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ENHANCING MUSIC DISCOVERY THROUGH CONVERSATIONAL AGENTS: A HYBRID RECOMMENDER SYSTEM APPROACH

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Abstract : Emotions are based on human feelings, which can be expressed or not, and they serve as different types of behavioral indications. The exclusion of emotions aids in identifying a person's behavioral state. The main objective of this paper is to recommend appropriate music based on the user's emotional state using a suitable API that is readily available. This paper focuses on a chatbot that uses artificial to analyze the user's tone in text form as users increasingly interact with systems through text and voice assistants. A chatbot is a computer software created specifically for messaging networks that uses artificial intelligence to engage in conversations with humans.

An song and emotion-based recommendation system permits the users to listen to music based on their emotions. Existing systems use audio signals using the CNN approach and collaborative filtering to recommend songs based on the user's history. The proposed research work develops a personalized system, where the user's current emotion is analyzed with the help of the chatbot. The chatbot identifies the user's sentiment by asking some general questions. Based on the input provided by the user, current emotion or mood is analyzed by the chatbot and it will generate the playlist. The proposed recommendation system utilizes the APIs for the playlist generation and recommendation.

Keywords: Interactive Chatbot, Application Program Interface, Interactive Systems, Recommender Systems, Playlist generation

1.Introduction: In recent years, the proliferation of digital music platforms has transformed the way individuals discover and interact with music. Traditional recommendation systems, often driven by collaborative filtering and content-based approaches, have faced challenges in meeting the diverse preferences and evolving tastes of users. To address these challenges, this paper introduces a novel chatbot-based music recommender system designed to enhance user engagement and personalize the music discovery experience.

In an age of digital abundance, users often face the paradox of choice when selecting music from vast libraries available on streaming platforms. Traditional recommendation systems, while effective to some extent, often lack interactivity and fail to adapt dynamically to user preferences in real time. Conversational agents, or chatbots, offer a promising solution by facilitating natural language interaction and enabling more personalized and engaging user experiences.

This research explores the development of a chatbot-based hybrid music recommender system that combines the strengths of content-based filtering and collaborative filtering to

enhance music discovery. By leveraging natural language processing (NLP), the chatbot interprets user queries and feedback in real time, refining recommendations based on both historical data and contextual input. This approach aims to bridge the gap between static recommendation interfaces and interactive, intelligent systems capable of understanding nuanced user preferences.

The proposed system not only improves recommendation accuracy but also offers a more human-like interaction model, making music discovery more intuitive and enjoyable. This paper details the system architecture, implementation strategies, and evaluation metrics used to assess performance and user satisfaction.

2.Literature survey: Most mainstream audio and video recommender systems, such as Spotify, Netflix, Gaana, and YouTube, predominantly rely on search queries and user preferences, often overlooking the emotional aspect of user needs. A novel CNN- based model has been proposed to address this gap by detecting emotions and generating playlists tailored to the user's emotional state. This innovative model integrates specialized modules designed for detecting emotions conveyed through facial expressions as well as sentiments expressed during interactions with a chatbot .By incorporating these modules, the model enhances the overall performance and robustness of the music recommender system, ensuring that users' emotional needs are effectively met. This study presents a novel approach to song selection by associating colors with emotions, implemented through a Color-to-Music application. The project was structured in three stages: first, creating a music library that connects colors to feelings and corresponding music; second, developing two types of graphical user interfaces (GUIs) for color selection; and third, collecting data from 120 trial participants. The overall accuracy of the Color-to-Music Library was found to be only

51.11%, indicating a need for improvement. Specifically, the linkages between the HSV model and the fundamental aspects of music require enhancement [1].

This study proposes a human emotion recognition system that utilizes a combined approach of 2D-Linear Discriminant Analysis (LDA) integrated with 2D-Principle Component Analysis (PCA). Simulated results reveal that this method outperforms its alternatives, specifically 2D-LDA and 2D-PCA, in terms of feature extraction. Furthermore, when paired with our proposed feature extraction technique, the KNN classifier shows superior performance compared to the SVM classifier, highlighting the effectiveness of our approach in accurately recognizing human emotions.

This paper introduces a novel music emotion recognition model tailored specifically for music generated through Scratch, a platform that allows children to create their own background music. The model employs a main melody extraction algorithm to compile a dataset of Scratch-generated pieces, from which key features are extracted and input into a Convolutional Neural Network (CNN). The learned features from the CNN are then processed by a Recurrent Neural Network (RNN) to achieve final classification results. While the RNN captures sequential information, the CNN focuses on identifying significant musical elements. However, the overall accuracy of the emotion recognition model remains limited.

The study suggests that different emotion models can affect music emotion recognition tasks due to the complex relationship between music emotion and its underlying components. Additionally, some musical qualities may be lost in the dataset creation process, and since music emotion is not solely encoded in the audio, analyzing audio data alone may not fully capture the emotional depth of the music[2].

The innovative competence-based song suggestion problem is presented in this paper. They created a singer profile that accounts for voice pitch, intensity, and quality to represent a singer's vocal prowess. To train a speech quality evaluation function that could be calculated at query time, we presented a supervised learning approach. Additionally, a scaled-down vocalist profile is suggested to lessen the recording task in competency modeling.[3] CompetenceBased Song Recommendation: Matching Songs to One's Singing Skill – March 2015

A chatbot is an AI-powered program designed to engage in conversations with users, usually through messaging platforms. This project explores how advancements in Artificial Intelligence and Machine Learning can enhance various services. The chatbot utilizes WordNet to analyze user input and identify the closest matching response from a predefined set of statements. The primary objective is to develop an online chatbot system that assists users in navigating a college website, leveraging AI techniques such as Natural Language Processing to provide accurate and helpful interactions.

3.Proposed technology: A chatbot is a conversational software program designed to replicate human communication skills. It engages people in discussion automatically. It's a modern, innovative method of customer service that makes use of a chat interface and artificial intelligence. [10] AI-powered chatbots have revolutionized the way we interact with technology. They possess the remarkable ability to understand natural language, picking up on both meaning and emotion, and crafting intelligent responses. This means customers no longer have to endure long waits on the phone or send countless emails to get the answers they seek—they can engage in a more comfortable, efficient manner. These chatbots not only enhance user experience but also help reduce call volumes, streamline average handling times, and lower customer service costs. However, achieving such sophisticated capabilities is no small feat; it requires a complex interplay of various system components.

In this study, the term "AI chatbot" is embraced as a synonym for conversational agents or advanced dialogue systems, highlighting their role as essential tools in modern communication.

Taxonomy of Chatbot:

The taxonomy of chatbots can be categorized based on various criteria, including functionality, technology, interaction style, and deployment method. Here's an overview of the main categories:

1.Functionality

- Rule-Based Chatbots: Operate on predefined rules and scripts, responding to specific commands and questions. They are limited in flexibility and context understanding.
- AI-Powered Chatbots: Use natural language processing (NLP) and machine learning to understand user intent and context, allowing for more dynamic and intelligent interactions.
- Transactional Chatbots: Designed to assist users in completing specific tasks, such as booking tickets, making purchases, or scheduling appointments.
- Informational Chatbots: Provide users with information on various topics, often functioning as FAQs or knowledge bases.

2.Technology

- Text-Based Chatbots: Communicate through written text, typically in messaging apps or websites.
- Voice-Activated Chatbots: Use speech recognition technology to engage users through voice, commonly found in smart speakers and virtual assistants.
- Multimodal Chatbots: Combine text, voice, and visual elements to create a more interactive experience.

3. Interaction Style

- Task-Oriented Chatbots: Focus on completing specific tasks and guiding users through processes (e.g., booking a flight).
- Conversational Chatbots: Emulate human-like conversations, engaging users in more open-ended dialogues and building rapport.
- Hybrid Chatbots: Blend both taskoriented and conversational elements, adapting to user needs dynamically.

4. Deployment Method

- Standalone Chatbot: Operate independently, often on dedicated platforms or applications.
- Integrated Chatbots: Embedded within existing systems (e.g., websites, customer service platforms) to enhance functionality.
- Social Media Chatbots: Deployed on social media platforms (e.g., Facebook Messenger, WhatsApp) to engage users directly.

5.User Experience

- Personalized Chatbots: Tailor interactions based on user data and preferences, enhancing relevance and engagement.
- Generic Chatbots: Provide standardized responses and interactions, without significant personalization.

6. Industry/Application

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- Customer Service Chatbots: Assist with customer inquiries, support, and servicerelated tasks.
- E-commerce Chatbots: Help users find products, make purchases, and provide recommendations
- Healthcare Chatbots: Offer medical advice, appointment scheduling, and health monitoring.
- Education Chatbots: Support learning through tutoring, answering questions, and providing resources.

This taxonomy illustrates the diverse landscape of chatbots, highlighting their varied functionalities, technologies, and applications. Understanding these categories can help businesses and developers design and implement effective chatbot solutions tailored to specific needs and user expectations.

4.Technologies:

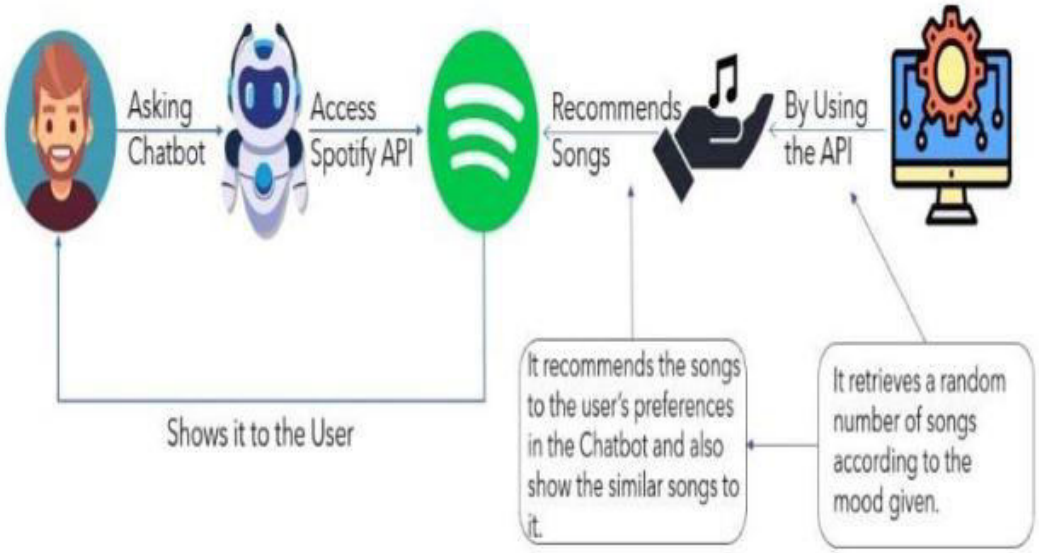
Python Main programming language to handle chatbot responses, recommendations

Flask web framework to connect frontend and backend

HTML Structure of the webpage (chat window, buttons, etc.)

CSS Styling the webpage (fonts, colors, layout)

Working:



1. Goal of the Landing Page

The landing page is where the user first interacts with your system. It usually features:

- A chatbot interface (user types in messages like “I’m feeling sad”)

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- A music recommendation component (Spotify)
- Backend logic to handle messages and fetch Spotify tracks

2. Python Backend Receives the Message

- Python (Flask app, for example) receives the request at the /chat endpoint.
- Uses basic NLP or sentiment analysis (or keywords) to understand mood/intent.
  - Example: “feeling sad” → mood = "sad"

3. Backend Queries Spotify API

- Python uses Spotify’s Web API (with OAuth token) to search for tracks.
- Based on mood/genre:

4.User Interaction and Data Collections :-

Natural Language Processing (NLP): The chatbot needs to understand user inputs, which typically involves NLP techniques for parsing and interpreting natural language. Common tasks include:

Intent Recognition Understanding the user’s intent, e.g., looking for a song, requesting a recommendation, or asking for information.

Entity Recognition: Identifying key entities in the user’s input, such as artist names, genres, moods, or specific song titles.

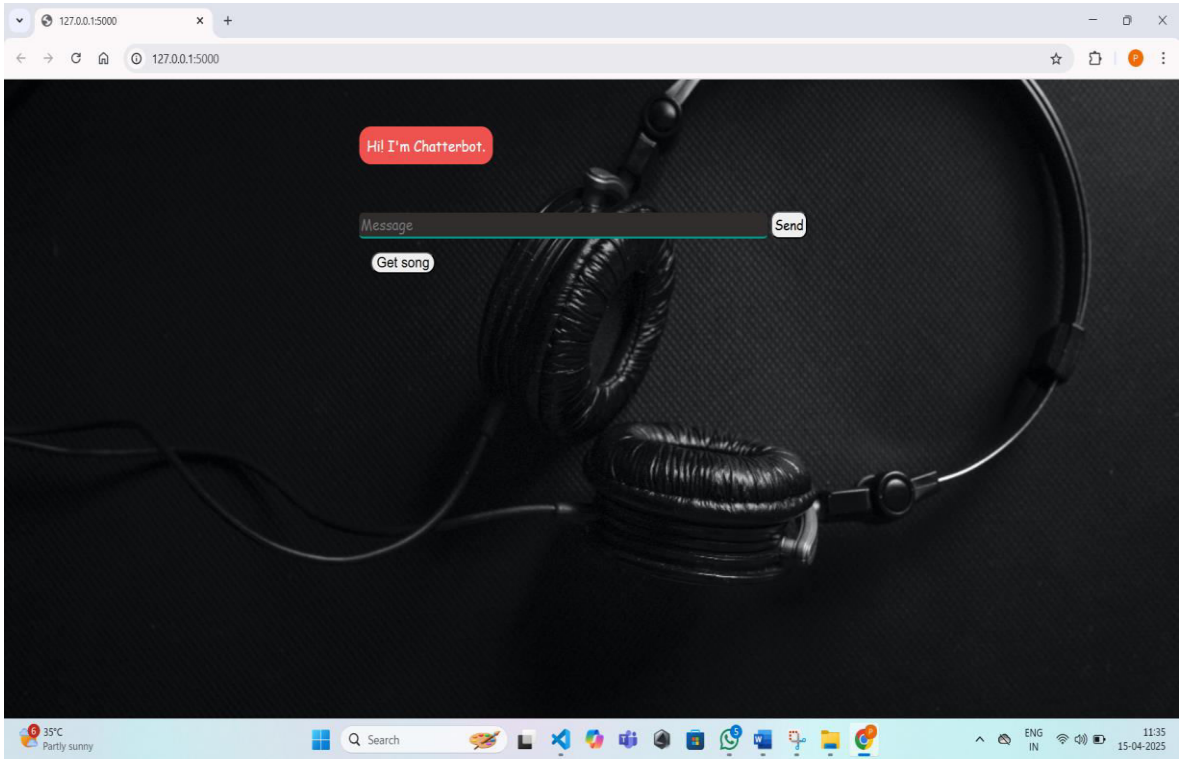

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Fig.Landing Page

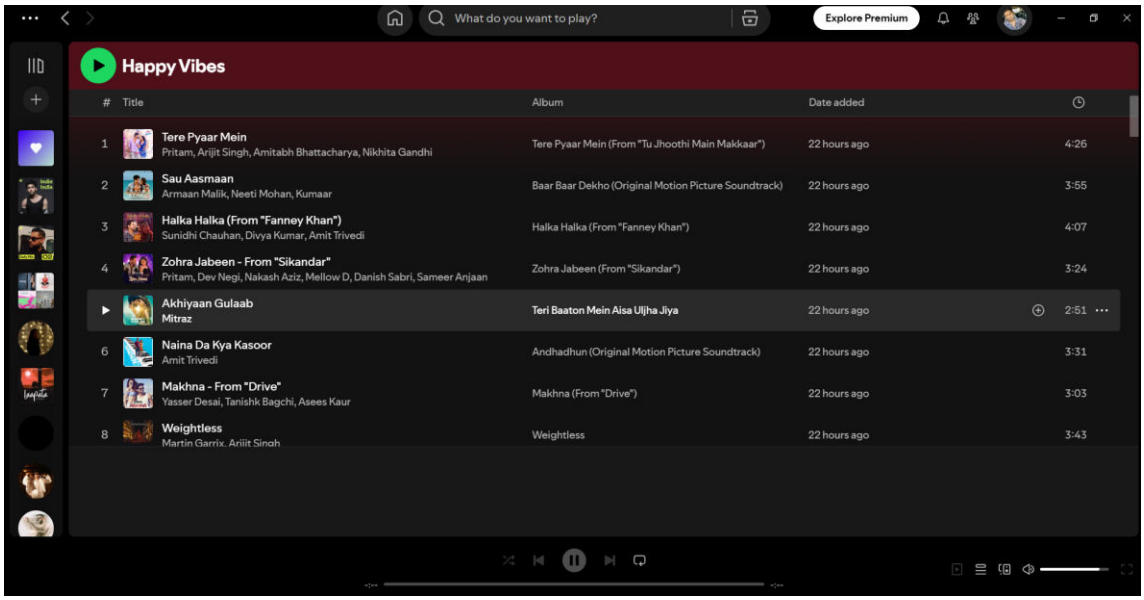

Fig. Spotify web Api

Conclusion :

Chatbots have emerged as valuable tools for simplifying human work through effective communication. While current research primarily emphasizes response improvement, there is a pressing need to explore linguistic aspects like emotional and sentiment analysis. Incorporating these features can enhance user experience by enabling chatbots to provide personalized and empathetic interactions. Additionally, leveraging artificial intelligence offers a promising avenue for enhancing chatbot capabilities and services. This direction can lead to intelligent and efficient chatbots that cater to diverse user needs. Moreover, the proposed work on human emotion recognition can be extended to effectively recognize mixed emotions, enabling a deeper understanding of individuals' emotional states. By considering these avenues, chatbots can evolve into powerful assistants, simplifying tasks and offering valuable support to humans in various domains

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