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A Survey on Emotion Based Music Recommendation System Using Facial Recognition

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ABSTRACT: Recent studies confirm that human react and respond to music and this music has a high impact on person's brain activity. People tend to listen to music based on their interests and mood. This project focuses on developing an application to suggest songs for user based on their mood by capturing facial expressions.In this system, to determine the user's emotion through facial expressions computer vision components are used. Once the emotion is recognized, based on the emotion the system suggests a playlist, this saves a lot of time of a user over selecting and playing songs manually. Emotion-Based Music Player also keeps track of user's details like a song played for number of times, sorts songs based on interest level and category, and reorganizes the play-list every time. The system also notifies user about the songs that are never played,sothat they can be modified or deleted.

KEYWORDS: Facial Emotion Detection, Facial Expression Recognition, Audio Feature Recognition, Emotion Based Music player.

I. INTRODUCTION

Emotions are expressed through speech, facial expressions, gestures, etc. We use facial expression for the system to understand a user's mood. We can capture the user's facial expression through the mobile device's camera. There are many emotion recognition systems which take captured image as input and then determine the emotion.There are two major approaches for the personalized music recommendation [3]. One is the collaborative filtering approach which recommends music that peer group of similar preference liked. The other content-based filtering approach which analyses the content of music that users liked in the past and recommends the music with relevant content. Both recommendation approaches are based on the users' preferences observed from the listening behavior[5]. However, sometimes, it is more adequate to recommend music based on the emotions. Potential applications of emotion-based music recommendation include of music score selection for production of home video, background music playing in shopping mall to stimulate sales and music therapy.

We are using Affectiva SDK for recognition of emotion for this application. The system includes a novel algorithm [EMO-algorithm] that organizes songs based on the user's preferences and emotions. This algorithm suggests user's songs to play based on their emotion[1].

II. LITERATURE SURVEY

I. Various methodologies have been proposed to classify the behavioral and emotional state of the user. Mase et al. focused on using movements of facial muscles while Tian et al. [8] attempted to recognize Actions Units.

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II. (AU) developed by Ekman and Friesen in 1978 using permanent and transient facial features. With evolving methodologies, the use of Convolutional Neural Networks (CNNs) for emotion recognition has become increasingly popular [9].

III. Pantic and Rothkrantz [4] proposed system which processes images of frontal and profile face view. Face boundaries have been found using Vertical and horizontal Histogram Analysis. Then, face contour is obtained by thresholding the image with HSV color space values.

IV. Music has also been classified using lyrical analysis [5], [6]. While this tokenized method is relatively easier to implement, on its own it is not suitable to classify songs accurately. Another obvious concern with this method is the language barrier which restricts classification to a single language.

V. Another method for music mood classification is using acoustic features like tempo, pitch and rhythm to identify the sentiment conveyed by the song. This method involves extracting a set of features and using those feature vectors to find patterns characteristic to a specific mood [7].

III. METHODOLOGIES

Image processing:

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them[3].

Facial Expression Recognition:

The input image to the system can be captured using a mobile camera or can be acquired from the memory. This image undergoes image enhancement, where tone mapping is applied to images with low contrast to restore the original contrast of the image. Hence, training and classification is performed using “one-vs-all” approach of SVM which successfully facilitates multi-class classification.[3]

Facial Emotion Recognition:

Various types of experiments were carried out to evaluate the performance of the facial motion recognition module.These experiments were broadly classified under two types: user independent and user dependent emotion classification. User independent experiments were carried out for 30 individuals.See Fig.1.[3]

Fig.1Different expressions of human

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Fig.1 Shows the different types of facial expression of human's face. Human can have different facial expression for different mood. Using some algorithms, we can find out the expression of human's face.

Audio Feature Recognition:

In Music Emotion recognition block, the playlist of a user forms the input. Using the emotion, we generate the playlist and play the songs.

MongoDB:

MongoDB is a free and open-source cross platform document-oriented database program. It uses JSON-documents with schemas. It is classified as NoSQL database. MongoDB supports various functions like range, field and also can search using regular expressions. It contains user defined JavaScript functions which returns specific fields of documents. MongoDB also gives good results if configured to return some random sample of results of any given size.

IV. TOOLS USED

Affectiva SDK:
Affectiva is an emotion measurement technology company which provides SDKs and APIs for extracting human emotions using facial cues or physiological responses. Affectiva's technology can help applications to use camera to track a user's emotion. Affectiva already measured more than 5.3 million faces. It also provides various SDK's for facial recognition. The image processing is done on the cloud and result is returned to the users.

Firebase:

Firebase is a mobile application development platform and also use in web application development platform. It has many different features available for developers, based on developers needs they can mix and match to fit their needs related to the database. For real time database Firebase is useful and also consists of sync features.

Android Studio:
Android Studio is Android's official IDE. It is purpose-built for Android to accelerate your development and help you build the highest-quality apps for every Android device.Android Studio provides extensive tools to help you test your Android apps with JUnit 4 and functional UI test frameworks. With Espresso Test Recorder, you can generate UI test code by recording your interactions with the app on a device or emulator.It provides to run your tests on a device, an emulator, a continuous integration environment, or in Firebase test lab.

V. PROPOSED SYSTEM

In this paper, we have proposed a system, which is an Android based application. It captures an image of the user using camera of his device and detects the face from this image. The application will then identify the emotion from the detected face. Based on the emotion recognized, it will send the emotion to the music server and will fetch a suitable playlist. The following flowchart (Fig.2) explains it in great detail. Fig.2 shows the overall workflow of the system.

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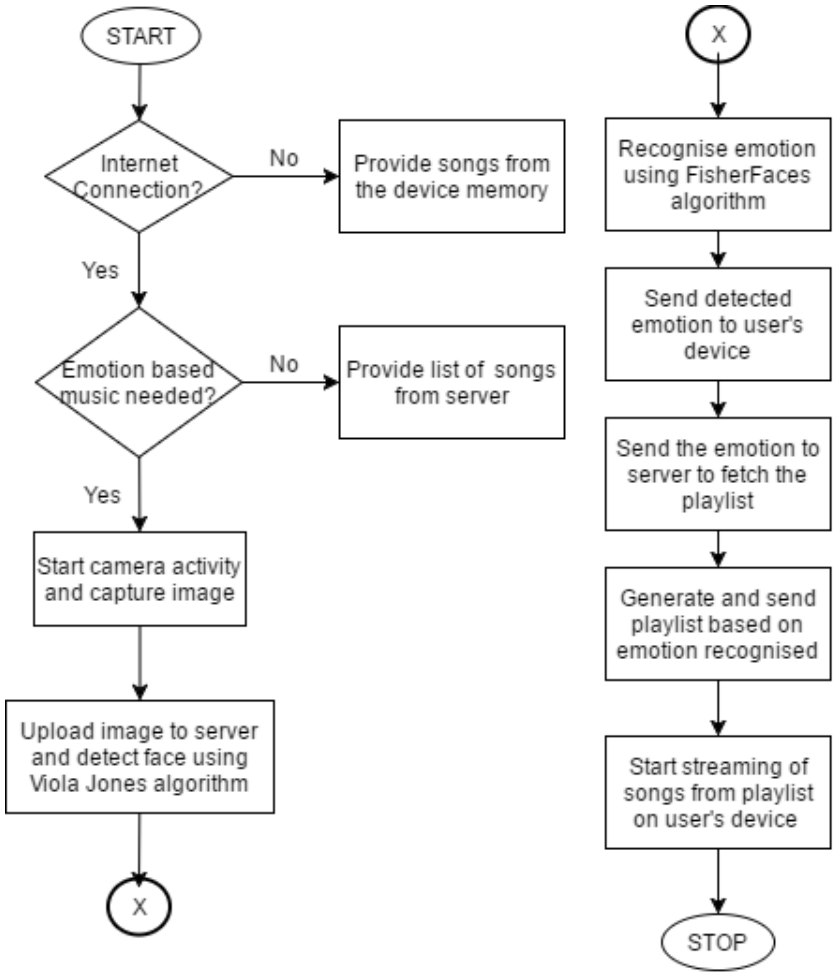

Fig.2 System Workflow

As soon as the application is launched by the user, it checks for internet connectivity. If the user is unable to connect to internet, the application displays the songs from the device's memory. However, on establishment of a stable internet, the user has an option of playing songs either based on his emotion or directly from the music server. Once he opts for an emotion based music recommendation, the device camera is then started by the application and the user has to capture his image. This image is uploaded to the image server. Face detection is then performed on the server using Viola Jones Algorithm. The code performing this algorithm uses the Cascade Classifier method provided OpenCV library. Next step is carried out using Fisherfaces Algorithm for emotion recognition. The image server sends the detected emotion to the device, displays it to the user and send emotion to the music server.

The music server gets this emotion and uses a code which suggests the user with a list of songs based on this emotion. Songs will be suggested in such an order that the initial few songs will reflect the current emotion and songs down the list will be of a happier emotion. This in turn will influence the mood of the user. Thus, the purpose of the system as a mood enhancing music recommendation is fulfilled.

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VI. CONCLUSION AND FUTURE SCOPE

Future Scope:

The future scope in the system would to design a mechanism that would be helpful in music therapy treatment and provide the music therapist the help needed to treat the patients suffering from disorders like mental stress, anxiety, acute depression and trauma.The proposed system also tends to avoid in future the unpredictable results produced in extreme bad light conditions and very poor camera resolution.

Conclusion:

The Emotion-Based Music Player is used to give a better music player experience for the end user and it can automate better music player experience. It eases the work of the end-user by capturing the image using a camera, determining their emotion, and suggesting a customized playlist through a more advanced and interactive system. The user will also be provided the list of songs that are not being played, to help them free up storage space.

REFERENCES

1. Anagha S.Dhavalikar and Dr. R. K. Kulkarni, “Face Detection and Facial Expression Recognition System” 2014 International Conference on Electronics and Communication System(ICECS -2014).
2. E. Bigand, S. Vieillard, F. Madurell, J. Marozeau, and A. Dacquet Multidimensional scaling of emotional responses to music: The effect of musical expertise and of the duration of the excerpts. Cognition & Emotion, 19(8):1113–1139, 2005. 5
3. Yong-Hwan Lee, Woori Han and Youngseop Kim, “Emotional Recognition from Facial Expression Analysis using Bezier Curve Fitting” 2013 16th International Conference on Network-Based Information Systems.
4. M. Pantic, L. Rothkrantz, "Automatic Analysis of Facial Expressions: The State of the Art", IEEE Transactions On Pattern Analysis and Machine Intelligence, Vol. 22, No. 12, 2000.
5. E. E. P. Myint and M. Pwint, “An approach for mulit-label music mood classification,” in 2010 2nd International Conference on Signal Processing Systems, Dalian, 2010, pp. V1-290-V1-294.
6. D. Gossi and M. H. Gunes, “Lyric-based music recommendation,” in Studies in computational intelligence. Springer Nature, pp. 301–310, 2016.
7. Bo Shao, Dingding Wang, Tao Li, and Mitsunori Ogihara, “Music recommendation based on acoustic features and user access patterns,” IEEE Transactions on Audio, Speech, and Language Processing, vol. 17, no. 8, Nov. 2009.
8. Ying-li Tian, T. Kanade, and J. Cohn, “Recognizing lower. Face action units for facial expression analysis,” in Proceedings of the 4th IEEE International Conference on Automatic Face and Gesture Recognition (FG’00), Mar. 2000, pp. 484–490.
9. Gil Levi and Tal Hassner, “Emotion Recognition in the Wild via Convolutional Neural Networks and Mapped Binary Patterns.”