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Mood Detection and Recommendation System

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ABSTRACT:A user's facial expressions can reveal his or her mood or level of emotion. The system uses facial emotion recognition to identify the user's emotional state and then recommends music that aligns with that emotion. These expressions can be gleaned from the system's camera's live feed. In the area of computer vision and machine learning (ML), a lot of research is being done to train machines to recognize different human emotions or moods. Machine learning offers a variety of methods for detecting human emotions. Music is a fantastic way to connect. It binds us despite differences in markets, ages, backgrounds, tongues, preferences, political philosophies, and socioeconomic status. As this project can be used anytime, anywhere, and in conjunction with daily activities, travel, sports, and other activities, they are in high demand. Mobile networks and digital multimedia technologies have developed quickly, and as a result, digital music and films have supplanted traditional media as the principal forms of consumer entertainment for many young people. People frequently utilize music as a tool for mood control, specifically to lift their spirits, boost their energy, or soothe tension. Therefore, music has a significant impact on how people feel. Our system's mood-based recommendation engine creates suggestions for music based on the mood that is being detected. Customer satisfaction is a significant advantage of mood detection. This system's goals are to analyse a user's image, anticipate their expression, and recommend music that will lift their mood.

I.INTRODUCTION

Emotions play a crucial role in human decision-making and behaviour. Advances in machine learning and computer vision have made it possible to analyze emotions in real-time and provide personalized experiences to users based on their emotional state. One such application is mood detection and recommendation systems, which leverage machine learning techniques to analyze the user's emotions and provide recommendations that align with their mood.

In this paper, we propose a mood detection and recommendation system that uses facial expression recognition to detect the user's emotional state and recommend music that aligns with their mood. The system also allows the user to input their preferred genre, which the recommendation algorithm considers when making suggestions. The proposed system has several potential applications, including mental health diagnosis, personalized music streaming, and marketing research. We evaluate the proposed system's accuracy and effectiveness in detecting emotions and providing personalized music recommendations.A general classification of human emotions includes: happy, sad, fear, angry, disgust etc. These feelings are quite understated. Very little facial muscle movement occurs, making it difficult to distinguish between variations because even a minor variation might cause a change in expression. Additionality, since emotions are highly context-dependent, different people's expressions of the same emotion may differ, even between the same person. Even though the mouth and eyes, which show the most emotion, are the only parts of the face that receive attention, how these gestures are extracted and classified is still a crucial issue. For these tasks, neural networks and machine learning have been applied with positive results. Machine learning algorithms have shown to be quite helpful in classifying and recognizing patterns, therefore they can also be used to identify mood.The creation of a personalized music recommendation system that makes music recommendation for consumers is crucial in given the advancement of digital music technology. Making recommendations based on the vast amount of the online data is really difficult. Company like Spotify and Pandora utilize machine learning and deep learning techniques to provide the right recommendations, while e-ecommerce behemoths like Amazon and eBay offer personalized recommendations to individuals based on their preferences and history. Work on personalized music recommendations has been done in order to suggest songs depending on the use's preferences. There are two main methods of providing individualized music and recommendations. One is the content-based filtering strategy, which examines the music and movie content that provides users have enjoyed and suggests music with pertinent content. The key advantages of this strategy are that the model can only provide recommendations based on the user's current interests. To put it another way, the model has a limited capacity to build upon the consumers already established interests. The purpose of this effort is to develop a music player or recommendation system for music that can recognize a user's face, determine their current mood, and then suggest a playlist based on that mood.

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II.LITERATURE REVIEW

1.Hemanth Adarsh,Aswan C.B, Ajith P, Veena A Kumar, "EMOPLAYER: Emotion Based Music Player", International Research Journal of Engineering and Technology (IRJET), vol. 5, no. 4,April 2018, pp. 4822-87.
The paper "EMO PLAYER: Emotion Based Music Player" by Hemanth et.al (2018) explores the concept of a music player that detects the user's emotions and plays songs accordingly. The authors used the FER-2013 dataset to train their machine learning model to detect emotions from facial expressions and achieved an accuracy of 90.5%. The study is part of a growing body of research in emotion-based music player development that has explored physiological signals, facial expressions, and text input as potential inputs for emotion detection. However, challenges such as subjectivity and the need for large and diverse datasets still need to be addressed.

2.Raut, Nitisha, "Facial Emotion Recognition Using Machine Learning" (2018). Master's Projects. 632. https://doi.org/10.31979/etd.w5fss8wd
In this paper on facial emotion recognition using machine learning highlights the various approaches proposed in previous studies, including deep neural networks and traditional machine learning algorithms. The review notes that high accuracy rates have been achieved using datasets such as CK+, FER2013 and JAFFE. However, the author also acknowledges that there are still challenges to be addressed, such as variations in lighting and pose, which limit the robustness and real-world applicability of these models. Overall, the literature review provides a comprehensive summary of the state od research in facial emotion recognition using machine learning.

3. Dr. Shaik Asif Hussain and Ahlam Salim Abdallah Al Balushi, "A real time face emotion classification and recognition using deep learning model", 2020 Journal. of Phys.: Conf. Ser. 1432 012087:
The literature review presented in the paper by Dr. Shaik Asif Hussain and Ahlam Salim Abdallah Al Balushi highlights the effectiveness of deep learning algorithms, such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), in achieving high accuracy rates in facial emotion recognition tasks. The authors note that the availability of large datasets, such as FER-2013 and CK+, has contributed to the success of these models. However, the review also highlights the challenges that still need to be addressed, such as the need for large amounts of data and the susceptibility of deep learning models to overfitting.Overall, the literature review provides a comprehensive summary of the state of research in facial emotion recognition using deep learning models.

4.Puri, Raghav & Gupta, Archit& Sikri, Manas& Tiwari, Mohit & Pathak, Nitish & Goel, Shivendra. (2020). Emotion Detection using Image Processing in Python.
This article states that the current music recommendation research results from the perspective of music resources description. It is suggested that there is a lack of systematic research on user behavior and needs, low level of feature extraction, and a single evaluation index in current research. Situation was identified to be an important factor in the music personalized recommendation system. Finally, it was concluded that when the weights given to all the contextual factors were the same, greatly reduced the accuracy of the recommendation results.

5. Lee, J., Yoon, K., Jang, D., Jang, S., Shin, S., & Kim, J. (2018).Music Recommendation System on genre distance and user preference classification.
In this study of hybrid recommendation system approach concept will work once their model is trained enough to recognize the labels. The mechanism for the automatic management of the user preferences in the personalized music recommendation service automatically extracts the user preference data from the user's brain waves and audio features from music. In their study, a very short feature vector, obtained from low dimensional projection and already developed audio features, is used for music genre classification problems. A distance metric learning algorithm was applied in order to reduce the dimensionality of the feature vector with a little performance degradation. Proposed user's preference classifier achieved an overall accuracy of 81.07% in the binary preference classification for the KETI AFA2000 music corpus. The user satisfaction was recognizable when brainwaves were used.

III.METHODOLOGY OF PROPOSED SURVEY

In this project it creates the playlist of Spotipy based on the user's input, where the user needs to enter the name of the artist. To enter the name, we have proposed the Graphical User Interphase with the help of tkinter. The programme then retrieves data from the artist's albums, saves it in a dictionary, and obtains audio features for each album's tracks. The dictionary also stores the acoustic characteristics and popularity of each tune.

Spotipy for interacting with the Spotify API, and PIL for loading and showing images. It then defines a function that is run once the user enters the artist's name and clicks the "Submit" button. The function obtains the artist's URI before

obtaining the URI.A nested dictionary is then created to store information about the albums and tracks. For each album, a function is called to get the tracks and store their information in the dictionary. Another function is then called to get the audio features of each track and store them in the dictionary as well.

User Input: The first part of the code uses Tkinter, a Python GUI toolkit, to get user input (name of the artist) through an input box. Once the user clicks the submit button, the input value is passed to the Spotify API search function to retrieve the artist's details.
Data Collection and Preparation: The second part of the code retrieves the album details for the specified artist, extracts all the tracks in each album, and gets their audio features using the Spotify API. The extracted data is then stored in a dictionary for further processing.

Data Analysis and Visualization: The third part of the code uses various data analysis and visualization libraries like NumPy and Matplotlib to analyze and visualize the extracted data. For example, it computes the average value of each audio feature for all the tracks in each album and visualizes them as bar plots. Finally, it uses the Silhouette Score from the Scikit-Learn library to cluster the tracks based on their audio features.
Execution Time and Error Handling: To avoid rate-limiting issues from the Spotify API, the code introduces random sleep times between requests. Additionally, the code incorporates error-handling measures like try-except blocks to handle any exceptions that may occur during the execution.
The program includes a loop that have some delay Spotify API with requests. Finally, the program utilizes the audio features of the tracks to perform clustering and identify the dominant emotion of each track using a pre-trained emotion classification model. Based on the dominant emotion of the tracks, the program creates a playlist of tracks with the same dominant emotion.

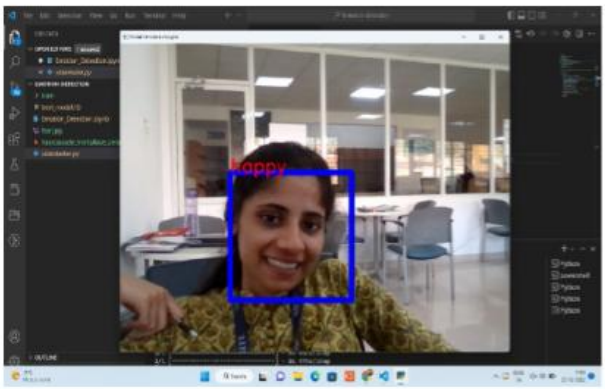

Figure 1: Facial recognition showing a happy mood.

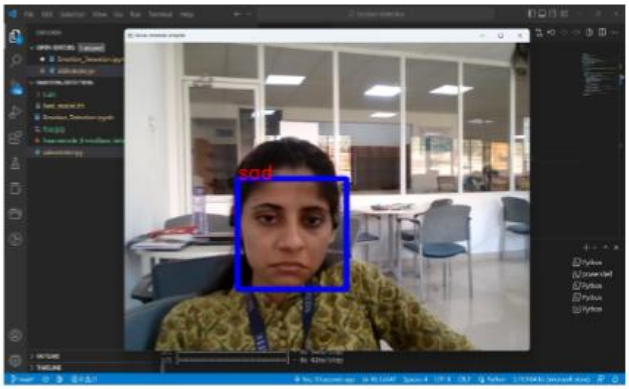

Figure 2: Facial recognition showing a sad mood.

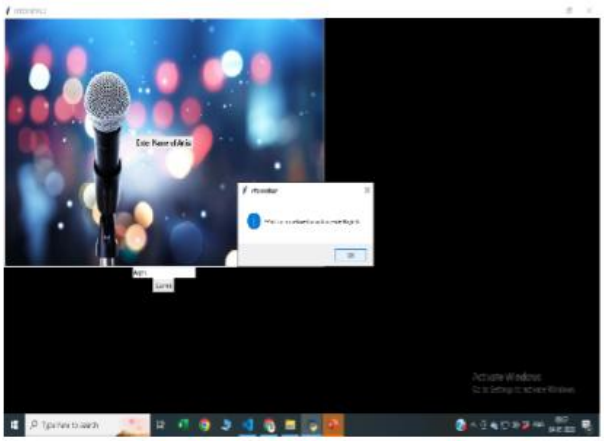

Figure 3: GUI that directs users to enter the artist's name.

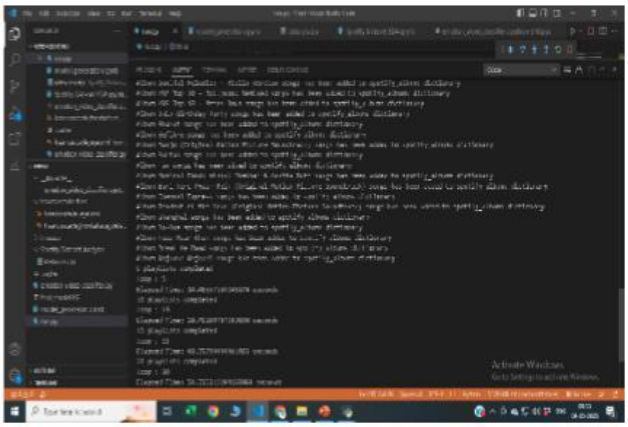

Figure 4: Creating the artist'splaylist entered.

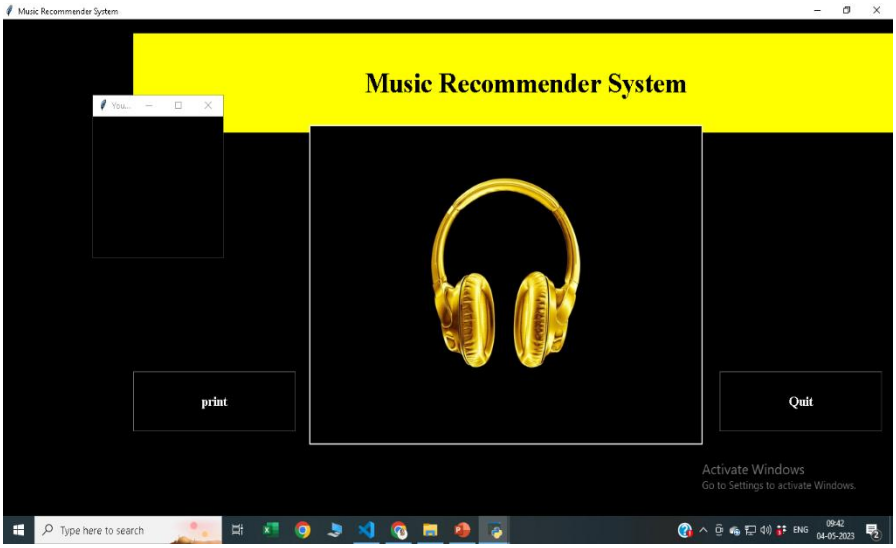

Figure 5: GUI for music recommendation system.

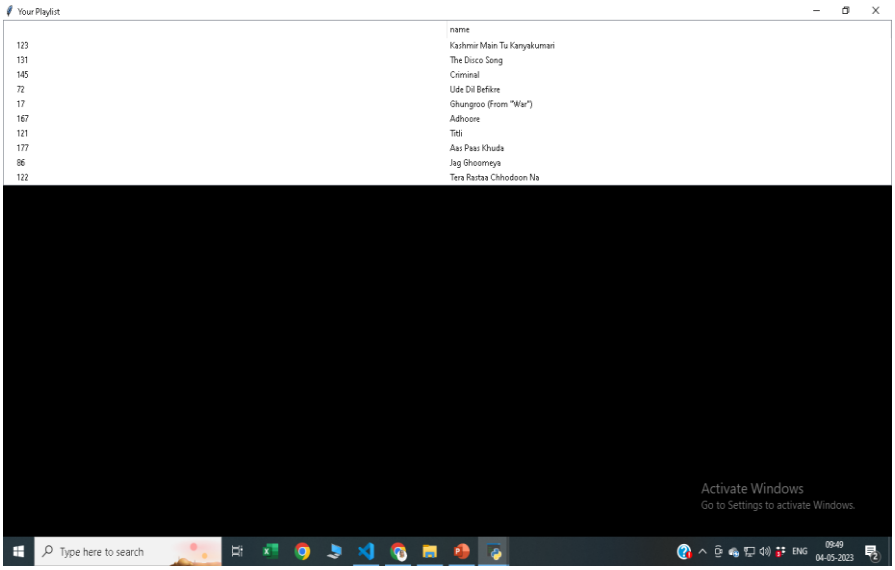

Figure 6 : Creating the top 20 playlists according to detected mood.

IV.CONCLUSION AND FUTURE WORK

Even though human emotions are complex and subtle, it is possible for a machine learning model to be trained to accurately detect a set of emotions which can be differentiated from each other with certain facial expressions. The expression on a person's face can be used to detect their mood, and once a certain mood has been detected, music suitable for the person's detected mood can be suggested. This project having the accuracy of approximately 65%, is able to detect two moods accurately: happy, sadand this project is able to recommend the music that would be suitable for the detected mood.

In addition to that, finding suitable musicon detection of happy or sad mood is also a challenge. As a result, can be viewed as a potential area of focus for our project. Overfitting in our trained model can occasionally cause variations in accurate detection. Therefore, it must be trained on more images to produce results that are more accurate. Using mood recognition to recommend films and TV shows is another potential future application for our project.

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