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AI CHATBOT FOR MENTAL HEALTH

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ABSTRACT:

: An AI-powered mental health chatbot is designed to help users detect early signs of mental health issues, provide personalized support, and guide overall wellbeing. It uses empathetic engagement to interact with individuals, making conversations feel natural and supportive. Many individuals face undiagnosed mental health challenges due to stigma and limited access to support. There is a need for an AI driven solution that can identify mental health issues, provide insights into potential causes, and offer personalized recommendations, including professional consultations. This chatbot will empower users to take proactive steps toward mental well-being with accessible, real- time support. Mental health chatbots can help with a variety of mental health issues, including mild anxiety, depression, stress, and addiction. If you're struggling with any of these issues, a mental health chatbot could be a helpful tool for you. They can help you develop emotional well-being and coping strategies in stressful situations. In this way, they can act as a coach, encouraging you to step outside your comfort zone or build helpful habits over time. Using an artificial intelligence chatbot isn't the same as talking to a human therapist face-to-face. AI chatbots in healthcare revolutionize patient care by

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Vol 19, Issue 2, 2025

enhancing triage, support, management, and decisionmaking while addressing ethical considerations and promoting health education.

Keywords – Natural Language Processing, FLASK, Python.

INTRODUCTION

In today's fast-paced world, mental health challenges such as anxiety, depression, stress, and addiction have become increasingly prevalent. Despite this, many individuals continue to face these issues in silence due to societal stigma and limited access to professional support. Recognizing the need for a solution that is both accessible and nonjudgmental, this project introduces an AI-powered mental health chatbot. Designed to empower individuals with real-time, empathetic, and personalized support, this innovative tool offers a proactive approach to improving emotional wellbeing and addressing mental health concerns.

The AI mental health chatbot uses advanced artificial intelligence to engage users in natural, conversational interactions, making them feel heard and understood. Through these interactions, the chatbot can identify early signs of mental health challenges, offering valuable insights into potential causes and personalized recommendations for improvement. This helps users take meaningful steps toward their well-being while maintaining a sense of privacy and security. With 24/7 availability, the chatbot ensures that support is always within reach, bridging the gap between the need for assistance and its accessibility.

Moreover, the chatbot continuously adapts to user needs through machine learning, refining its recommendations based on past interactions. This dynamic learning process ensures that support remains relevant and progressively more effective, encouraging users to actively engage with their mental health journey.

1. LITERATURE REVIEW

1.1 Introduction

Mental health disorders are a growing concern, with barriers like stigma and limited healthcare access preventing timely intervention. AI-powered solutions, including chatbots, digital twins, and symptom checkers, offer promising ways to detect and support mental health conditions. Studies on digital twin models, emotion recognition systems, and chatbot-based interventions highlight their potential in early diagnosis and personalized care. Additionally, research on AI accuracy, usability scales, and virtual humans emphasizes the need for validation and standardization. As AI-driven mental health tools evolve, their integration into healthcare can improve accessibility and early intervention.

3.2 Base paper

The paper "Dialogue System for Early Mental Illness Detection: Toward a Digital Twin Solution" addresses the growing challenges in mental health care, particularly exacerbated by the COVID-19 pandemic, such as stigma, limited accessibility, and resource constraints. To tackle these issues, the paper proposes a conversational AI framework that leverages a digital twin model to detect and classify mental health problems and provide personalized feedback. The solution involves the development of a chatbot system using a pre-trained BERT model, fine-tuned on the E-DAIC dataset, and integrated with a Rasa-based natural language processing (NLP) pipeline for intent classification and conversation management.

The model uses tokenization, feature extraction, and intent classification, managed by Rasa's dialogue flow management policies, achieving a 69% accuracy in detecting mental health issues and a high user acceptability score (SUS of 84.75%). The framework

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Vol 19, Issue 2, 2025

shows promise in complementing clinical diagnosis, improving mental health accessibility, and reducing stigma.

Future work includes expanding the system to cover more mental health disorders like PTSD and generalized anxiety disorder, collaborating with clinical institutions for broader testing, integrating multimodal inputs (voice tone and facial expressions), and enhancing privacy and AI model robustness for better user interaction and outcome prediction

2. SYSTEM MODEL

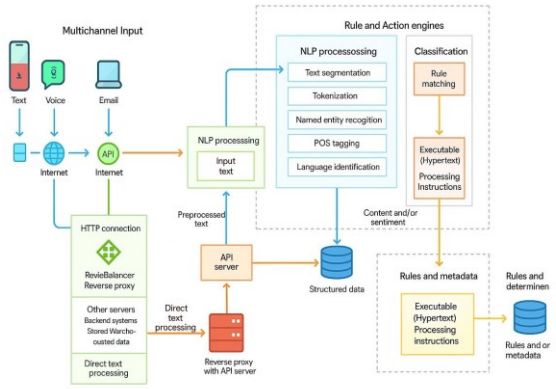

Fig 1: System Architecture

1. Network & Security Layer
   - HTTPS Connection ensures secure communication.
   - Load Balancer manages hardware/software traffic distribution.
   - Client Access involves role-based access control.
   - Secure token-based authentication is used for session management.
2. Virtual Assistant & Query Processing
   - User queries are processed by the virtual assistant.
   - Queries are classified and routed appropriately.
   - The system uses a Kafka cluster for streaming and data distribution.
3. AI/ML Engine
   - NLP Preprocessing: Tokenization, entity recognition, stopword removal, normalization, and lemmatization.
   - Word Vectorization: Embedding models convert text into numerical representations.
   - Language identification: Determines the language used in the query.
   - Classification & entity extraction: AI classifies the intent and extracts key information from the user input.

4.Multichannel Input System

The architecture begins with a multichannel input system designed to support various forms of user communication. Users can interact with the chatbot through text messages, voice conversations (converted into text), or emails. These diverse inputs allow the chatbot to be accessible across multiple platforms such as mobile apps, websites, smart speakers, and email clients. Regardless of the medium, all incoming messages are transmitted over the internet to the backend systems. This flexibility in input channels ensures that users seeking mental health support can communicate in the way most comfortable or available to them, which is essential in sensitive and emotionally nuanced contexts like mental health care.

5. Central Control through API Server

The API server forms the central nerve center of the chatbot's operational flow. It receives preprocessed or raw text from the reverse proxy and determines the next steps in the processing pipeline. For more complex mental health-related messages, it forwards the text to the Natural Language Processing (NLP) engine. The API server not only orchestrates the flow of data but also ensures modularity and separation of concerns, allowing developers to update or replace components like the NLP module or rule engine without affecting the rest of the system. Furthermore, the server facilitates secure communication between internal modules and may also handle authentication, logging, and error tracking.

6. Structured Data Generation and Storage

After NLP processing, the system generates structured data containing categorized information about the user's message. This data includes extracted emotions, key topics, language used, and syntactic patterns, which are stored in a structured format like JSON or in a database. This structured representation allows the downstream modules, particularly the rule engine, to make decisions with greater clarity and consistency. Moreover, this data can be logged for future training of machine learning models or for clinician review in hybrid (AI + human) mental health support systems.

7. Rule and Action Engines

The structured data then moves into the Rule and Action Engines, which serve as the decision-making backbone of the chatbot. Here, a classification system evaluates the data to determine the nature of the interaction. This may involve matching user input to predefined rules, such as recognizing phrases that indicate emotional distress, anxiety patterns, or passive suicidal

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Vol 19, Issue 2, 2025

ideation. When a rule is matched, it triggers a set of executable hypertext instructions, which may be dynamically generated responses or actions such as scheduling a therapy session, sending relaxation exercises, or escalating the session to a human counselor. These instructions are not hardcoded text responses, but rather flexible scripts that adapt based on the context of the conversation, user profile, and emotional tone detected.

8. Rule Repository and Metadata Layer

Behind the rule engine is a comprehensive rules and metadata repository, which stores all the logic that governs chatbot responses. This includes libraries of cognitive behavioral therapy (CBT) scripts, emergency protocols, emotion classification standards, and therapeutic guidance. The repository is continuously updated by mental health professionals and data scientists to ensure the chatbot aligns with best practices in digital mental health care. Additionally, metadata such as timestamps, user identifiers (anonymized), and previous rule paths are logged here, which is crucial for auditing, personalization, and longitudinal mental health tracking.

9. Output and Response Generation

Based on the outcome of the rule engine and classification process, the system generates a contextualized response to the user. This could be in the form of a supportive message, a set of coping techniques, or a recommendation to contact a professional. The system can also escalate the case if high-risk behavior is detected, for example by alerting a live therapist or directing the user to a crisis hotline. These responses are logged for accountability and further learning. Over time, the chatbot can adapt its responses based on previous interactions, leading to more personalized and emotionally intelligent support. This architecture is designed with scalability, flexibility, and clinical integrity in mind. It allows the chatbot to respond in real-time to users in distress, detect nuanced emotional signals through advanced NLP, and dynamically adjust its behavior based on structured rules. It also supports multilingual communication, making it globally accessible.

3. METHODOLOGIES

Proposed System

The proposed system is an **AI-powered mental health chatbot** designed to assist individuals in recognizing early signs of mental health challenges, offering real-time support, and guiding users toward better emotional well-being. The key aspects of the system include:

Education and Awareness:

- **Reducing Stigma Around Mental Health:** Provides non-judgmental support, making users feel comfortable discussing their emotions.
- **Providing Reliable Information**: Educates users on mental health conditions, symptoms, and coping strategies.

More Personalized Feedback:

- **Tailored Responses**: Incorporates machine learning techniques to analyze user interactions and provide customized advice based on emotional state, previous conversations, and individual needs.
- **Adaptive Coaching**: Uses user-specific data to offer stress-reduction techniques and coping mechanisms aligned with their habits and preferences.

Emotional State Monitoring:

- **Integration with AI**: Includes emotional context analysis through NLP and voice sentiment recognition to better understand and respond to user moods.
- **Proactive Interventions**: Provides early warnings or suggests intervention strategies based on detected mood changes.

Support for Behavioral Insights:

- Tracks users' emotional progress over time and gives insightful feedback for better mental health management.

4. EXPERIMENTAL RESULTS

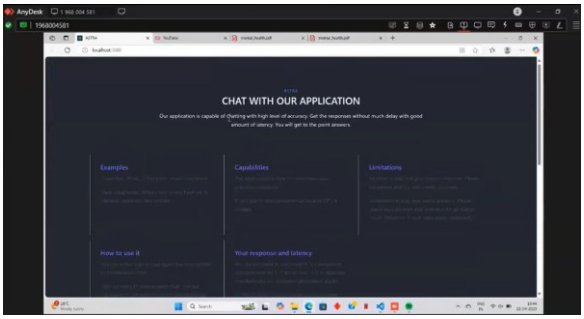

Fig.1: Graphical User Interface.

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Vol 19, Issue 2, 2025

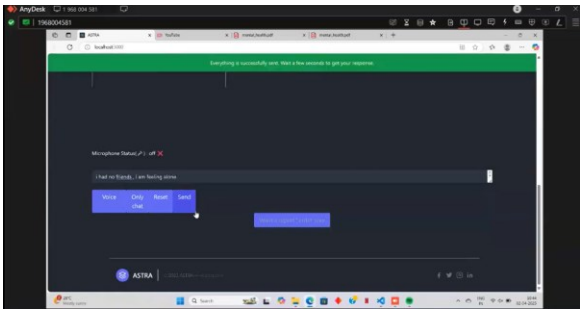

Fig 2: upload data

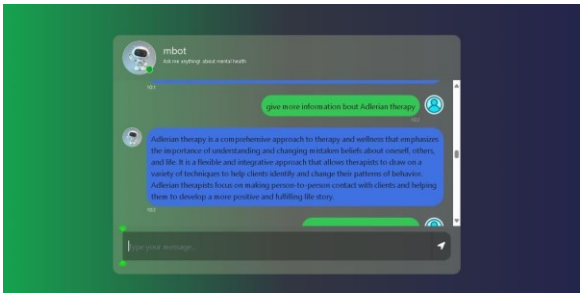

Fig.4: Result

5. CONCLUSION

Mental health chatbots have revolutionized the landscape of mental health care, addressing critical challenges such as accessibility, affordability, and the shortage of mental health professionals. These AI-powered tools serve as a bridge between individuals in need and professional support, offering a safe, non-judgmental space where users can seek help, express their emotions, and receive personalized guidance. By leveraging natural language processing (NLP) and machine learning, chatbots can engage users in meaningful conversations, assess their mental well-being, and provide tailored recommendations based on their emotional state.

One of the most significant advantages of mental health chatbots is their 24/7 availability, ensuring that individuals can access support whenever they need it, regardless of time or location. This round-the-clock assistance plays a crucial role in early intervention, helping to prevent mental health conditions from worsening by offering immediate coping strategies, therapeutic exercises, and professional referrals when necessary. Unlike traditional mental health services, which may require scheduled appointments and long waiting periods, chatbots provide instant support, making them a valuable tool in crisis situations.

REFERENCES

[1]. John Brooke, "SUS: A 'Quick and Dirty' Usability Scale," in *Usability Evaluation in Industry*, P. W. Jordan, B. Thomas, B. A. Weerdmeester, and A. L. McClelland, Eds., Taylor & Francis, pp. 189-194, 1996, doi: 10.1201/9781498710411-35.

[2]. K. Kroenke, R. L. Spitzer, J. B. Williams, "The PHQ-9: Validity of a Brief Depression Severity Measure," in *Journal of General Internal Medicine*, vol. 16, no. 9, pp. 606–613, 2001, doi: 10.1046/j.1525-1497.2001.016009606.x.

[3]. T. W. Bickmore, S. E. Mitchell, B. W. Jack, M. K. Paasche-Orlow, L. M. Pfeifer, J. Odonnell, "Response to a Relational Agent by Hospital Patients with Depressive Symptoms," in *Interacting with Computers*, vol. 22, no. 4, pp. 289–298, 2010, doi:

10.1016/j.intcom.2009.12.001.

[4]. Gillian Cameron, David Cameron, Gavin Megaw, Raymond R. Bond, Maurice D.

Mulvenna, Siobhan O'Neill, Cherie Armour, and Michael F. McTear, "Towards a Chatbot for Digital Counselling," in *Proceedings of the 31st British Computer Society Human Computer Interaction Conference (HCI 2017)*, Sunderland, UK, 2017, pp. 1–6, doi: 10.14236/ewic/HCI2017.24

ISSN 2454-9940

www.ijasem.org

Vol 19, Issue 2, 2025

[5]. B. Schrank, M. Amering, A. Grant Hay, M. Weber, I. Sibitz, "Insight, Positive and Negative Symptoms, Hope, Depression and Self-Stigma: A Comprehensive Model of Mutual Influences in Schizophrenia Spectrum Disorders," in *Epidemiology and Psychiatric Sciences*, vol. 23, no. 3, pp. 271–279, 2014, doi: 10.1017/S2045796013000322

[6]. P. Philip, J.-A. Micoulaud-Franchi, P. Sagaspe, E. De Sevin, J. Olive, S. Bioulac, A. Sauteraud, "Virtual Human as a New Diagnostic Tool, a Proof of Concept Study in the Field of Major Depressive Disorders," in *Scientific Reports*, vol. 7, Article no. 42656, 2017, doi: 10.1038/srep42656

[7]. D. A. Regier, E. A. Kuhl, D. J. Kupfer, "The DSM-5: Classification and Criteria Changes," in *World Psychiatry*, vol. 12, no. 2, pp. 92–98, 2013, doi: 10.1002/wps.20050.

[8]. M. Colizzi, A. Lasalvia, M. Ruggeri, "Prevention and Early Intervention in Mental Health: Multidisciplinary Model for Care," in *International Journal of Mental Health Systems*, vol. 14, Article no. 23, 2020, doi: 10.1186/s13033-020-00356-9.

[10]. H. F. Badawi, F. Laamarti, A. El Saddik, "ISO/IEEE 11073 Personal Health Device (X73-PHD) Standards Compliant Systems: A Systematic Literature Review," in *IEEE Access*, vol. 7, pp. 3062–3073, 2019, doi: 10.1109/ACCESS.2018.2886818.

[11]. A. El Saddik, H. F. Badawi, R. Martinez, F. Laamarti, "Dtwins: A Digital Twins Ecosystem for Health and Well-Being," in *IEEE COMSOC MMTC Communications – Frontiers*, vol. 14, no. 3, pp. 39–43, May 2019, doi: 10.1016/B978-0-32-399163-

6.00011-1.