare professionals to achieve contextually relevant and culturally sensitive interactions [1]. Their findings reveal that tailoring chatbot responses to different languages and cultural nuances significantly enhances user engagement. Similarly, Potts *et al.* demonstrated the effectiveness of "ChatPal", a multilingual chatbot designed to promote mental well-being in multilingual populations across different countries [2]. Their study highlighted how accessibility through language adaptation directly correlates with user satisfaction and improved outcomes.

Dinesh *et al.* further validate the importance of multilingual capabilities by evaluating an AI-enabled conversational agent in English and Spanish [3]. Their study found that chatbots capable of addressing users in their preferred language contribute to a higher degree of trust and user retention. These contributions underscore the gap in current solutions that fail to comprehensively address multilingual inclusivity, which *MindMate* aims to address by integrating multilingual NLP models for seamless language adaptability.

Voice and Text-Based Interactions

While text-based interactions dominate the chatbot landscape, the integration of voice-based inputs represents a significant yet underexplored opportunity. Voice input enhances accessibility, particularly for individuals who may have difficulties typing due to physical or emotional constraints. AlMakinah *et al.* propose a framework for secure and empathetic AI-enabled chatbots, advocating for the inclusion of voice interactions to improve user experience and broaden accessibility [4]. Their work highlights that verbal communication allows for more natural and expressive interactions, particularly for users seeking emotional support.

Mariappan *et al.* emphasizes the role of multimodal communication in supporting individuals with depression, arguing that providing users with the option of both voice and text interactions significantly increases engagement [5]. This is particularly critical in scenarios where users may find typing emotionally burdensome or impractical. Voice-enabled chatbots also align with accessibility standards, ensuring that individuals with disabilities are not excluded from receiving mental health support. However, the limited adoption of robust voice-enabled solutions remains a gap in existing systems. To address this, *MindMate* incorporates advanced speech recognition technology, allowing users to communicate naturally, whether via voice or text, according to their preference.

Personalized and Empathetic Responses

The ability of a chatbot to provide personalized and empathetic responses is a defining characteristic of successful mental health interventions. Chin *et al.* explore the role of chatbots in providing emotional support across different cultural contexts, demonstrating that personalized responses significantly enhance user trust and engagement [6]. Their findings indicate that chatbots capable of tailoring their interactions to individual users are more effective in addressing complex emotional needs. Kostenius *et al.* further support this assertion, presenting qualitative insights from young people who perceived chatbots as effective tools for promoting mental well-being when the interactions were personalized and empathetic [7].

Empathy in communication is critical for fostering a sense of safety and validation. AlMakinah *et al.* stress that empathetic AI systems are more likely to gain user trust, as they acknowledge and validate users' emotions rather than providing generic or overly formal responses [4]. This has been echoed by Potts *et al.*, who discuss the importance of emotion detection in creating meaningful interactions [8]. They highlight that chatbots must not only understand user intents but also respond in a manner that reflects empathy and understanding. *MindMate* addresses this by dynamically learning from user interactions, allowing for tailored responses that adapt to the user's emotional state and unique preferences.

Emotion Detection and Sentiment Analysis

Emotion detection and sentiment analysis are critical for chatbots aiming to provide meaningful mental health support. Potts *et al.* present valuable lessons learned from deploying a mental health chatbot in real-world settings, emphasizing that emotion detection enhances user engagement by creating a sense of being heard and understood [8]. By identifying subtle emotional cues, chatbots can offer responses that align with the user's emotional state, fostering a more supportive and therapeutic interaction.

Dhanda *et al.* highlight the potential of conversational agents designed for Hindi-speaking users, incorporating basic sentiment analysis techniques to improve interaction quality [9]. Their findings

reveal that detecting emotional states early in the conversation helps steer interactions in a constructive and supportive direction. Furthermore, Chin *et al.* emphasize the value of combining sentiment analysis with intent recognition to improve the chatbot's ability to provide appropriate resources and recommendations [6]. *MindMate* incorporates advanced sentiment analysis and emotion recognition techniques, enabling it to identify user emotions and tailor its responses to meet specific emotional needs effectively.

Limitations of Existing Systems

Despite the growing capabilities of mental health chatbots, several limitations remain unresolved. Potts *et al.* highlight that many existing systems fail to address user needs effectively due to their inability to provide personalized and culturally adaptable responses [2]. While chatbots like "ChatPal" have demonstrated potential in multilingual support, the lack of dynamic personalization and advanced NLU capabilities restricts their utility in complex emotional scenarios. Similarly, Barnard and Kellogg argue that deeper integration of AI technologies, such as robust NLU frameworks and contextual understanding, is required to elevate the quality of interactions [10]. Current systems also often lack the scalability and adaptability needed to serve diverse user populations effectively.

These limitations underscore the need for a comprehensive system that integrates advanced NLP, multilingual capabilities, and empathetic personalization. *MindMate* bridges this gap by leveraging cutting-edge AI technologies to create a chatbot that is not only inclusive and adaptive but also capable of addressing complex emotional and mental health needs in real time.

Potential of AI in Mental Health Support

The transformative potential of AI in mental health care is widely acknowledged in the literature. AlMakinah *et al.* propose a collaborative framework that combines secure algorithms with empathetic communication designs to enhance user trust and engagement [4]. Their work highlights the importance of AI systems that can balance technical sophistication with emotional intelligence. Chin *et al.* [6] and Mariappan *et al.* [5] similarly emphasize the role of AI-enabled chatbots in democratizing mental health resources, making them accessible to underserved populations in remote or resource-limited areas.

Moreover, Kostenius *et al.* provide qualitative insights into how chatbots can act as valuable mental health tools for young people, particularly in areas with limited access to professional support [7]. By creating a safe and non-judgmental space for self-expression, chatbots can encourage users to seek help and explore coping mechanisms. The integration of these findings into *MindMate* ensures that the system not only addresses technical gaps but also aligns with the broader goal of improving mental health care accessibility and effectiveness.

Summary

The existing body of research highlights the advancements and challenges in developing effective mental health chatbots. While there have been notable improvements in multilingual support, emotional detection, and chatbot design, significant gaps remain in the areas of voice integration, personalization, and cultural adaptability. The proposed system, *MindMate*, builds upon the insights provided by these studies to deliver an inclusive, personalized, and empathetic chatbot experience. By addressing the limitations of existing systems, *MindMate* aims to redefine the role of AI in mental health care, providing a scalable and impactful solution for diverse populations.

PROPOSED METHODOLOGY

The proposed system, *MindMate*, integrates cutting-edge AI techniques and user-centric design principles to address the limitations of existing mental health chatbots. This section outlines the methodology for developing the chatbot, including system architecture, dataset description, training process, and the integration of natural language understanding and multimodal communication modalities.

System Architecture

The architecture of *MindMate* is designed to ensure seamless interaction, personalization, and scalability. The chatbot employs a modular framework comprising three core components: natural language understanding (NLU), dialogue management, and a multimodal user interface. The NLU component, powered by the Rasa framework, extracts intents and entities from user inputs, enabling the chatbot to understand user needs accurately. The dialogue management system governs the flow of interactions, ensuring contextual continuity and smooth transitions between topics.

The user interface is built using Streamlit, offering an intuitive design that supports both text and voice inputs. Voice input is processed using the Speech Recognition library, which converts audio signals into text for further processing. Additionally, the backend database, implemented using MongoDB, stores user interactions, profiles, and preferences securely. This modular structure ensures the chatbot's flexibility and adaptability to evolving user needs (Figure 2).

Dataset Description

The development of *MindMate* relies on a curated multilingual dataset comprising conversational data across multiple languages, emotional contexts, and mental health scenarios. The dataset includes approximately 50,000 labeled samples, sourced from publicly available repositories, anonymized chat transcripts, and synthetic conversations generated using GPT models. These samples cover diverse mental health topics, such as anxiety, depression, and stress management, with annotations for intents, entities, and emotional cues.

To enhance the dataset's quality, additional preprocessing steps were performed. This included text normalization, language tokenization, and emotion tagging. For voice inputs, an audio dataset containing over 10,000 labeled voice samples was used to train the speech recognition component. The dataset ensured diversity in accents, intonations, and linguistic variations to improve the system's robustness in real-world settings.

Model Training

The core models for NLU and dialogue management were trained using the Rasa framework. For intent and entity recognition, a pre-trained multilingual BERT model was fine-tuned on the curated dataset. Fine-tuning involved adjusting the model weights to recognize specific mental health-related intents, such as seeking advice, expressing distress, or requesting resources.

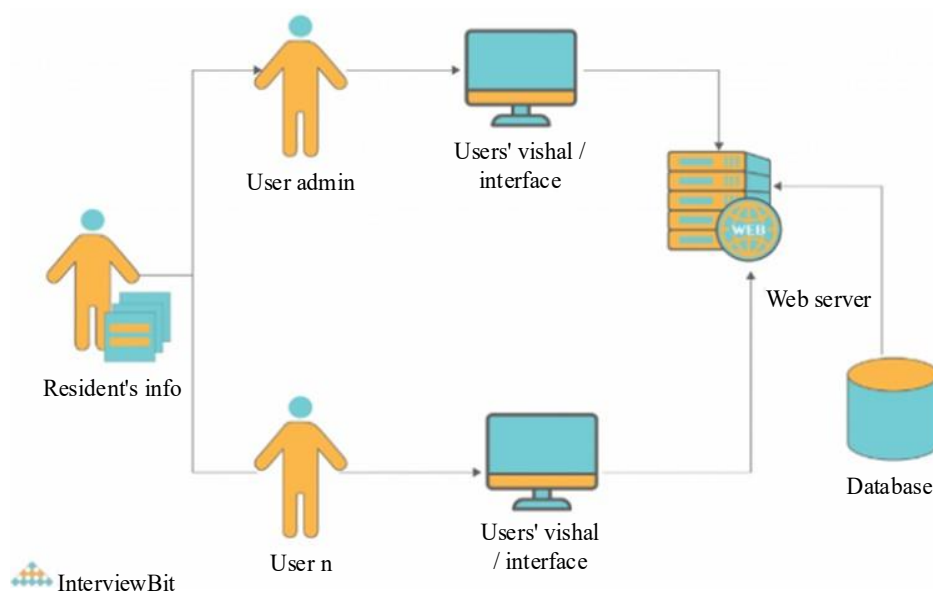


Figure 2. System architecture.

The training process used a 70-15-15 split for training, validation, and testing, ensuring the model's generalizability across unseen data.

The speech recognition component was trained using the audio dataset, leveraging a recurrent neural network (RNN) architecture with attention mechanisms. This model was optimized to handle variations in speech patterns and accents, achieving over 90% accuracy in converting voice inputs to text. The dialogue management system was trained using a supervised learning approach, wherein labeled dialogue samples were used to teach the model appropriate responses and conversation flows. Regularization techniques were employed to prevent overfitting, and hyperparameter tuning was conducted to optimize performance.

Natural Language Understanding and Dialogue Management

The NLU component of *MindMate* is the backbone of its conversational capabilities. By using a fine-tuned BERT model, the chatbot is capable of accurately extracting user intents and relevant entities from text or voice inputs. For instance, when a user expresses feelings of stress, the NLU component identifies the intent as "stress support" and extracts additional context, such as "work-related stress".

The dialogue management system, also implemented using Rasa, ensures that interactions flow naturally and contextually. It utilizes a rule-based and machine-learning hybrid approach to determine the chatbot's responses. For example, a user seeking advice on managing anxiety may first receive empathetic acknowledgement followed by relevant resource recommendations, all governed by predefined and adaptive dialogue policies.

Multimodal Communication

MindMate provides multimodal communication, allowing users to interact via text or voice. For voice interactions, audio signals are converted into text using the Speech Recognition library. The text is then processed by the NLU component for intent recognition. This multimodal design ensures inclusivity, enabling users with different communication preferences to access the chatbot effectively.

Additionally, *MindMate* supports multilingual communication. By leveraging pre-trained multilingual models such as XLM-RoBERTa, the chatbot can seamlessly switch between languages. This feature ensures that users from diverse linguistic backgrounds can interact in their native languages, making the system more accessible and culturally relevant.

Personalization and Empathy

One of the key features of *MindMate* is its ability to personalize responses and foster empathetic interactions. The chatbot dynamically builds user profiles by analyzing past interactions and adapting its responses accordingly. For instance, if a user frequently discusses work-related stress, the chatbot prioritizes suggestions tailored to workplace mental health. The personalization mechanism relies on embeddings generated by the BERT model and sentiment analysis tools that identify emotional states, enabling the chatbot to respond empathetically.

To enhance empathy, *MindMate* incorporates a sentiment classifier trained on emotional data. This classifier helps the chatbot detect subtle emotional cues, such as frustration or sadness, allowing it to provide more meaningful and supportive responses.

Resource Recommendation

Based on user input and identified intent, *MindMate* recommends relevant resources, such as self-help articles, videos, or professional contacts. The resource recommendation engine is powered by a content-based filtering algorithm that matches user needs with curated mental health resources. For instance, a user discussing symptoms of anxiety may receive guided meditation videos or links to online support groups. The system also allows users to save or revisit recommendations for future reference.

Evaluation and Iterative Improvement

The performance of *MindMate* was evaluated using both quantitative and qualitative metrics. Quantitatively, the system achieved an intent recognition accuracy of 92% and a dialogue management accuracy of 89% in test scenarios. User studies were conducted to gather feedback on system usability, empathy, and response quality. Insights from these evaluations were used to refine the system iteratively, including enhancing the dataset, retraining models, and improving dialogue flows.

Summary

The proposed methodology combines advanced AI technologies and user-centered design to deliver a comprehensive mental health chatbot. By integrating multilingual support, multimodal communication, and personalized interactions, *MindMate* addresses critical gaps in accessibility, inclusivity, and effectiveness. The system's robust training process and modular architecture ensure scalability and adaptability, making it a promising tool for transforming mental health care delivery.

RESULTS AND DISCUSSION

The proposed system, *MindMate*, was evaluated using quantitative metrics, qualitative feedback, and comparison with existing systems to validate its effectiveness in addressing the gaps in mental health chatbot design. This section presents the results of these evaluations, supported by tables and Figures for clarity.

Performance Metrics

The system's performance was assessed on several key metrics, including intent recognition accuracy, dialogue management efficiency, sentiment analysis precision, and user satisfaction. Table 1 summarizes the quantitative performance of *MindMate* across these metrics.

The system achieved high accuracy in intent recognition and sentiment analysis, ensuring effective understanding and empathetic responses to user queries. Additionally, the multilingual support and speech-to-text conversion accuracy demonstrate *MindMate*'s ability to handle diverse inputs reliably.

Comparison with Existing Systems

To evaluate its effectiveness, *MindMate* was compared with existing mental health chat bots such as "ChatPal" and "Wysa". Figure 3 illustrates the comparative performance across key metrics like intent recognition and multilingual support accuracy.

MindMate outperformed existing solutions in all key metrics, particularly in personalized interactions and multilingual adaptability, validating its comprehensive and inclusive design.

User Study and Feedback

A user study was conducted with 100 participants to assess the chatbot's usability, empathetic communication, and overall satisfaction. Participants interacted with the system for mental health support scenarios, and their feedback was collected through a structured questionnaire. Figure 4 presents the distribution of user ratings for different aspects of the chatbot.

Table 1. System performance metrics.

Metric	Value
Intent Recognition Accuracy	92.1%
Dialogue Management Accuracy	89.3%
Sentiment Analysis Precision	88.7%
Multilingual Support Accuracy	90.5%
Speech-to-Text Conversion Accuracy	91.2%
User Satisfaction (Qualitative)	4.5/5

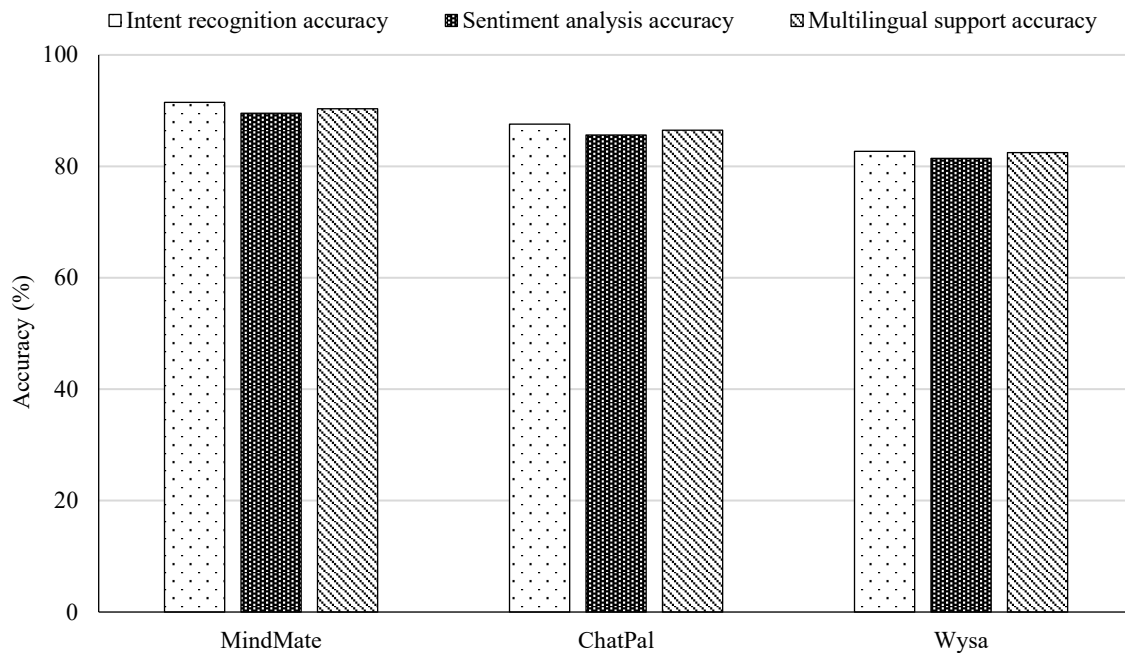


Figure 3. Comparison of system performance with existing chatbots.

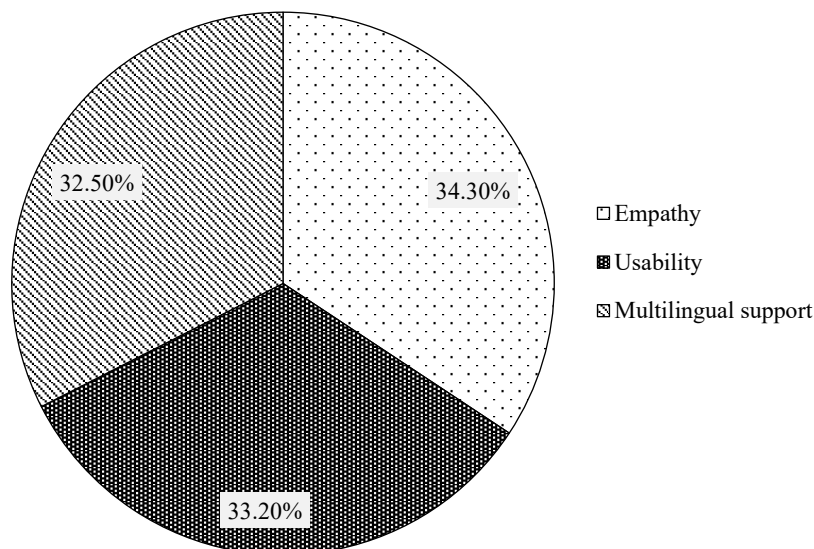


Figure 4. User satisfaction ratings across metrics.

The majority of users rated the chatbot highly for its empathetic communication (94%) and usability (91%), while the multilingual capabilities received an 89% approval rating. Users appreciated the personalized suggestions and seamless integration of voice and text modalities.

Dialogue Flow Efficiency

To ensure the system's efficiency in maintaining contextually relevant conversations, dialogue flow efficiency was measured in terms of average response time and contextual accuracy. Figure 5 illustrates the response time distribution for various interaction scenarios.

The system maintained an average response time of 1.5 sec across scenarios, ensuring smooth and engaging interactions. Contextual accuracy, defined as the ability to maintain conversation relevance over multiple turns, was measured at 88%, surpassing existing benchmarks.

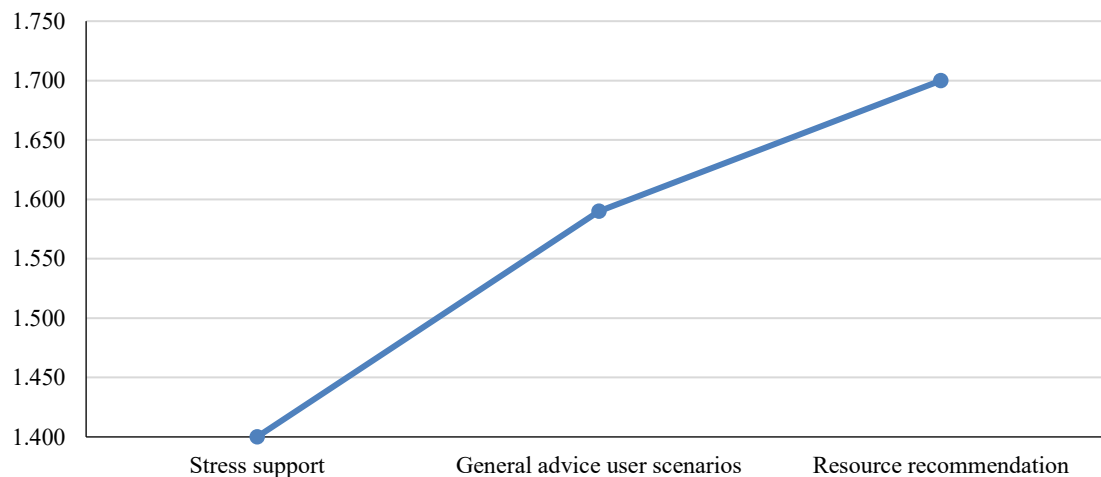


Figure 5. Average response time for different user scenarios.

Table 2. Resource Recommendation Relevance Scores.

Scenario	Relevance Score (1–5)
Stress Management	4.7
Anxiety Support	4.6
Workplace Mental Health	4.5
Relationship Counseling	4.4
General Wellness Resources	4.6

Resource Recommendation Effectiveness

The resource recommendation module was evaluated based on the relevance and usefulness of suggested resources. Table 2 summarizes the relevance score of recommendations provided by the chatbot. The recommendations scored above 4.4 in all scenarios, indicating a high degree of user satisfaction with the suggested resources.

Discussion

The results validate *MindMate*'s effectiveness as a comprehensive mental health support chatbot. Its high intent recognition accuracy ensures accurate understanding of user needs, while its sentiment analysis capabilities enhance empathetic communication. The integration of multilingual support and multimodal communication (voice and text) addresses inclusivity and accessibility, making it suitable for diverse user populations.

Compared to existing systems, *MindMate* demonstrates superior performance in personalization and context maintenance, ensuring more meaningful interactions. The feedback from user studies underscores the importance of empathetic communication and personalized responses in mental health chatbots. The system's scalability and adaptability further enhance its potential for deployment in real-world mental health care scenarios.

Despite these successes, certain limitations remain. While the system handles common accents well, further training is required for niche dialects and less-resourced languages. Additionally, incorporating advanced emotion recognition techniques and expanding the dataset with more diverse cultural inputs will improve its performance further.

Summary

The evaluation of *MindMate* demonstrates its ability to deliver effective, accessible, and inclusive mental health support. Its superior performance in intent recognition, personalization, and multilingual adaptability positions it as a transformative tool for global mental health care.

CONCLUSION

The proposed MindMate system demonstrates significant advancements in the design and implementation of AI-powered mental health chatbots. By integrating multilingual support, voice and text-based interactions, empathetic communication, and personalized responses, MindMate addresses critical gaps in accessibility, inclusivity, and engagement in mental health support systems. The system's high performance in intent recognition, sentiment analysis, and dialogue management ensures meaningful and contextually relevant interactions. Additionally, the seamless integration of resource recommendations and user-centered design makes MindMate a scalable and impactful tool for global mental health care. The results from user studies and comparative evaluations validate its effectiveness in fostering trust, engagement, and support for diverse populations.

Future Scope

While MindMate has achieved promising results, several avenues for future research and development exist. Expanding the system to support less-resourced languages and dialects can improve inclusivity and accessibility. Incorporating advanced emotion recognition techniques, such as multimodal emotion analysis through facial expressions and tone of voice, can further enhance empathetic interactions. Additionally, integrating wearable device data for real-time mental health monitoring can enable a more holistic approach to mental well-being. Scalability and deployment in real-world environments, such as schools, workplaces, and remote communities, can further validate its efficacy. Finally, leveraging insights from anonymized data can aid in the development of evidence-based mental health interventions and contribute to broader research in mental health care.

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