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EMOTION BASED MUSIC RECOMMENDATION SYSTEM

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Abstract: Music plays a very important role in enhancing an individual's life as it is an important medium of entertainment for music lovers and listeners and sometimes even imparts a therapeutic approach. In today's world, with ever increasing advancements in the field of multimedia and technology, various music players have been developed with features like fast forward, reverse, variable playback speed (seek & time compression) local playback, streaming playback with multicast streams and including volume modulation, genre classification etc.

The motivation of this work comes from the possibility of reducing the human effort in creating music playlists manually, thus generating them automatically based on the user's emotional state. The human face plays an important role in knowing an individual's mood. The required input is extracted from the human face directly using a camera. One of the applications of this input can be for extracting the information to deduce the mood of an individual. This data can then be used to get a list of songs that comply with the "mood" derived from the input provided earlier. This eliminates the time-consuming and tedious task of manually Segregating or grouping songs into different lists and helps in generating an appropriate playlist based on an individual's emotional features.

Index Terms **- Face Emotion Detection, Emotion Classification.**

I. INTRODUCTION

The automatic analysis and understanding of music by the computer is the new possibility in the fieldof music information retrieval. Since the diversity and richness of music content, are high, a multitude of research topics in this field are pursued by the researchers, ranging from computer science, digital signal processing, mathematics, and statistics applied to musicology. Recent development in music information retrieval includes automatic audio genre/mood classification, music similarity computation,audio artist identification, audio-to-score alignment, query-by-singing/humming and so on. Content- based music recommendation is one the feasible application that can be provided. From the context information, we can achieve more intelligent context-based music recommendation. Multidisciplinary efforts such as emotion description, emotion detection/recognition, feature based classification, and inference-based recommendation are needed for the achievement in content-based music recommendation system. Music taxonomy has been described effectively using an emotion descriptor. An assumption for emotion representation is that emotion canbe considered as a set of continuous quantities and mapped into a set of real numbers. As a pioneering effort to describe human emotions, researchers proposed a circumflex model where each affect is displayed over two bipolar dimensions. Those two dimensions are pleasant-unpleasant and arousal sleep. Thus, each affect word can be defined as some combination of pleasure and arousal components. Later, another researcher adapted Russel's model to music. The "arousal" and "valence" are the two main dimensions in Thayer's model. Emotion terms were described as silent to energetic along the arousal dimension emotion are termed as silent to energetic, and negative to positive along the valence dimension. With Thayer's model, the two-dimensional emotion plane can be divided into four

quadrants with eleven emotion adjectives placed over them. On the other hand, Xiang et al. Proposed a "mental state transition network" for describing emotion transitions of human beings. In the network, mental states consist of happy, sad, anger, disgust, fear, surprise, and serene. Every transition between two states is calculated from test data and represented by some probability.

However, other emotions such as nervous and excited aren't considered. With the technological advances of digital signal processing and various effective feature extraction methods the automatic emotion detection and recognition in music are growing rapidly. Emotion detection/recognition can play an important role in many other potential applications such as music entertainment and human- computer interaction systems. Feng presented the first research in emotion detection is music. They implemented on the viewpoint of Computational Media Aesthetics (CMA) by analysing two dimensions of tempo and articulation which are mapped into four categories of moods: happiness,anger, sadness and fear.

This work will present a new emotion based and user-interactive music system. It aims to provide user-preferred music with emotion awareness. The system starts with recommendations with expert knowledge. If the user does not like the recommendation, he/she can decline the recommendation and select the desired music himself/herself.

II. LITERATURE SURVRY

"David Matsumoto" and "Hyi Sung Hwang" published a paper titled "Reading facial expressions ofemotion" Emotions are an incredibly important aspect of human life and basic research on emotions ofthe 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 expressionsof 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. EMOTION BASED MUSIC RECOMMENDATION

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.

IV.

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.

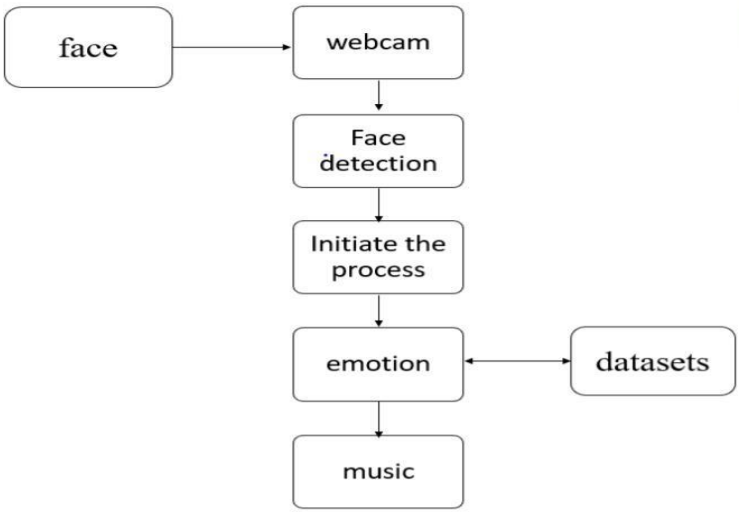

Figure 2: Emotion Based Music Recommendation System

V. RESULTS

A. *Emotion Classification*

When the face is detected successfully, a box will appear as, and it overlay the image to extract the face and the images that are extracted previously will process. The code will extract the facial spatial positions from the face image, and it is based on the pixel's intensity values that are indexed at each point and it uses boosting algorithm. Then perform the comparison between the input data and with stored one so it can predict the class that contain the emotion. If it contains one of the four emotions anger, sad, neutral or happy, and detection of the emotion as seems to be decreasing speed command and it will be executed so that it can reduce the speed of the wheelchair so, that we could prevent the user from endangerment.

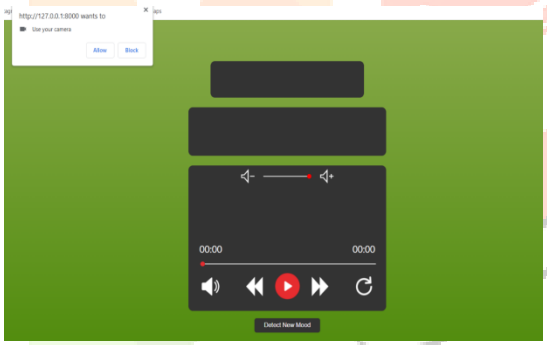

Figure 3: Accessing the Webcam

In the above Figure it is asking permission to allow the webcam to detect the emotion of the face.

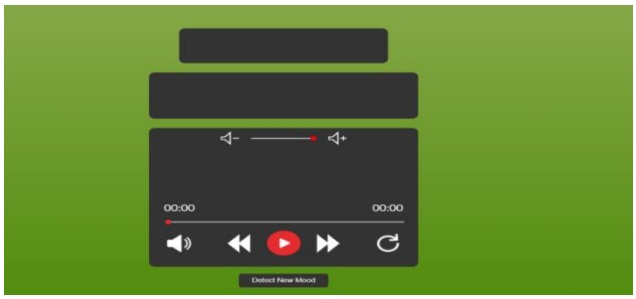

Figure 4: Face Detection

B. *Music Recommendation*

The input image that is acquired is from the web camera and is used to capture real-time images. It is very hard to define all the emotions and by limited options it can help the compilation time and the outcome is more sophisticated. The emotions are assigned to every song. It compares the values that are present as a threshold in the code. The values will be transferred to perform the web service. The song's will be played from the detected emotion. When the emotion is transferred the respective song and the emotions are numbered are arranged and assigned to every song. However, we can use many kinds of models to recommend because of their accuracy. The fisher face that contains the PCA and LDA algorithms gives

the accuracy better than other algorithms and for the sound mechanism win sound(commonly used python library) for basic sound play ing for the mechanism obtained are being compared the values that are present as a threshold.

Figure 5: Detection of Sad Emotion and Music Player

Figure 6: Detection of Happy Emotion and Music Play

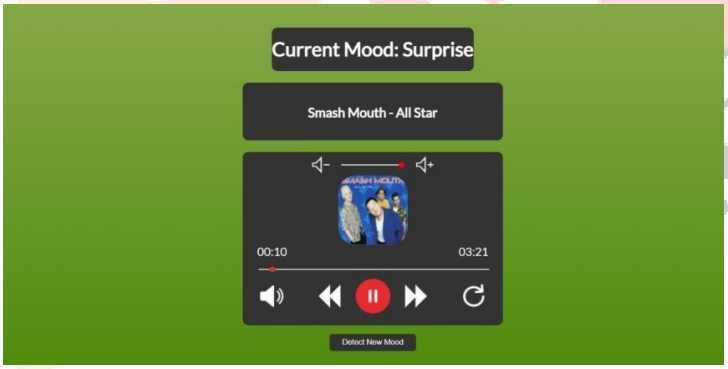

Figure 7: Detection of Surprise Emotion and Music play

The above figures shows the Emotion Classified by capturing the face of a person and recommends the music playlist based on the emotion detected.

VI. Conclusion

Music is helpful in changing the mood of the user and for some people it is a stress reliever. Recent development shows a wide prospective in the developing the emotion-based music recommendation system. The methodology that enhances the automatic playing of songs is done by the detection of person mood. The music player that we are using it can be used locally and the emotion of a person can be taken by different of wearable sensors that would giveus enough data to predict the mood of the customer accurately. This system with enhanced will beable to benefit and the system with advanced features and needs to be constantly upgraded. An the alternative method, that is based on the additional emotions which are being excluded in our system.

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