AI Powered Mental Health Monitoring and Recommendation System

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Abstract– **The AI-Powered Mental Health Monitoring and Recommendation System is a webbased application developed to help users track and improve their emotional well-being in a simple and effective way. In today's busy lifestyle, people often ignore their mental health, which can lead to stress, anxiety, and other emotional issues. This system provides a smart solution by using Artificial Intelligence to monitor user emotions on a daily basis. The application collects user input through daily questions, which are dynamically generated using the Gemini API. These questions help in understanding the user's thoughts, feelings, and daily experiences. The responses provided by the user are then processed and analyzed using a Machine Learning model trained for emotion classification. Based on the input, the model predicts the user's current emotional state, such as happy, sad, stressed, or relaxed. After predicting the emotion, the system provides personalized video recommendations to help improve or maintain the user's mood. For example, if the user is feeling sad, the system suggests motivational videos, while for stress, it recommends relaxing or meditation content. This makes the system interactive and supportive for users. All user responses and predicted emotions are stored in a database, allowing users to view their past records and track their emotional changes over time. The system also provides graphical representations of mood trends, helping users understand their emotional patterns and identify possible causes of stress or happiness. The entire system is developed using Flask for backend processing, along with Machine Learning techniques for prediction and API integration for dynamic interaction. This project combines Artificial Intelligence, web development, and data visualization to create a practical and user-friendly mental health support system. Overall, the system not only predicts emotions but also encourages self-awareness and promotes better mental health management through continuous monitoring and personalized recommendations.**

Keywords – Artificial Intelligence, Machine Learning, Mental Health Monitoring, Emotion Detection, Mood Prediction, Recommendation System, Flask Web Application, Gemini API, Text Classification, Data Visualization.

I. INTRODUCTION

In today's modern world, mental health has become a major concern due to increasing stress, workload, and fast-paced lifestyles. Many people experience emotional issues such as anxiety, depression, and stress, but they often do not have proper tools or support systems to monitor their mental well-being regularly. Unlike physical health, mental health is often ignored, which can lead to serious long-term problems. Therefore, there is a need for an intelligent system that can help users understand and manage their emotions in a simple and effective way [1].

With the advancement of Artificial Intelligence (AI) and Machine Learning (ML), it has become possible to analyze human emotions using computational methods. Emotion detection and sentiment analysis are important areas of research in Natural Language Processing (NLP), where systems can understand human feelings based on text input. These technologies are widely used in applications such as chatbots, recommendation systems, and mental health monitoring tools [2]. By using these techniques, systems can classify emotions like happiness, sadness, stress, and relaxation based on user responses.

The proposed project, "AI-Powered Mental Health Monitoring and Recommendation System," aims to provide a smart and user-friendly solution for tracking emotional well-being. This system allows users to answer daily questions related to their feelings and experiences. Unlike traditional systems that use fixed questionnaires, this project integrates the Gemini API to generate dynamic and interactive questions. This makes the system more engaging and helps in collecting more accurate and meaningful data from users [3].

The collected responses are processed and analyzed using a Machine Learning model trained for emotion

classification. The model converts user input into a suitable format using text preprocessing techniques such as tokenization, stopword removal, and feature extraction methods like TF-IDF. Based on this processed data, the model predicts the emotional state of the user. This prediction helps in understanding the user's mental condition on a daily basis and provides a foundation for further recommendations [4].

After predicting the emotion, the system provides personalized video recommendations to improve or maintain the user's mental state. For example, if a user is feeling stressed, the system suggests relaxing or meditation videos, while for sadness, it recommends motivational content. This recommendation system enhances user experience and provides immediate support, making the application more practical and useful in real-life scenarios. Additionally, the system stores user data in a database, allowing users to track their emotional patterns over time and visualize them through graphs and charts [5].

Overall, this project combines Artificial Intelligence, Machine Learning, web development, and API integration to create a complete mental health support system. It not only predicts emotions but also encourages users to become more aware of their mental well-being. By continuously monitoring emotions and providing personalized recommendations, the system helps users maintain a balanced and healthy lifestyle.

II. OBJECTIVE

The main objectives of the AI-Powered Mental Health Monitoring and Recommendation System are as follows:

A. To Create a User-Friendly Interface

The system should have a simple and easy-to-use interface so that users of all age groups can interact with it without difficulty. A clean and interactive design improves user experience and encourages regular usage of the application.

B. To Integrate Gemini API for Dynamic Question Generation

The system aims to use the Gemini API to generate daily questions dynamically instead of using fixed questions. This improves user engagement and ensures that the responses are fresh and meaningful. By using AI-generated questions, the system can collect better data and provide more accurate emotion predictions [8].

C. To Implement Machine Learning for Emotion Prediction

Another important objective is to use Machine Learning techniques to predict the emotional state of users based on their textual responses. The system should be capable of classifying emotions such as happy, sad, stressed, and relaxed. This objective focuses on applying NLP and classification algorithms to real-world problems, making the system intelligent and automated [7].

D. To Provide Personalized Recommendations

One of the key objectives is to suggest appropriate video content based on the predicted emotion of the user. For example, if a user is feeling stressed, the system should recommend relaxation or meditation videos. This feature helps users improve their mood and provides a supportive experience, making the system more useful and practical [9].

E. To Store and Manage User Data Efficiently

The system is designed to store user responses, predicted emotions, and timestamps in a database. This objective ensures proper data management so that users can access their previous records whenever required. It also helps in maintaining a history of emotional data for future analysis [10].

F. To Visualize Mood Trends

Another objective is to provide graphical representations of the user's emotional trends over time. By using charts and graphs, users can easily understand how their mood changes daily, weekly, or monthly. This helps in identifying patterns and possible reasons behind emotional fluctuations.

G. To Develop a Mental Health Monitoring System

The primary objective of this project is to design and develop a system that can monitor the emotional well-being of users on a daily basis. The system should allow users to regularly express their thoughts and feelings so that their mental condition can be analyzed effectively. This helps in promoting awareness about mental health and encourages users to take care of their emotional state [6].

H. To Combine AI and Web Technologies

This project aims to integrate Artificial Intelligence with web development technologies like Flask to

create a complete and functional application. It demonstrates how different technologies can work together to solve real-world problems effectively.

I. To Promote Mental Health Awareness

The final objective is to encourage users to become more aware of their emotional wellbeing. By regularly tracking and analyzing their mood, users can take better decisions for their mental health and overall lifestyle.

III. LITERATURE REVIEW

Sr. No.	Author(s) & Year	Title of Paper	Methodology Used	Key Findings
1	Calvo & D'Mello (2010) [11]	Affect Detection Review	Survey of emotion detection models	Highlighted importance of emotion-aware systems in mental health
2	Devlin et al. (2019) [12]	BERT Model	Deep learning (Transformer)	Improved accuracy in textbased emotion detection
3	Mohammad & Turney (2013) [13]	Emotion Lexicon Study	Lexicon-based approach	Words can effectively represent emotions
4	Hasan et al. (2020) [14]	Sentiment Analysis	Machine Learning models	ML models perform well in emotion classification
5	Nguyen et al. (2021) [15]	Emotion Recognition Review	Comparative analysis	Different ML models used for emotion detection
6	Khaleghi et al. (2022) [16]	Text Emotion Detection	NLP + Classification	Text-based emotion detection is efficient
7	Baker & Xiang (2021) [17]	Smart Healthcare Systems	IoT + AI	AI can improve healthcare monitoring systems
8	Alhuzali & Ananiadou (2021) [18]	Multi-label Emotion Detection	Span-based NLP	Multiple emotions can be detected simultaneously
9	Schwartz et al. (2013) [19]	Language & Personality	Text analysis	Language reflects emotional and psychological states
10	Jurafsky & Martin (2021) [20]	NLP Techniques	Text processing methods	NLP is essential for understanding user input
11	Russell & Norvig (2021) [21]	Artificial Intelligence	AI concepts	AI can be applied to realworld problems like mental health

12	WHO Report (2023) [22]	Mental Health Study	Global analysis	Mental health awareness is increasing worldwide

IV. METHODOLOGY

i. RESEARCH PROBLEM

How In today's fast and stressful lifestyle, many people face emotional issues such as stress, anxiety, and mood changes, but they do not have an easy and regular way to monitor their mental health. Most existing systems are either complex, not personalized, or do not provide real-time support based on user emotions.Therefore, the main research problem is to develop a simple, intelligent, and user-friendly system that can accurately detect a user's emotional state from daily inputs and provide personalized recommendations to improve their mental well-being

ii. SYSTEM ARCHITECTURE

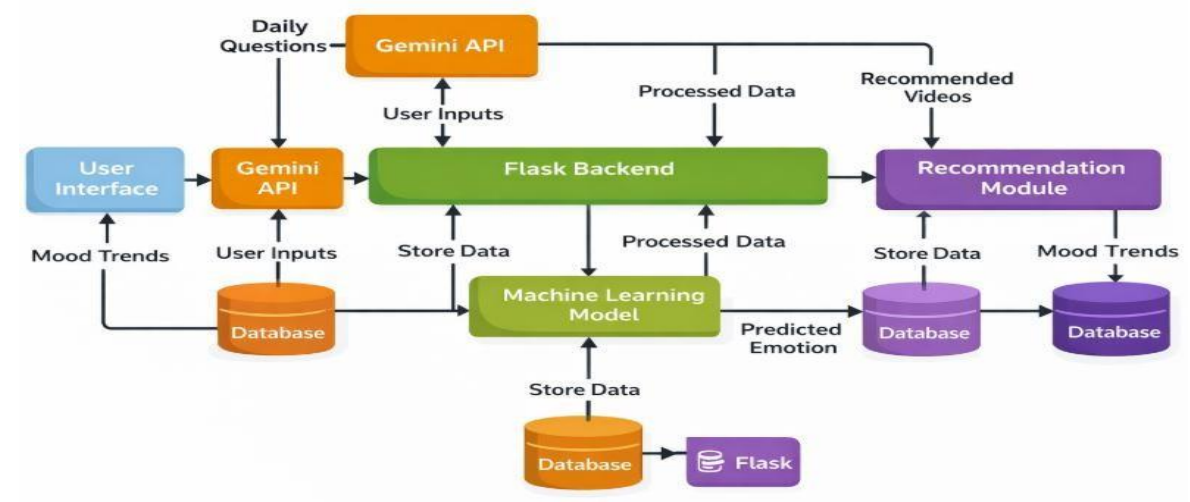

Figure 1. System Architecture Diagram

iii. WORKING FLOW

The working flow of the AI-Powered Mental Health Monitoring and Recommendation System explains how the system operates step-by-step from user interaction to final output.

A. User Login and Access

The process starts when the user logs into the system using their credentials. After successful login, the user is directed to the dashboard where they can access daily questions, view previous records, and check mood trends. This ensures secure and personalized access for each user [11].

B. Daily Question Generation using Gemini API

Once the user enters the system, the Gemini API generates daily questions dynamically. These questions are designed to understand the user's emotional condition, such as their feelings, stress level, and daily experiences. This dynamic approach avoids repetition and keeps the interaction fresh and engaging [12].

C. User Response Collection

The user answers the generated questions through the web interface. These responses are collected in text format and sent to the backend system. The quality and honesty of user input play a very important role in accurate emotion prediction [13].

D. Data Preprocessing

After collecting the user responses, the system performs preprocessing on the text data. This includes:

1. Removing unnecessary words (stopwords)
2. Converting text to lowercase
3. Removing punctuation
4. Tokenization (splitting text into words)

These steps help in converting raw text into a format suitable for machine learning models [14].

E. Feature Extraction
The cleaned text data is then converted into numerical form using techniques like TF-IDF (Term Frequency-Inverse Document Frequency). This step is necessary because machine learning models cannot understand text directly and require numerical input [15].

F. Emotion Prediction using ML Model
The processed data is passed to the trained Machine Learning model. The model analyzes the input and predicts the user's emotional state such as happy, sad, stressed, or relaxed. This is the core functionality of the system.

G. Display of Predicted Emotion
Once the emotion is predicted, the result is displayed to the user on the dashboard. This helps the user understand their current mental state clearly.

H. Recommendation Generation
Based on the predicted emotion, the system provides personalized video recommendations:

1. Sad → Motivational videos
2. Stressed → Meditation/relaxation videos
3. Happy → Entertainment content

This step helps in improving or maintaining the user's emotional well-being.

I. Data Storage in Database All the information including:

1. User responses
2. Predicted emotions 3. Date and time is stored in the database. This ensures that user history is maintained properly for future reference.

J. Mood Trend Analysis
The stored data is used to generate graphs and charts that show emotional trends over time. Users can view:

1. Daily mood changes
2. Weekly patterns
3. Monthly analysis

This helps users identify emotional patterns and triggers.

K. User Dashboard Display
The dashboard presents all the information in an organized way, including:

1. Current mood
2. Recommended videos
3. Previous records
4. Mood graphs

This makes the system easy to use and understand.

L. Continuous Monitoring
The system works continuously as users provide daily inputs. Over time, it builds a detailed emotional profile of the user, which helps in better understanding and managing mental health.

iv. LIST OF MODULES WITH DISCRIPTION

The AI-Powered Mental Health Monitoring and Recommendation System is divided into several important modules. Each module performs a specific function to ensure the smooth working of the entire system.

A. User Authentication Module
This module handles user registration and login functionality. New users can create an account by providing basic details, while existing users can log in using their credentials. This module ensures data privacy and security by restricting access to authorized users only. It also helps in maintaining individual user records separately [16].

B. User Interface Module
The user interface is the front-end part of the system developed using HTML, CSS, and Flask templates. It allows users to interact with the system easily. Through this module, users can:

a) Answer daily questions
b) View predicted emotions
c) Check recommended videos
d) See mood trends

A simple and user-friendly interface improves user experience and encourages regular usage [17].

C. Gemini API Integration Module
This module is responsible for generating daily questions dynamically using the Gemini API. Instead of showing fixed questions, the system provides new and engaging questions every day. This helps in collecting more meaningful responses and keeps the user interested in the system [18].

D. Data Collection Module
This module collects user responses from the interface and sends them to the backend for processing. It ensures that all user inputs are properly captured and stored temporarily before further

analysis. The accuracy of the system depends heavily on this module [19].

E. Data Preprocessing Module
In this module, the collected text data is cleaned and prepared for analysis. The main tasks include:
a) Removing stopwords
b) Converting text to lowercase
c) Removing punctuation
d) Tokenization
This step is necessary to improve the performance of the machine learning model [20].

F. Feature Extraction Module
This module converts the cleaned text into numerical format using techniques like TF-IDF or Bag of Words. Machine learning models require numerical input, so this module plays a crucial role in preparing the data for prediction.

G. Machine Learning Prediction Module
This is the core module of the system. It uses a trained Machine Learning model to predict the emotional state of the user based on the processed input. The model classifies emotions into categories such as happy, sad, stressed, or relaxed.

H. Recommendation Module
This module provides personalized video recommendations based on the predicted emotion. It uses a rule-based approach to map emotions to suitable content. For example:
a) Sad → Motivational videos
b) Stressed → Relaxation videos
c) Happy → Entertainment
This module helps in improving the user's mood and overall experience.

I. Database Management Module
This module is responsible for storing and managing all system data, including: a) User details
b) Responses
c) Predicted emotions
d) Date and time
It ensures data consistency and allows users to access their history whenever needed.

J. Visualization Module
The visualization module generates graphs and charts to represent mood trends over time. It helps users understand their emotional patterns clearly. This module plays an important role in self-awareness and analysis.

K. Dashboard Module
This module combines all outputs and displays them in a structured format. The dashboard includes: a) Current mood
b) Recommended videos
c) Past records
d) Mood graphs
It acts as the main interaction point for the user.

L. System Integration Module
This module connects all components of the system, including frontend, backend, ML model, API, and database. It ensures smooth communication and proper data flow between all modules, making the system fully functional.

V. RESULT ANALYSIS

The result analysis of the AI-Powered Mental Health Monitoring and Recommendation System explains how effectively the system performs in terms of emotion prediction, user interaction, and recommendation quality.

A. Accuracy of Emotion Prediction
The Machine Learning model used in the system is able to predict user emotions with good accuracy based on text input. The use of preprocessing techniques and feature extraction methods improves the performance of the model. The system successfully classifies emotions such as happy, sad, stressed, and relaxed in most cases [21].

B. Effectiveness of Data Preprocessing
The preprocessing steps like stopword removal, tokenization, and text cleaning help in improving the quality of input data. Clean data leads to better model performance and more accurate predictions. This shows that proper preprocessing is very important in text-based emotion detection systems [22].

C. Performance of Gemini API for Question Generation
The integration of Gemini API plays a significant role in improving user interaction. The system generates different questions daily, which prevents repetition and keeps the user engaged. This leads to better quality responses and more reliable emotion prediction results [23].

D. Quality of Recommendations

The recommendation system provides relevant video suggestions based on predicted emotions. Users receive appropriate content such as motivational, relaxing, or entertaining videos. Although the system uses a rule-based approach, it still delivers satisfactory results and improves user experience [24].

E. User Engagement and Experience

The system is designed with a simple and user-friendly interface, which makes it easy to use for all types of users. Users can easily answer questions, view results, and track their mood. This increases user engagement and encourages regular usage of the system.

F. Data Storage and Retrieval Efficiency

The database efficiently stores user responses, predicted emotions, and timestamps. Users can access their past data without any delay. This ensures smooth functioning of the system and proper data management.

G. Mood Trend Visualization

The graphical representation of mood trends helps users understand their emotional patterns over time. Users can identify changes in their mood and possible reasons behind those changes. This feature is very useful for self-awareness and mental health improvement [25].

VI. CONCLUSION

The AI-Powered Mental Health Monitoring and Recommendation System is a useful and practical application that helps users understand and manage their emotional wellbeing. The system successfully combines Artificial Intelligence, Machine Learning, and web technologies to create an interactive and user-friendly platform. Through daily question-based interaction, the system collects user responses and predicts their emotional state using a trained Machine Learning model. The integration of the Gemini API makes the system more dynamic by generating fresh and engaging questions every day. Based on the predicted emotion, the system provides personalized video recommendations, which help users improve or maintain their mood. The system also stores user data and presents it in the form of graphs, allowing users to track their emotional patterns over time. This feature promotes self-awareness and helps users identify changes in their mental health. The Flask-based backend ensures smooth functioning, while the overall design keeps the system simple and accessible for all users.

Although the system has some limitations, such as dependency on data quality and rulebased recommendations, it still performs effectively in achieving its main objectives. It demonstrates how modern technologies can be used to address real-life problems like mental health monitoring. In conclusion, this project provides a strong foundation for developing intelligent mental health support systems and can be further improved by using advanced models and additional features in the future.

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