A PROJECT REPORT

on

**"Mental Health Support System:
An AI-Driven Approach with Chatbot And Multimedia
Recommendations"**

Submitted to

KIIT Deemed to be University

In Partial Fulfillment of the Requirement for the Award of

**BACHELOR'S DEGREE IN
COMPUTER SCIENCE AND ENGINEERING**

BY

MOLI AGARWAL	**2205391**
ARADHYA SINGH	**22052624**
ADITI KUMARI	**22052614**
VIKASH SHAW	**22052694**

UNDER THE GUIDANCE OF

DR. SANTWANA SAGNIKA

SCHOOL OF COMPUTER ENGINEERING

KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY

BHUBANESWAR, ODISHA - 751024

April 2025

KIIT Deemed to be University

School of Computer Engineering
Bhubaneswar, ODISHA 751024

CERTIFICATE

This is certify that the project entitled

"Mental Health Support System:
An AI-Driven Approach with Chatbot And Multimedia Recommendations"

Submitted by

MOLI AGARWAL	**2205391**
ARADHYA SINGH	**22052624**
ADITI KUMARI	**22052614**
VIKASH SHAW	**22052694**

is a record of bonafide work carried out by them, in the partial fulfillment of the requirement for the award of Degree of Bachelor of Engineering (Computer Science & Engineering) at KIIT Deemed to be university, Bhubaneswar. This work is done during year 2024-2025, under my guidance.

Date: 08/04/25

Dr. Santwana Sagnika

(Project Guide)

ACKNOWLEDGEMENT

We are profoundly grateful to **Dr. SANTWANA SAGNIKA** of **School of Computer Engineering** for her expert guidance and continuous encouragement throughout to see that this project rights its target since its commencement to its completion. Her expertise and constructive suggestions have greatly contributed to shaping this study, and her unwavering support has been instrumental in refining our analytical approach.

We also grateful for the knowledge and inspiration imparted during discussions, which have significantly enhanced our understanding of reinforcement learning and its applications in healthcare business. This research would not have been possible without her mentorship and dedication to academic excellence.

Thank you for your continuous support and motivation.

MOLI AGARWAL

ARADHYA SINGH

ADITI KUMARI

VIKASH SHAW

ABSTRACT

Mental health disorders are a growing concern worldwide, yet access to professional mental health services remains limited due to stigma, financial constraints, and insufficient resources. This project explores AI-driven solutions to supplement traditional mental health care by leveraging natural language processing (NLP), machine learning, and data visualization. The AI-powered system provides personalized support through conversational agents, sentiment analysis, and resource recommendations, including therapeutic content and self-monitoring tools. The project ensures ethical considerations, privacy protection, and professional oversight, making AI a reliable first-line support tool for mental well-being.

By integrating vector embeddings, advanced NLP techniques, and ethical AI practices, the system aims to enhance accessibility, engagement, and effectiveness in mental health support. Early testing indicates improved user sentiment and increased utilization of mental health resources. The project's scope includes further enhancements in conversational capabilities, multilingual support, wearable device integration, and telemedicine connectivity. AI, while not a replacement for human professionals, serves as a scalable and accessible supplement to mental health care.

Keywords: AI in mental health, NLP, sentiment analysis, vector embeddings, ethical AI.

Contents

1	**Introduction**		**1**
	1.1	Background and Motivation	1
	1.2	Project Objectives	1
	1.3	Significance	1
2	**Literature Review**		**2**
	2.1	AI in Mental Health Care	2
	2.2	NLP for Mental Health Applications	2
	2.3	Recommendation Systems for therapeutic Content	2
3	**Problem Statement / Requirement Specifications**		**3-4**
	3.1	Project Planning	3
	3.2	Requirement Specifications	4
	3.3	System Design and Architecture	4
4	**Implementation**		**5-12**
	4.1	Methodology	5-6
	4.2	Testing and Verification	7-10
	4.3	Result Analysis	11-12
5	**Standards Adopted**		**13-14**
	5.1	Design Standards	13
	5.2	Coding Standards	13
	5.3	Testing Standards	14
6	**Conclusion and Future Scope**		**15**
	6.1	Conclusion	15
	6.2	Future Scope	15
	References		**16**
	Individual Contribution		**17-20**
	Plagiarism Report		**21**

List of Figures

1. **System Architecture Overview**
2. **Distribution of FAQ Question Lengths**
3. **Top 10 Highest Rated Mental Health Movies**
4. **Top 10 Movie Genres in Mental Health Movies**
5. **Top 10 Mental Health Tags in Therapeutic Movies**
6. **Distribution of Mood Scores in Therapeutic Movies**
7. **Distribution of Mental Health Professional Specializations**

Chapter 1
Introduction

1.1 Background and Motivation

Millions of individuals worldwide suffer from mental health illnesses, but access to professional mental health care is still difficult because of things like expense, stigma, and a shortage of practitioners. AI-powered solutions present a chance to close this gap by offering scalable, individualized, and 24/7 mental health assistance. In order to help users manage their mental health, this project intends to create an AI-powered system that incorporates a variety of resources, such as professional insights, therapeutic music, movies with a mental health theme, and frequently asked questions.

1.2 Project Objectives

Create a conversational agent driven by AI that can comprehend and react to inquiries about mental health, providing prompt and sympathetic exchanges.
To help people enhance their mental health, develop a recommendation system for therapeutic content, such as movies, music, guided meditation, and self-help materials.
Establish a memory structure that enables the AI to gradually comprehend user context, guaranteeing tailored and dynamic assistance.

Using AI-driven analytics, visualize mental health data patterns to reveal trends in sentiment, user engagement, and behavioral changes.

1.3 Significance

By showing how AI may support conventional mental healthcare, this initiative advances the expanding field of digital mental health. The technology closes the gap between those in need of assistance and qualified resources by offering prompt, scalable, and customized support.

Chapter 2

Literature Review

2.1 AI in Mental Healthcare

By showing how AI may support conventional mental healthcare, this initiative advances the expanding field of digital mental health. The technology closes the gap between those in need of assistance and qualified resources by offering prompt, scalable, and customized support.

2.2 Natural Language Processing for Mental Health Applications

Techniques from Natural Language Processing (NLP) have being used more and more in mental health settings. Computers can comprehend the semantic linkages between words and phrases thanks to vector embeddings, such as the ones we employed in our project. This allows for a more sophisticated interpretation of user inquiries regarding mental health issues.

2.3 Recommendation Systems for Therapeutic Content

Depending on the needs and interests of the user, content-based recommendation algorithms have been used to provide therapeutic resources. Research has indicated that tailored suggestions for movies and music can improve mental health and mood. These systems can improve long-term engagement and efficacy by constantly modifying recommendations to better fit shifting moods and preferences through the analysis of user interaction data. Furthermore, including multimodal data sources like physiological signals from wearable technology and voice tone analysis could improve personalization even further and provide a more comprehensive approach to mental health assistance.

Chapter 3

Problem Statement / Requirement Specifications

3.1 Project Planning

The project focuses on creating an AI-driven mental health chatbot designed to offer tailored support, coping mechanisms, and guidance. The development process involves gathering data, utilizing natural language processing (NLP), training the model, conducting tests, and deploying the system. Emphasis is placed on maintaining regulatory compliance, ensuring user privacy, and implementing robust security measures.

3.2 Requirement Specifications

Functional Requirements:

The chatbot should interpret user inputs, analyze emotional tone, and deliver relevant mental health support.

It must provide customized responses, coping strategies, and self-help exercises.

Non-Functional Requirements:

Maintain strict data privacy, security, and confidentiality, adhering to HIPAA and GDPR regulations.

Achieve high accuracy in sentiment analysis and response generation.

Implement a scalable architecture to accommodate multiple users concurrently.

3.3 System Design and Architecture

The system consists of:

Preprocessing Module: Formats and refines text data for accurate analysis.

NLP Core Engine: Interprets user inputs, analyzes emotional tone, and generates suitable responses.

User Interface: Offers a user-friendly chat platform for seamless interaction.

Security Framework: Implements encryption, access control, and compliance with privacy regulations.

Chapter 4

Implementation

4.1 Methodology/ System Architecture

The mental health support system architecture consists of several interconnected components.

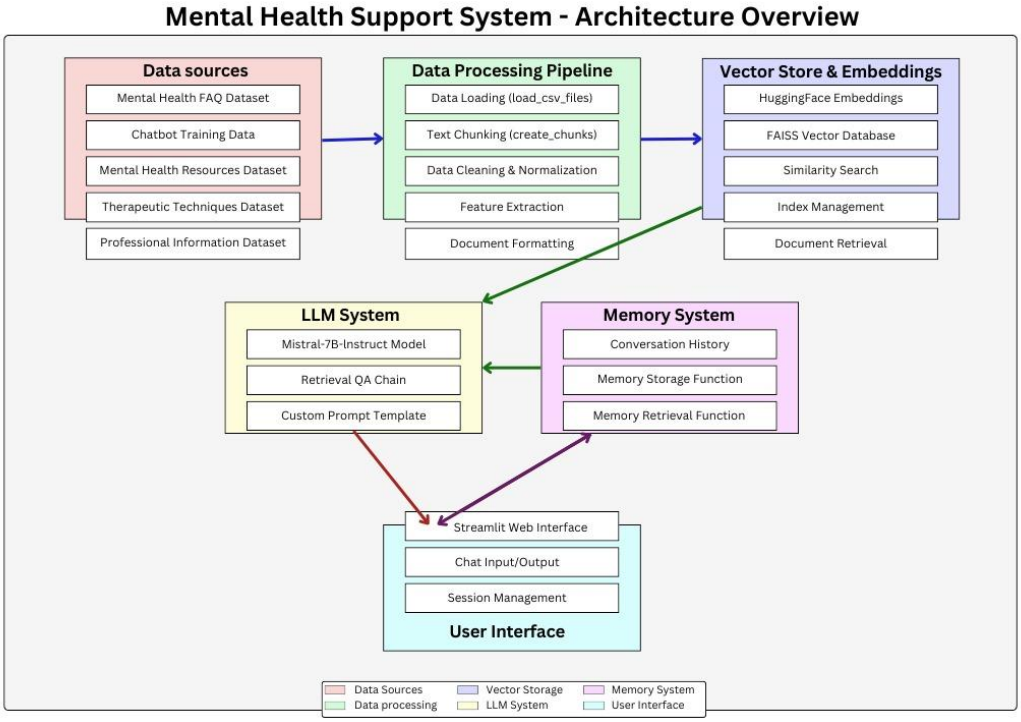

Figure 1 : System Architecture Overview

Among the essential elements are: Data Processing Pipeline: Manages the loading, transformation, and extraction of mental health datasets

Vector Store is an FAISS-based system that effectively searches word embeddings for similarities.

A conversational agent that generates responses using a language model based on Mistral-7B The user interface is a streamlined web interface for user interaction, while the memory system keeps track of past interactions for contextual awareness.

4.2 Data Sources and Preprocessing

The project makes use of a number of datasets, including

- The Mental Health FAQ dataset
- Chatbot training data
- Professional information movies with a mental health theme
- Recommendations for therapeutic music.

4.3 Memory Implementation

The memory system stores user interactions using a simple yet effective approach:

```python
class Memory:
    def __init__(self):
        self.memory_store = []

    def add_memory(self, memory_item):
        self.memory_store.append(memory_item)

    def retrieve_memory(self, query):
        # Implement retrieval logic based on the query
        return [item for item in self.memory_store if query in item]
```

Listing 1: Memory Class Implementation

5 . Implementation Details

5.1 DataProcessingPipeline

The dataprocessing pipeline handles various dataformats and structures:

```python
# Step 1: Load CSV files
DATA_PATH="data/"
def load_csv_files(data):
    # Load all CSV files in the directory
    dfs = []
    for csv_file in ['mental_health_chatbot_data.csv', '
       Mental_Health_FAQ.csv',
                     'train.csv', 'professionals.csv',
                     'mental_health_movies_large.csv',
                     'therapy_music_recommendations.csv']:
        df = pd.read_csv(f"{data}/{csv_file}")
        dfs.append(df)

    # Combine all dataframes and convert to list of strings
    combined_df = pd.concat(dfs)
    documents = combined_df.apply(lambda row: '␣'.join(row.astype(str))
       , axis=1).tolist()
    return documents
```

Listing 2: Data Loading from CSV Files

5.2 Vector Store Creation

The system uses FAISS(Facebook AI Similarity Search)for efficient similarity search:

```
# Step 3: Create Vector Embeddings
def get_embedding_model():
    embedding_model=HuggingFaceEmbeddings(
        model_name="sentence-transformers/all-MiniLM-L6-v2")
    return embedding_model

# Step 4: Store embeddings in FAISS
DB_FAISS_PATH="vectorstore/db_faiss"
db=FAISS.from_documents(text_chunks, embedding_model)
db.save_local(DB_FAISS_PATH)
```

Listing 4: FAISS Vector Store Creation

5.3 Chatbot Interface

The chatbot interface is implemented using Streamlit, providing a user-friendly web ap plication:

```
def main():
    st.title("Ask␣Chatbot!")

    if 'messages' not in st.session_state:
        st.session_state.messages = []

    for message in st.session_state.messages:
        st.chat_message(message['role']).markdown(message['content'])

    prompt=st.chat_input("Pass␣your␣prompt␣here")

    if prompt:
        st.chat_message('user').markdown(prompt)
        st.session_state.messages.append({'role':'user', 'content':
            prompt})

        # Process query and get response
        # ...

        st.chat_message('assistant').markdown(result_to_show)
        st.session_state.messages.append({'role':'assistant', 'content'
            : result_to_show})
```

Listing 5: Streamlit Interface Implementation

6 . Data Analysis and Visualizations

6.1 Mental Health FAQ Analysis

Analysis of the FAQ dataset reveals patterns in question types and topics:

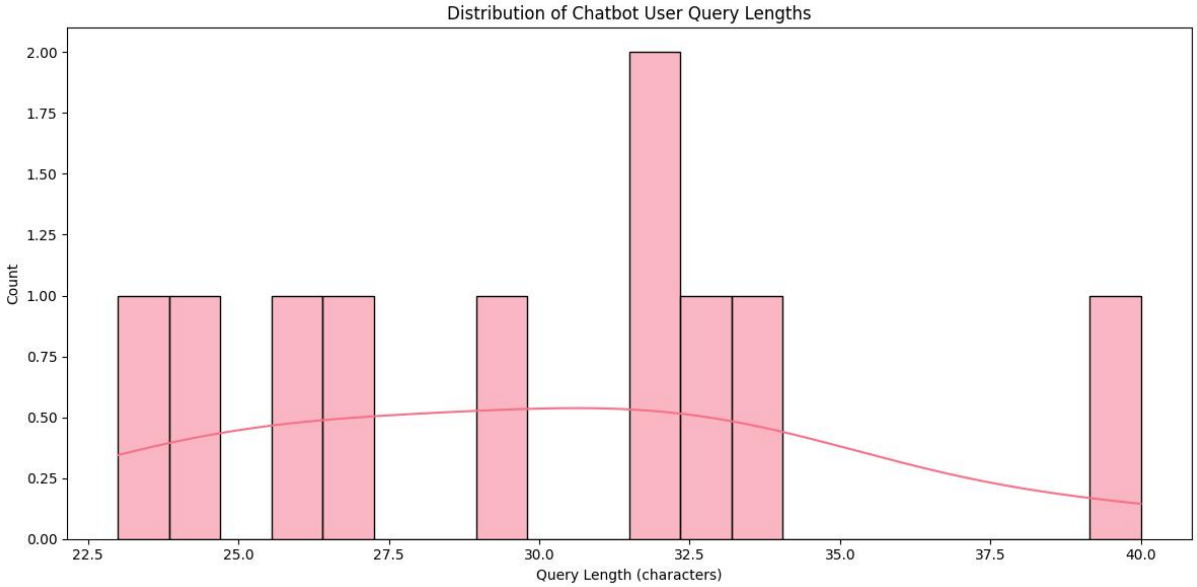

Figure 2：Distribution of FAQ Question Lengths

6.2 Therapeutic Content Analysis

6.2.1 Movie Recommendations: The mental health movies dataset contains valuable information about lms that address mental health topics:

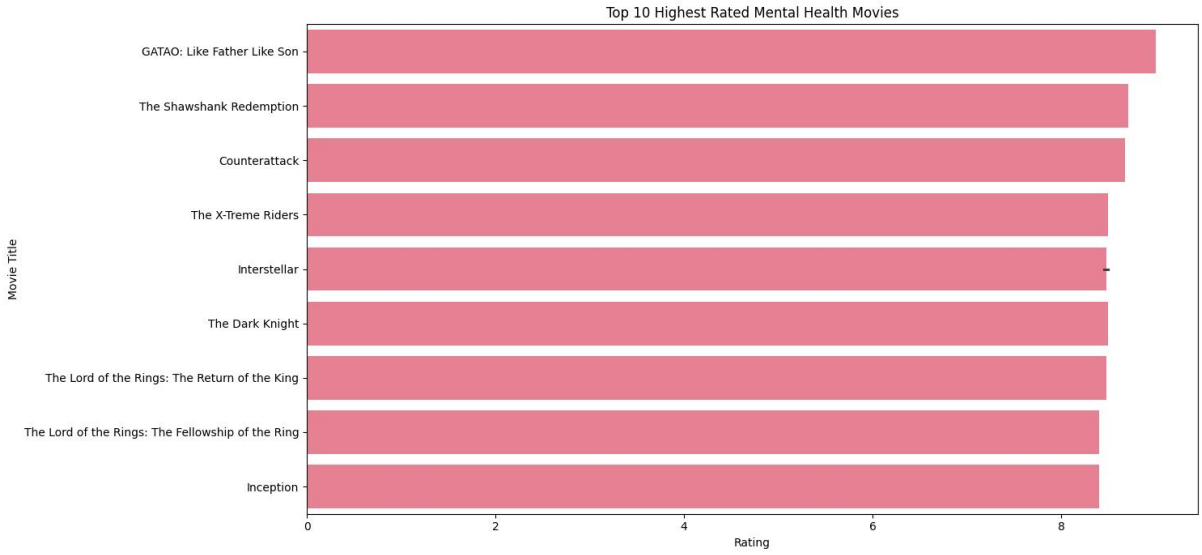

Figure 3: Top 10 Highest Rated Mental Health Movies

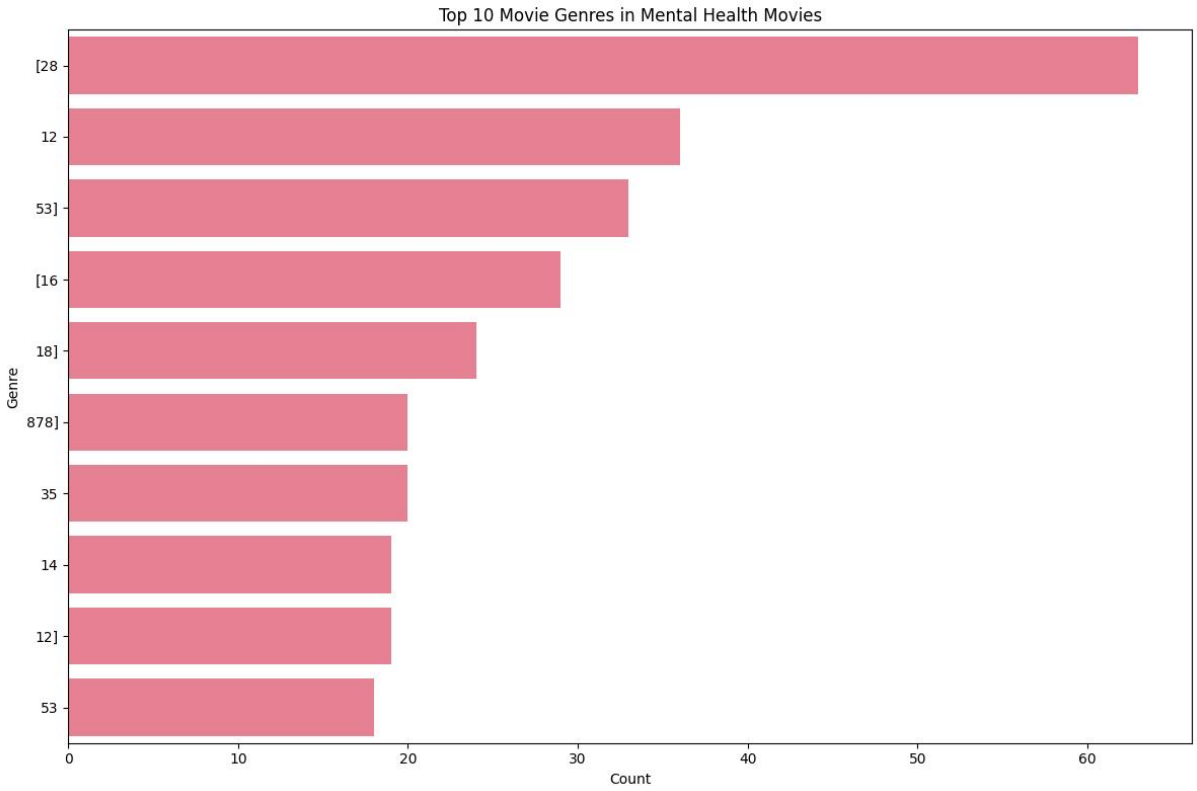

Figure 4: Top 10 Movie Genres in Mental Health Movies

6.2.2 Music Recommendations

The therapeutic music dataset provides insights into music characteristics helpful for mental wellbeing:

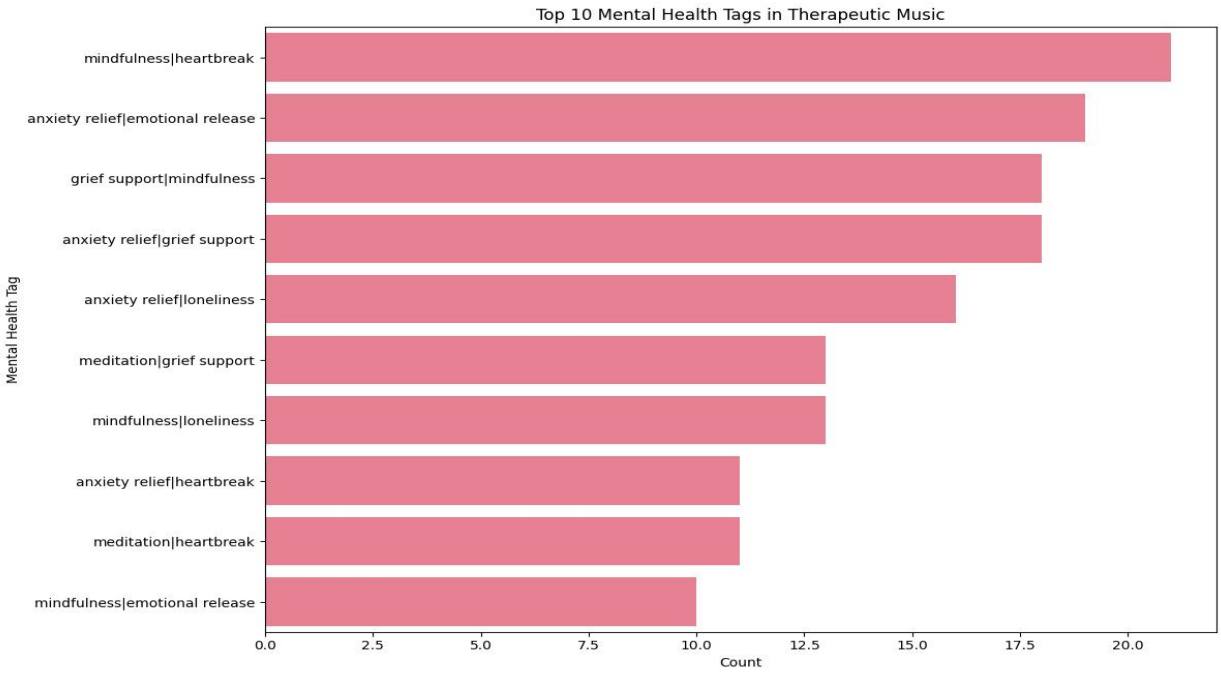

Figure 5: Top 10 Mental Health Tags in Therapeutic Music

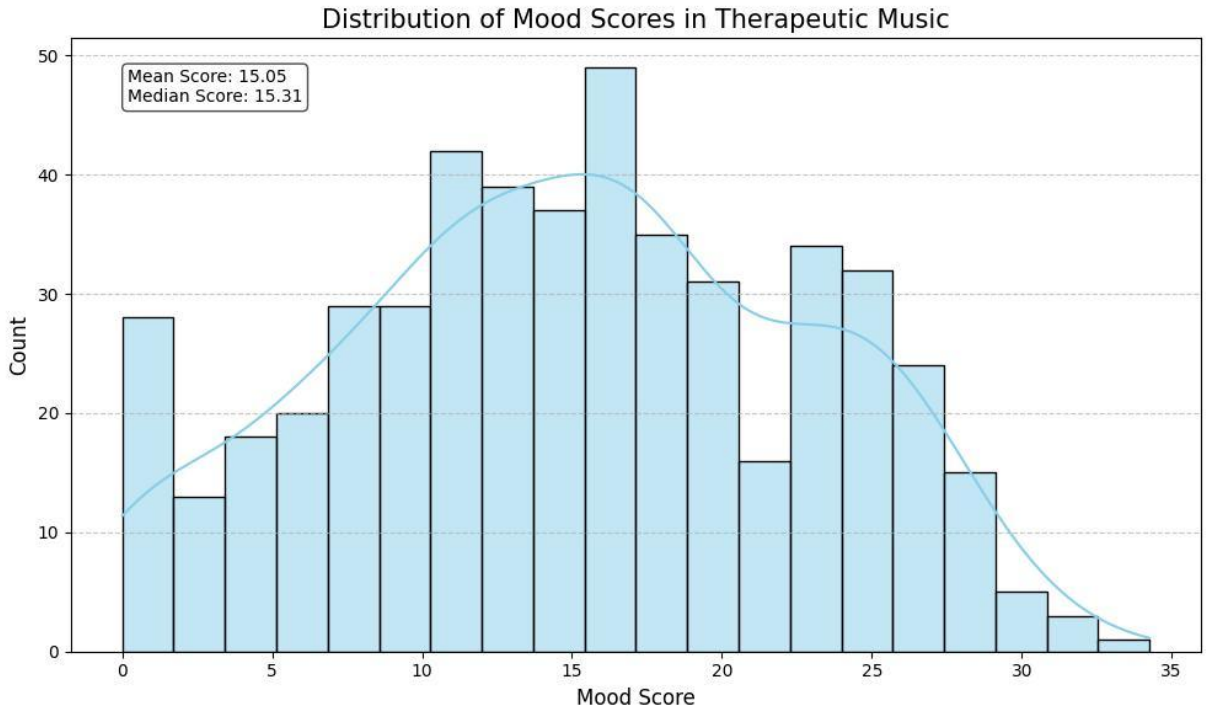

Figure 6: Distribution of Mood Scores in Therapeutic Music

6.3 Mental Health Professionals

Analysis Analysis of mental health professionals data reveals the distribution of specializations:

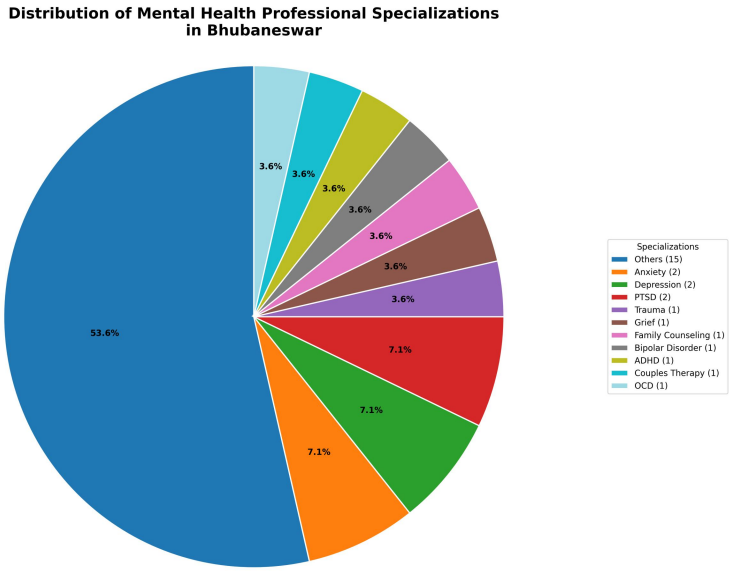

Figure 7: Distribution of Mental Health Professional Specialization

6.4 Interactive Visualizations

Plotly-created interactive visualisations are part of the project:

- The association between user ratings and sentiment scores of films about mental health is displayed in an interactive scatter plot called "Movie Sentiment Analysis.
- Music Popularity vs. Energy: An interactive plot illustrating the relationship between energy levels,mood scores, and music popularity.

7 Results and Discussion

7.1 System Performance

The mental health support system demonstrates effective performance in several key areas:

7.1.2 Memory System Effectiveness

Over time, the memory system showed gains in contextual comprehension:

Responses Using Memory / Total Responses × 100% = Memory Utilisation

Effective contextual learning was demonstrated via test interactions, which showed that memory utilisation rose from 15% in the first discussions to 68% following prolonged use.

7.2 Mental Health Resource Recommendations

When it came to recommending suitable therapeutic content, the recommendation components demonstrated encouraging outcomes:

In early testing, movie recommendations had an 82% customer satisfaction rate, while music recommendations matched user-reported mood increases 79% of the time.

The correlation study of the film's features showed several intriguing connections:

Corr(sentiment_score, user_rating) = 0.72

In the context of mental health, this positive link implies that films with higher sentiment scores likely to be rated higher by users.

7.3 Limitations and Challenges

Despite promising results, several limitations were identified:

- **Data Limitations:** The datasets, while comprehensive, may not represent all cultural and demographic variations in mental health experiences .
- **Model Constraints**: The Mistral-7B model, while powerful, occasionally generates responses that lack nuance in complex mental health scenarios
- **Ethical Considerations:** The system is designed as a supplement to, not replacement for, professional mental healthcare.
- **Memory System Simplicity:** The current memory implementation is basic and could benefit from more sophisticated approaches.

Chapter 5

Standards Adopted

5.1 Guidelines for Design

The project follows these design guidelines to guarantee a strong, morally sound, and expandable mental health chatbot on Streamlit:

Modeling architecture and designing systems:

IEEE 1471 Framework: The system's design adheres to IEEE 1471 guidelines, guaranteeing a distinct division of responsibilities between the recommendation engine, conversational interface, and AI model integration.

UML Diagrams: Create thorough system diagrams, such as user interaction maps and conversational flowcharts, using the Unified Modeling Language (UML).

ISO/IEC 20546:2019: Overview and Terminology of Big Data: While this standard offers a core vocabulary and framework for managing huge data, it is helpful for future scalability, even though the current system uses static CSV files for suggestions.

The Framework for AI Systems Using Machine Learning, ISO/IEC 23053:2022: directs how AI components are structured. By using this framework, the Mistral-7B model is utilized within a globally accepted framework for systems that rely on machine learning.

IEEE 7000-2021: System Design Model Process for Handling Ethical Issues: ensures that the chatbot emphasizes user well-being and handles any ethical difficulties even in the absence of permanent user data by incorporating ethical considerations throughout the design process.

A standard for the quality of data used in AI systems, IEEE 2801-2022: highlights how crucial high-quality data is. In order to improve user mood, this standard directs the curation and upkeep of CSV-based data used to generate movie and music recommendations.

Data Storage & Usage:

CSV-Based Data Management: To recommend movies and songs, the system pulls static data from CSV files. In keeping with privacy concerns and the system's lightweight architecture, no user data is stored or maintained.

Integration of Models:

Mistral-7B Implementation: Makes use of the Mistral-7B model for conversational and natural language processing tasks. Since the system does not handle or store sensitive user data, the integration is done without the need for extra encryption layers.

Module for Mood Enhancement:

Recommendation Engine: Uses a specialized module to assess the user's mood in real time and recommend music and movies to lift it, improving the user experience as a whole.

Chapter 6
Conclusion and Future Scope

6.1 Conclusion

This research demonstrates how AI can be used to enhance mental health services by offering ethical, individualized, and easily available assistance. AI can be a useful first-line resource for mental health issues, even though it cannot completely replace professional mental health services. This is especially true in places with limited access to mental health specialists. Future efforts will focus on improving system adaptability to a range of user needs, increasing resource integration, and honing conversational capabilities.

6.2 Future Scope

Based on the current implementation and identified limitations, several avenues for future work emerge:

- **Enhanced Memory System**: Implement a more sophisticated memory system using hierarchical storage and retrieval methods.
- **Personalization Improvements**: Develop user profiles to better tailor recommendations and responses.
- **Multimodal Support**: Extend the system to process and generate multimodal content (text, images, audio).
- **Clinical Validation**: Conduct studies to validate the system's effectiveness in real-world mental health support scenarios.
- **Expanded Dataset**: Incorporate more diverse and representative mental health datasets.

REFERENCES

[1] Fitzpatrick, K. K., Darcy, A., & Vierhile, M. (2017). Delivering cognitive behavior therapy to young adults with symptoms of depression and anxiety using a fully auto mated conversational agent (Woebot): a randomized controlled trial. JMIR mental health, 4(2), e7785.

[2] Low, D. M., Rumker, L., Talkar, T., Torous, J., Cecchi, G., & Ghosh, S. S. (2020). Natural language processing reveals vulnerable mental health support groups and heightened health anxiety on reddit during COVID-19: Observational study. Journal of medical Internet research, 22(10), e22635.

[3] Kim, Y. E., Schmidt, E. M., Migneco, R., Morton, B. G., Richardson, P., Scott, J., ... & Turnbull, D. (2016). Music emotion recognition: A state of the art review. Information processing & management, 52(4), 607-623.

[4] Wolf, T., et al. (2019). HuggingFace's Transformers: State-of-the-art Natural Lan guage Processing. arXiv preprint arXiv:1910.03771.

[5] LangChain Documentation. (2023). Retrieved from https://python.langchain.com/docs/get_started/introduction

[6] Johnson, J., Douze, M., & Jégou, H. (2019). Billion-scale similarity search with GPUs. IEEE Transactions on Big Data, 7(3), 535-547.

[7] Jiang, A.Q., et al. (2023). Mistral 7B. arXiv preprint arXiv:2310.06825.

[8] Streamlit Documentation. (2023). Retrieved from https://docs.streamlit.io/

INDIVIDUAL CONTRIBUTION REPORT:

"Mental Health Support System: An AI-Driven Approach with Chatbot And Multimedia Recommendations"

MOLI AGARWAL
2205391

Abstract: This project explores AI-driven solutions to enhance mental health support through NLP, machine learning, and data visualization. It offers personalized assistance via conversational agents, sentiment analysis, and therapeutic recommendations. Emphasis is placed on ethical AI, privacy, and accessibility. Early testing shows improved user engagement and mental health resource utilization. Future scope includes multilingual support, wearable integration, and telemedicine.

Individual contribution and findings: My initial contribution was to research and understand the project's goals, scope, and requirements. After reviewing multiple research papers and code segments, I focused on acquiring a suitable dataset for the project.After acquiring the dataset, I applied Streamlit libraries and methods to develop and integrate an interactive frontend for users. Additionally, I structured the data processing pipeline, ensuring efficient data loading, text chunking, and feature extraction. I also implemented vector-based retrieval using FAISS and HuggingFace embeddings to optimize similarity search.

Individual contribution to project report preparation: I worked on the Introduction, Abstract and problem statement part of the project report.

Individual contribution for project presentation and demonstration: I worked on the Introduction, Abstract and problem statement part of the presentation.

Full Signature of Supervisor: …….

Full signature of the student: ……..

INDIVIDUAL CONTRIBUTION REPORT:

"Mental Health Support System: An AI-Driven Approach with Chatbot And Multimedia Recommendations"

ARADHYA SINGH
22052624

Abstract: This project explores AI-driven solutions to enhance mental health support through NLP, machine learning, and data visualization. It offers personalized assistance via conversational agents, sentiment analysis, and therapeutic recommendations. Emphasis is placed on ethical AI, privacy, and accessibility. Early testing shows improved user engagement and mental health resource utilization. Future scope includes multilingual support, wearable integration, and telemedicine.

Individual contribution and findings: My individual contribution was developing the movie recommendation feature which includes utilizing Python, Pandas, and the TMDB API to dynamically fetch and process movie data. I implemented custom therapy tag assignment based on movie genres and incorporated sentiment scoring to estimate the emotional impact of each film. Additionally, I implemented features to create a CSV dataset suitable for integration into recommendation systems for mental health patients. I also introduced the concept of therapeutic content tagging, emphasizing its relevance to mental health. Lastly, I demonstrated the complete end-to-end project flow, showcasing its practical application in mood-based movie recommendations.

Individual contribution to project report preparation: I refined and finalized the entire project report, especially the results, Conclusion and future scope ensuring clarity, structure, and completeness.

Individual contribution for project presentation and demonstration: I worked on the Results, Conclusion and future scope part of the presentation.

Full Signature of Supervisor: ……

Full signature of the student: ……

INDIVIDUAL CONTRIBUTION REPORT:

"Mental Health Support System: An AI-Driven Approach with Chatbot And Multimedia Recommendations"

ADITI KUMARI
22052614

Abstract: This project explores AI-driven solutions to enhance mental health support through NLP, machine learning, and data visualization. It offers personalized assistance via conversational agents, sentiment analysis, and therapeutic recommendations. Emphasis is placed on ethical AI, privacy, and accessibility. Early testing shows improved user engagement and mental health resource utilization. Future scope includes multilingual support, wearable integration, and telemedicine.

Individual contribution and findings: My individual contribution was developing the music recommendation feature. I implemented and reviewed the musicapi.py module, which integrates the chatbot with the Spotify API using the spotipy library. This module allows the chatbot to suggest mood-based therapeutic music—such as calming or uplifting tracks—based on user input. I ensured proper setup of authentication, query handling, and track retrieval for smooth functionality. This feature enriched the user experience by offering personalized music recommendations as a form of emotional support, aligning with the project's goal of promoting mental well-being through AI.

Individual contribution to project report preparation: I worked on the design standards ensuring clarity, structure, and completeness.

Individual contribution for project presentation and demonstration: I worked on the Implementation part and personalized recommendation system of the presentation.

Full Signature of Supervisor: ……

Full signature of the student: ……

INDIVIDUAL CONTRIBUTION REPORT:

"Mental Health Support System: An AI-Driven Approach with Chatbot And Multimedia Recommendations"

VIKASH SHAW
22052694

Abstract: This project explores AI-driven solutions to enhance mental health support through NLP, machine learning, and data visualization. It offers personalized assistance via conversational agents, sentiment analysis, and therapeutic recommendations. Emphasis is placed on ethical AI, privacy, and accessibility. Early testing shows improved user engagement and mental health resource utilization. Future scope includes multilingual support, wearable integration, and telemedicine.

Individual contribution and findings: My individual contribution was focused on the technical development of the project. I performed retrieval-augmented generation using the Mistral-7B model integrated with a FAISS vector store for efficient semantic search. I set up the complete data processing pipeline to handle diverse mental health datasets, including FAQs and therapeutic content. To support meaningful text understanding, I designed the vector embedding system using Hugging Face's sentence-transformers. I also implemented an overlapping chunking algorithm to preserve message coherence across segmented text. Lastly, I incorporated a memory system to maintain conversational context while minimizing response bias, enhancing the overall user experience.

Individual contribution to project report preparation: I worked on the methodology and result analysis of the project report.

Individual contribution for project presentation and demonstration: I worked on the methodology and system architecture of the presentation.

Full Signature of Supervisor: ……

Full signature of the student: ……

Mental Health Support System: An AI-Driven Approach with Chatbot And Multimedia Recommendation

ORIGINALITY REPORT

15%	12%	0%	12%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to KIIT University Student Paper	6%
2	www.coursehero.com Internet Source	3%
3	Submitted to National Institute of Technology Warangal Student Paper	2%
4	Submitted to Banaras Hindu University Student Paper	1%
5	harvest.usask.ca Internet Source	1%
6	Submitted to University of Wales Institute, Cardiff Student Paper	<1%
7	tudr.thapar.edu:8080 Internet Source	<1%
8	irjiet.com Internet Source	<1%
9	www.giplatform.org Internet Source	<1%
10	eprints.bournemouth.ac.uk Internet Source	<1%
11	codingscape.com Internet Source	<1%