EMOTION BASED MUSIC RECOMMENDATION SYSTEM

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ABSTRACT
Collaborative or content-based recommendation engines are used by the majority of the music recommendation systems currently in use. However, a user's choice of music is not solely influenced by their past tastes or the genre of the music. but also based on the user's emotional state. The goal of this project is to use facial feature recognition technology to create an emotion-based music recommendation system. The system makes music recommendations based on the user's current emotional state by analyzing facial expressions and extracting emotional features through computer vision techniques. The suggested system makes use of a collaborative filtering algorithm-based music recommendation engine in addition to a deep learning model for facial expression recognition. With a straightforward interface that enables users to engage with the system and receive tailored music recommendations based on their present emotional state, the system is made to be easily accessible and user-friendly. Potential advantages of the project include raising user engagement with the music streaming platform, improving the user's musical experience by making personalized music recommendations based on their emotional state, and possibly improving mental health outcomes.

Introduction
The creation of personalized recommendation systems that can offer users content that is tailored to their interests and behaviors has drawn more attention in recent years.A promising solution to this problem is the emergence of emotion-based recommendation systems, which use the user's emotional state to generate personalized recommendations.

The popularity of personalized music recommendation systems is rising as more and more people seek for new music that suits their tastes and preferences. These systems are essentially made to offer users personalized recommendations based on their unique listening habits, tastes, and behaviors.The ability of personalized music recommendation systems to introduce users to new music that they might not have otherwise heard is one of its main advantages. These systems are usually driven by algorithms that examine a user's playlists, listening history, and other information to provide personalized recommendations based on their own likes and preferences. This implies that consumers have a higher chance of discovering music they like and value.The total listening experience of the user can also be improved by using personalized music recommendation systems. Certain systems have the ability to examine a user's listening preferences in order to generate personalized playlists that correspond with their activities or mood. Those looking for music to help them focus, unwind, or exercise may find this to be especially beneficial.Personalized music recommendation systems also have the advantage of promoting a feeling of community among their users. A lot of these systems have social features that let users share music-related content with friends and followers, like playlists and favorite songs.

This can foster a feeling of community and involvement around music, which is especially advantageous for those who have a strong love for it and wish to interact with like-minded individuals.

Of course, there are drawbacks to personalized music recommendation systems.

The fact that these systems rely on algorithms, which occasionally generate biased or incorrect recommendations, is one of the main problems. For instance, the algorithm might not consider a user's wider musical tastes and preferences if it is only examining their recent listening history.

The current method relies on collaboration and uses user data from prior listeners to suggest music to the user; however, it is useless without prior user input. The current method of categorizing different music into groups like happy, sad, angry, etc. takes a lot of manual labor.

In order to address the aforementioned problem, the author is employing "Wearable Physiological Sensors." These sensors will transmit signals to an application about the user's present state, and the application will use SVM (support vector machine) and deep learning neural network algorithms to extract features from the signal in order to classify and predict the user's mood. All data pertaining to mood-based signals will be used to train the SVM algorithm. Deep learning neural networks and SVM will then apply newly received signals to the train data in order to classify user moods. The user will see and be recommended songs from a list based on the detected mood.

Since we are students and cannot afford sensors for this project, we are recommending music and detecting user mood using face-based images. Faces are the most reliable indicator of a user's mood. We made numerous attempts to look for sensor data to categorize mood, but there are no such datasets on the internet.

A system that uses computer vision techniques to detect and analyze facial expressions in order to extract emotional features is known as an emotion-based music recommendation system using facial emotions. These features are then used to recommend music that corresponds with the user's current emotional state. This system integrates recommendation engines for music and facial expression recognition, two critical technologies. By examining the user's facial expressions in real-time, the system determines their emotional state and then suggests music that fits with that state.By making tailored musical recommendations based on the user's emotional state, the system can improve their musical experience. For instance, the system can suggest more soothing or calming music to a user when they are depressed. On the other hand, the system can suggest more lively or lively music if the user is in a good mood. This might lift the user's spirits and result in a better listening experience.A deep learning model is trained to identify various facial expressions and categorize them into distinct emotional categories in order to create an emotion-based music recommendation system using facial emotions.

Using this data, the system can then suggest music to the user based on their emotional state. All in all, a facial recognition system for emotion-based music recommendations.

The current method relied on user participation and made music recommendations based on historical user data. It was, nevertheless, constrained by the lack of fresh user input.

Furthermore, a lot of manual labor was needed to classify music according to various emotional states (such as happy, sad, or angry).

The author suggested using "Wearable Physiological Sensors" to determine the user's emotional state in order to overcome these difficulties. The application that receives the signals from these sensors would use SVM and deep learning neural network algorithms to extract features and categorize/predict the user's mood. The system could recommend a suitable song list based on the detected mood by using mood-based signal data to train the SVM algorithm and applying new signals to the trained model.

Since students lacked the resources to purchase sensors, a different strategy was used to assess user mood and suggest music: facial image recognition.

It was found that facial expressions were the best indicator of a user's mood.

No existing datasets containing sensor data for mood classification could be found online, despite searches.

Facial emotions are used in the proposed emotion-based music recommendation system, which uses computer vision techniques to identify and interpret facial expressions.

The user's current emotional state is taken into account when recommending music based on emotional features that are extracted from these expressions. This system combines music recommendation engines with facial expression recognition technology. The system determines the user's emotional state by interpreting their in-the-moment facial expressions and making tailored music recommendations.

EXISTING SYSTEM

The majority of the current music recommendation systems rely on the user's listening habits and preferences. Nevertheless, there are a few drawbacks to this strategy. It doesn't consider the user's emotional state at the time of listening, first and foremost.

Furthermore, other important factors like cultural background, social context, and physiological factors are overlooked by the current systems. The algorithms used by conventional recommendation systems are unable to adjust to the changing preferences and emotional states of the users.

The recommendations are frequently too generic and depend on well-known songs or performers, disregarding the user's personal tastes. Moreover, these systems don't offer real-time recommendations, which can be helpful in a variety of circumstances, like workouts, lengthy car rides, or relaxation sessions.

The majority of the current music recommendation systems rely on the user's listening habits and preferences.They rely on methods of content-based or collaborative filtering. They make song recommendations based on user preferences and characteristics like artist and genre.

These methods, however, fail to consider the user's emotional state, which is a critical factor in identifying their musical preferences. Furthermore, other important factors like cultural background, social context, and physiological factors are overlooked by the current systems. The algorithms used by conventional recommendation systems are unable to adjust to the changing emotional states and preferences of users.

PROPOSED SYSTEM:

The goal of the suggested emotion-based facial expression-based music recommendation system is to get beyond the drawbacks of the current ones. The system can precisely identify the user's emotional state in real-time by utilizing a facial recognition technology.

The system can offer customized recommendations that are suited to the user's present emotional state based on their facial expressions. The system offers a consistent and customized experience by adjusting to shifts in the user's emotional state.Using a facial recognition system, our system is able to precisely identify the user's emotional state. Personalized music recommendations are generated by the system according to the user's emotional state. It is made to adjust to shifts in the user's emotional state, offering a dependable and customized experience. By making recommendations that are emotionally meaningful, it seeks to improve the experience of listening to music.

By taking into account user input, feedback, and preferences, the suggested system can also take cultural and social contexts into account. This will guarantee that the suggestions correspond with the user's musical tastes, cultural background, and preferences.Furthermore, by revealing to users the generation process for the recommendations, the proposed system promotes transparency.

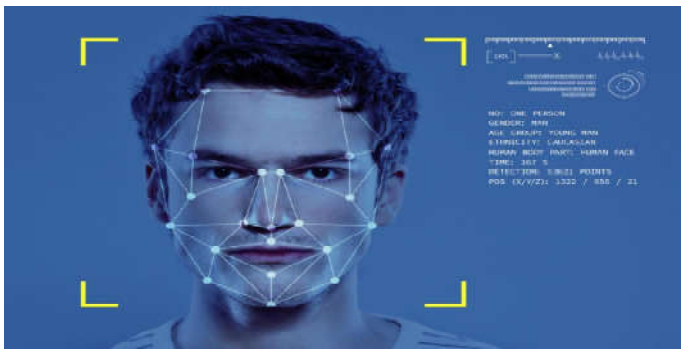
Users will be better able to comprehend the rationale behind some recommendations and offer input on them as a result. Users can also adjust the music's intensity using the system, which can be crucial for those who are sensitive to different emotions. In addition to offering users real-time recommendations, the suggested system will let them select from a large selection of emotions, musical genres, and playlists based on their tastes and mood.

1. Image Detection

In this module an image is the input through camera or file selection process. This module detects images of persons and displays its count.

2. Image Recognition

In this module image with faces will be recognised using image processing and haar cascade image classifier, which classifies image into positive and negative



Emotion Detection

In this module emotions from the input image is detected like happy, sad, angry, surprised

Music Recommendation

In this module music is recommended by the application based on the emotion detected.

TESTING

The goal of testing is to find mistakes. The process of trying to find every potential flaw or vulnerability in a work product is called testing. It offers a means of testing the functionality of individual parts, subassemblies, assemblies, and/or final products. Software testing is the process of putting software through its paces to make sure it meets requirements.

The software system satisfies user expectations and meets requirements without exhibiting unacceptable failures. Different test kinds exist. Every test type responds to a particular testing need.

IMPLEMENTATION DETAILS

Using Python OPENCV, we upload images to this application.

We first preprocess the image to extract features, which are then applied to the SVM/Deep Learning Neural Network Training Model to predict the user's moods. All of the songs are then detected and displayed in a drop-down box, allowing the user to select and play any song.

All sample photos are located in the images folder, and all songs are located in the songs folder. You have the ability to add new songs to the songs folder by naming them something like happy1.mp3, happy2, happy3, sad1, sad2, etc. In a similar manner, you can add songs to any category.

Currently i am using different songs for all moods.

To run project , install below packages -

Pip install playsound

pip install imutils

pip install tensorflow==1.14.0

pip install playsound

pip install openvcv-python==4.5.2.52

pip install h5py==2.10.0

pip install msvc-runtime

pip install keras==2.3.1

pip install --user --upgrade tensorflow-gpu

pip install --user --upgrade tensorboard

pip install keras==2.3.1

pip install --user --upgrade tensorflow-gpu==1.14.0

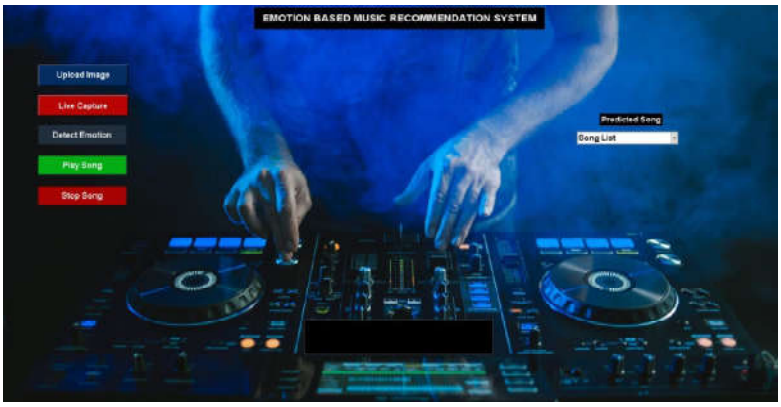
To run the Project :

1. To start the project click on emotion based music recommendation system folder
2. Go to source code folder and click on emotion.py file.
3. Select the python file and go to cmd to launch the code.
4. So after launching the code click on new terminal or power shell and type Emotion.py migrate.
5. We have to install the required packages in Visual Studio code to launch the application
6. So make sure that you install every package and then launch the application.

These are the implementation details to run the project.

Results

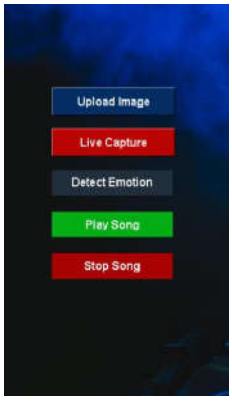
Double click on 'run.bat' file to get below screen



This is the main window of the project

1. We can see the main background and all the functions on this window
2. This is the project's primary window, presenting the main backdrop and displaying various functions.

CONTROL SECTION



The project's main window includes functions for uploading images, capturing live images, detecting emotions from input, playing predicted songs, and stopping the currently playing song.

These buttons serve their respective purposes within the application.

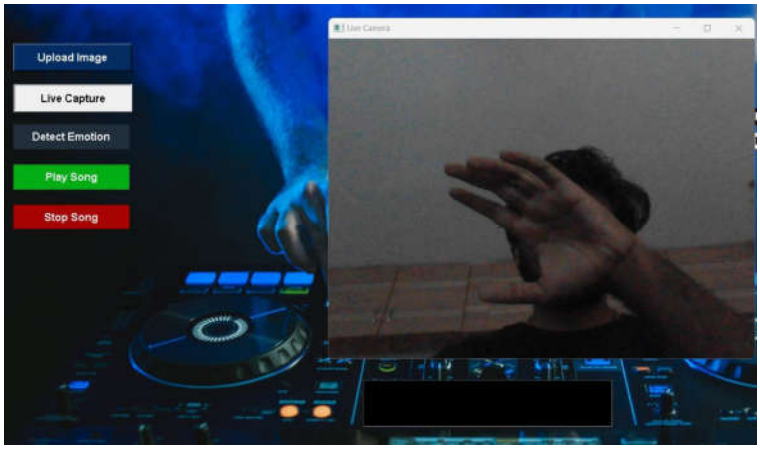
These are the functions or buttons of the application ,

Each button has a functionality as they are mentioned above.

IMAGE SELECTION

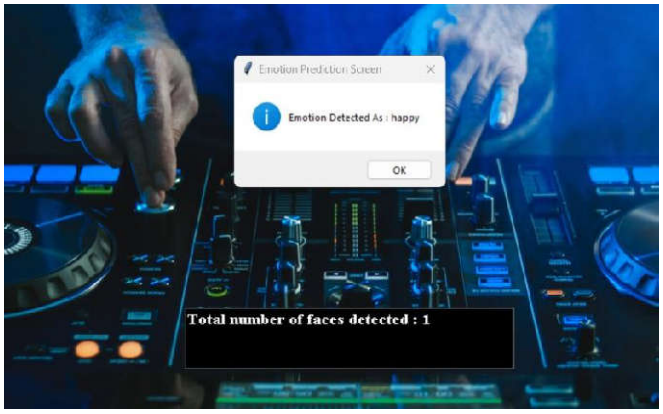
1. To access the screen mentioned above, click on the "Upload image" button.
2. From there, you can choose an image from your device and effortlessly upload it to the
3. system.
4. Simply select the desired image, and the system will automatically handle the uploading
5. process.
6. Click on the Upload image button to get to the above screen
7. Here you can select any image from your device and upload it to the system
8. By simply selecting the image , the system will automatically uploads it to the system.

LIVE CAPTURE SCREEN

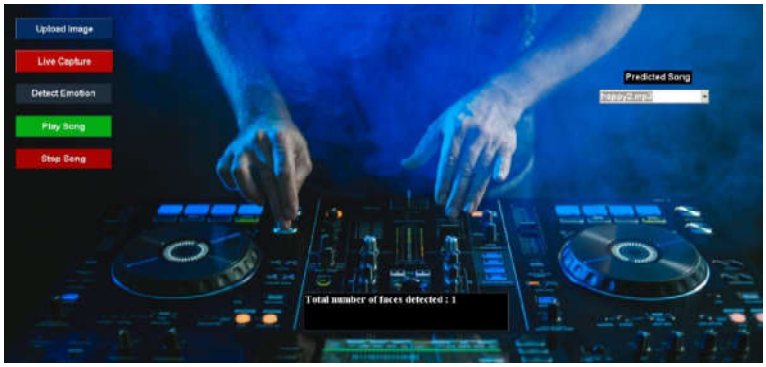


1. By clicking the "Live capture" button, the system will activate the camera, allowing you to
2. capture live images by pressing the 'q' button on the keyboard.
3. The captured image will then undergo preprocessing and be used as input for emotion
4. prediction.
5. If we click on the Live capture button.
6. The system will open camera and we can capture live images by pressing button ‘q’ on the
7. Keyboard
8. Then the system will preprocess the image as input and predicts the emotion.

EMOTION DETECTION SCREEN



 After the number of faces detected.
 Click on Detect Emotions to get to the above screen
 As I have selected a happy image the emotion is detected as happy as we can see above
 In this screen emotion will be detected



 By clicking the "Play song" button, the system will initiate the playback of the selected song.
 To stop the song, simply click on the "Stop song" button.
 You can repeat this process as desired. This marks the final screen of the application.
 If you click on the play song button.
 The system will play the song you selected, To stop we have to click the Stop song button.
 We can also repeat this process again anytime

This is the Final screen of the Application.

Conclusion

Facial Features-Based Emotion-based Music Recommendation System With the use of AI, machine learning, and facial recognition technologies, Recognition is a ground-breaking app that delivers a customized music experience to users based on their emotional states.

In comparison to other music recommendation systems, the system offers a number of benefits, one of which is that it gives users an interesting and distinctive musical experience. This technology could revolutionize the music industry and alter how people listen to music, given the growing demand for customized music experiences.

Users' musical experiences can be greatly improved by the promising technology known as the Emotion-based Music Recommendation System, which uses facial emotions.

This system analyzes users' emotional states using facial emotion recognition, suggesting music that matches the user's current emotional state.

Compared to conventional music recommendation systems, the suggested system offers a number of benefits, such as enhanced emotional response, increased user engagement, and greater personalization. Furthermore, this system can offer insightful information about users' emotional states, facilitating additional research and advancements in the areas of emotion recognition and music recommendation.

References

1. S. Jhajharia, S. Pal, and S. Verma, “Wearable computing and its application,” Int. J. Comp. Sci. and Inf. Tech., vol. 5, no. 4, pp. 5700– 5704, 2014.
2. K. Popat and P. Sharma, “Wearable computer applications: A feature perspective,” Int. J. Eng. and Innov. Tech., vol. 3, no. 1, 2013.
3. P. Melville and V. Sindhwani, “Recommender systems,” in Encyc. of mach. learn. Springer, 2011, pp. 829–838.
4. N. Sebe, I. Cohen, T. S. Huang et al., “Multimodal emotion recognition,” Handbook of Pattern Recognition and Computer Vision, vol. 4, pp. 387– 419, 2005.
5. R. W. Picard, E. Vyzas, and J. Healey, “Toward machine emotional intelligence: Analysis of affective physiological state,” IEEE Trans. Pattern Anal. Mach. Intell., vol. 23, no. 10, pp. 1175–1191, 2001.
6. D. Ayata, Y. Yaslan, and M. Kamasak, “Emotion recognition via galvanic skin response: Comparison of machine learning algorithms and feature extraction methods,” IU J. of Elect. & Elect. Eng., vol. 17, no. 1, pp. 3129–3136, 2017.
7. P. Ekman, R. W. Levenson, and W. V. Friesen, “Autonomic nervous system activity distinguishes among emotions.” Am. Assoc. for Adv. of Sci., 1983.