International Journal of Scientific Research in Computer Science, Engineering and Information Technology
ISSN : 2456-3307 (www.ijsrcseit.com)
doi : https://doi.org/10.32628/IJSRCSEIT

Emotion based Music Recommendation System

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ARTICLEINFO

Article History:

Accepted: 01 April 2023
Published: 11 April 2023

Publication Issue
Volume 10, Issue 2
March-April-2023

Page Number
294-299

ABSTRACT

We propose a new approach for playing music automatically using facial emotion. Most of the existing approaches involve playing music manually, using wearable computing devices, or classifying based on audio features. Instead, we propose to change the manual sorting and playing. We have used a Convolutional Neural Network for emotion detection. For music recommendations, Pygame & Tkinter are used. Our proposed system tends to reduce the computational time involved in obtaining the results and the overall cost of the designed system, thereby increasing the system's overall accuracy. Testing of the system is done on the FER2013 dataset. Facial expressions are captured using an inbuilt camera. Feature extraction is performed on input face images to detect emotions such as happy, angry, sad, surprise, and neutral. Automatically music playlist is generated by identifying the current emotion of the user. It yields better performance in terms of computational time, as compared to the algorithm in the existing literature

Keywords : Emotion Detection, Face Recognition, Music

I. INTRODUCTION

Many of the studies in recent years admit that humans reply and react to music and this music has a high impression on the activity of the human brain. In one examination of the explanations why people hear music, researchers discovered that music played a crucial role in relating arousal and mood. Two of the most important functions of music are it is ability is participants rated to help them achieve a good mood and become more self-aware. Musical preferences have been demonstrated to be highly related to personality traits and moods. The meter, timbre, rhythm, and pitch of music are managed in areas of the brain that affects emotions and mood. Interaction between individuals may be a major aspect of lifestyle. It reveals perfect details and much of data among humans, whether they are in the form of body language, speech, facial expression, or emotions. Nowadays, emotion detection is considered the most

important technique used in many applications such as smart card applications, surveillance, image database investigation, criminal, video indexing, civilian applications, security, and adaptive human-computer interface with multimedia environments. With the increase in technology for digital signal processing and other effective feature extraction algorithms, automated emotion detection in multimedia attributes like music or movies is growing rapidly and this system can play an important role in many potential applications like human-computer interaction systems and music entertainment. We use facial expressions to propose a recommender system for emotion recognition that can detect user emotions and suggest a list of appropriate songs. The proposed system detects the emotions of a person, if the person has a negative emotion, then a certain playlist will be shown that includes the most related types of music that will enhance his mood. And if the emotion is positive, a specific playlist will be presented which contains different types of music that will inflate the positive emotions. The dataset we used for emotion detection is from Kaggle Facial Expression Recognition. Dataset for the music player has been created from Bollywood Hindi songs. Implementation of facial emotion detection is performed using Convolutional Neural Network which gives approximately 95.14% of accuracy.

II. RELATED WORK

"David Matsumoto" and "Hyi Sung Hwang" published a paper titled "Reading facial expressions of emotion" Emotions are an incredibly important aspect of human life and basic research on emotions of the past few decades has produced several discoveries that have led to important real world applications. This article described two of those discoveries – the universality of facial expressions of emotion and the existence of micro expressions – because of their importance to and novelty in psychology. The paper discussed how those discoveries create programs that teach people how to read facial expressions of emotion, as well as recent research that has validated those training programs and documented their efficacy. "Akshobhya Rao BV" and "Fathima RameeshaAsokan" published a paper titled Emotion Based Music Player (Emotify). Music is a major form of entertainment. Through the advent of technology, much focus has been given to the optimization of manual labor. There are still many traditional music players who need songs to be selected and arranged manually. User, the playlist needs to be generated and modified for every mood which takes time. Some of the music players have advanced features, such as lyrics and assisting the user by suggesting similar tracks. "DegerAyata" and "Yusuf Yuslun" published a paper titled "Emotion Based Music Recommendation". Most of the existing music recommendation systems use collaborative or content based recommendation engines. However, the music choice of a user is not only dependent to the historical preferences or music contents. But also dependent on the mood of that user. This paper proposes an emotion based music recommendation framework that learns the emotion of a user from the signals obtained via wearable physiological sensors. "Asha Sugave" and "Sahil Mulani" published a paper titled "Emotion Recognition from Audio- Visual Data". Emotion Recognition Systems is used to identifying the emotions of humans with their accuracy. This paper using Audio-visual Data to recognizing emotion. This emotion recognition system automatically identifies the human emotional states fromhis or her voice and face images. An audiovisual emotion recognition system is used to develop uses fusion algorithm. In this system firstly separate emotion recognition systems that use voice and facial expressions were tested separately.

III. PROPOSED SYSTEM

The Proposed automatic playlist generation scheme is a combination of multiple schemes together. In this

work different types of emotions are considered as shown in the Figure1 from the user's expressions, and explore how this information could be used to improve the user experience with music players.

Figure 1: Different Types of Emotions

The proposed system is based on the idea of automating much of the interaction between the music player and its user. It introduces a "smart" music player that learns its user's emotions, and tailors its music selections accordingly. After an initial training period, the smart music player is able to use its internal algorithms to make an educated selection of the song that would best fit its user's emotion.

A. Face Expression Capturing

To capture images use webcam or any other physiological devices. For that purpose, the python computer vision library is used. This makes it easier to integrate it with other libraries which can also use NumPy, and it is mainly used as a real time computer vision. In the initial process when execution starts it starts to access the camera stream and captures about ten images for further process and emotion detection. So, the initial phase of this work is to capture the images of human face by using Fisher Face Algorithm. Fisher Face Algorithm is used for reducing the face space dimensions using the principal component analysis (PCA) method and then it applies fishers linear discriminant(FDL) or the LDA method to obtain the feature of the image characteristics. This algorithm maximizes the separation between classes in the training process and process for image recognition is done in fisher face.This algorithm use minimum Euclidean to classify the expression that implies the emotion of the user.

B. Face Emotion Detection

The face recognition is considered as one of the best ways to determine a person's mood. Fisher face with open CV mainly it mainly emphasis onthe class specific transformation metric by training the model that the value evaluated from the process can help us to deduce the mood of the user. Each emotion is compared with tens of stored images and scale gives the exact emotion. Haarcascade Algorithm is a machine learning algorithm to categorize objects in a captured image. It is mainly used for object detection. Objects here are nose, eyes, ears, lips in face. Haar cascade which is designed by open cv is to detect the frontal face. It also has the capacity to detect the features from the source. It works by training the negative images over the positive images which are superimposed by it. Positive images contain the images only which we want our classifier to categorize, Negative Images contain the Images of everything else, which do not contain the object we want to detect. The cascade classifier has different stages of collection which resembles from weak learners. These weak classifiers are the simplest form classifiers that have a name called boosting. If the label ranges in positive state, then it goes to the next stage showing the result. These have a positive side and a negative side where they identify the images according to the labels. These have a set of positive images over negative images on various stages. As images with higher resolution has greater quantity are preferred as better-quality results.

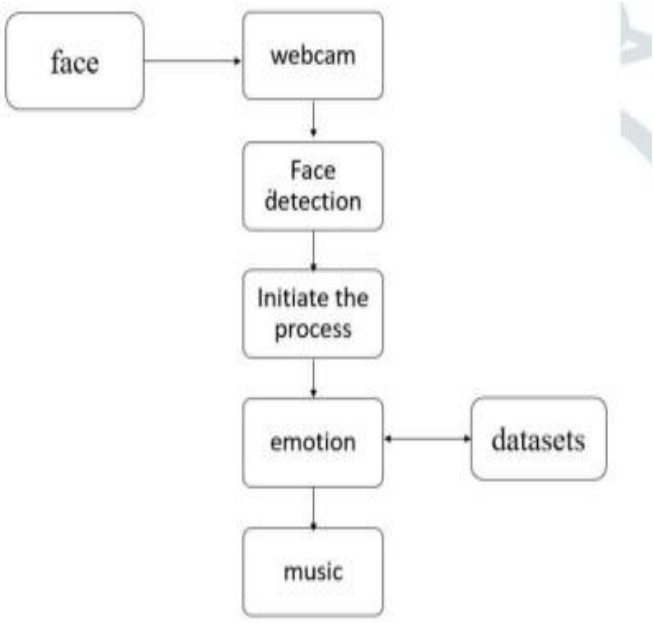

Figure 2 : Emotion Based Music Recommendation System

IV. RESULTS AND DISCUSSION

As every person has unique facial features, it is difficult to detect accurate human emotion or mood. But with proper facial expressions, it can be detected up to a certain extent. The camera of the device should have a higher resolution. The android application that we have developed runs successfully and following are some of the screenshots captured while using it. Fig.3. displays "sad" mood being detected, Fig.4. displays "angry" mood being detected, Fig.5. displays "happy" mood being detected, Fig.6. displays "neutral" mood being detected and Fig.7. displays "surprise" mood being detected. and Fig.8. displays "fear" mood being detected.

Fig.3. "Sad" mood detected successfully by the application.

Fig.4. "Angry" mood detected successfully by the application

Fig.5. "Happy" mood detected successfully by the application.

Fig.6 “Neutral” mood detected successfully by the application.

Fig.7. “Surprise” mood detected successfully by the application.

Fig.8. “Fear” mood detected successfully by the application

V. CONCLUSION

There are several methods to use the Music Recommender System, according to a thorough examination of the literature. The methods proposed by preceding researchers and developers were examined. So when we started studying we mainly found 2 approaches and that too independent. The first approach was like just determining the accurate emotion from the facial expression and second one was classifying the songs into the front emotions based on their acoustic features. The goals of our system were fixed based on the results. So we decided to merge these two approaches and provide complete solution for existing problem. The available technology can determine a user's emotions. The system was able to identify happy, sad, angry, neutral, or shocked emotions. The suggested approach presented the user with a playlist of music matches that corresponded to the user's emotion after identifying it. Memory and CPU usage increase as a result of processing a large dataset. Development will become more difficult and appealing as a result. The goal is to develop this application as affordably as feasible and on a common platform. Our facial emotion-based music recommendation system will make it easier for users to make and manage playlists.

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Cite this article as :

M Vineela, Thota Prathyusha, Ette Pravalika, "Emotion based Music Recommendation System", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 9, Issue 2, pp.294-299, March-April-2023.