EMOTION BASED MUSIC RECOMMENDATION USING FACE RECOGNITION

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ABSTRACT:

The human face is an important part of an individual's body and it especially plays an important role in knowing an individual's mood. Extracting the required input from the human face can now be done 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. Facial Expression Based Music Player aims at scanning and interpreting the data and accordingly creating a playlist based on the parameters provided. Thus our proposed system focuses on detecting human emotions for developing emotion based music player. It uses Pycharm tool for analysis which follows to detect human emotions and specifies how it is better to use our system for emotion detection. It also gives brief idea about our systems working, playlist generation and emotion classification.

I. INTRODUCTION

The need for music is to provide entertainment. It plays a vital role in day to day life. Psychologically it has been proved that music relieves stress and enhances the mood of an individual. Modern technologies such as smart phone,tablet,notebook etc., has millions of songs by accessing the internet or from database. Those music players includes variety of features like fast forward ,reverse and variable playback with help of ever increasing technologies in the field of multimedia.Although one has to still manually select the song from the playlist based on their current mood and behaviiour. This is a tedious task of browsing the entire playlist for a particular song which probably irritates the user, resulting in not satisfying the basic requirement. Also, random recommendation of songs may not be appropriate for the current state of an user and it would be a disappointment. To overcome this problem , the way is to identify the emotion of an user and recommend songs accordingly. Basically ,Images are very powerful tools for conveying moods and emotions. Many systems uses wearable hardwares such as sensors to detect emotion .But it is insignificant and will be a burden for the user to carry it around. The only efficient way is to recognize the mood of an individual is by extracting portions like eyes , lips from the face and analysing them. For this analysation, facial recognition system can be used.It detects an image and identifies the presence of user. After this identification the later process is to crop the required parts from the face and determining the emotions from those extractions. The available architecture performs the emotion detection on still images which will not determine the current behavioural state of the user. Hence real time processing of the image must be involved to provide ease of use. Later there emerged a recommender system by processing the real time image. This limits the recognition of different emotions of the user and tooks very long period of time to respond.

An user cannot wait for a long period of processing time to hear a song .In addition the designing process must also be considered.Since the programming technology adopted in that system is difficult and does not provides free environment for programmers.

The main objective of this paper is to enhance the user interface by recommending the appropriate song suiting the current state of an individual.This can be perfomed by capturing the image in real time by using webcam.Face detection and facial feature extraction are the first step to be carried out.General algorithm for facial recognition is used.Facial feature extraction is done with the help of generating landmark points from the face.

The next step is the classification of emotion for which we have used multiclass SVM classification.The generated landmark points are the input to the SVM which classifies the emotions : joy, sad, pleasant, surprise, fear, angry and neutral.Now according to the classified emotion the appropriate song from the playlist is recommended.The platform adopted here is PyCharm. It is a Python IDE with complete set of tools for Python development. In addition, this IDE provides capabilities for professional Web development using the Django framework. Makes coding faster and with more easily in a smart and configurable editor with code completion, snippets, code folding and split windows support. This gives better environtment for programmers.

II. RELATED WORKS:

- **Face Detection and Facial Expression Recognition System -** System uses AAM i.e Active Appearance Model Method for facial feature extraction In this method the point on the face like eye, eyebrows and mouth are located and it create a data file which gives information about model points detected.

With the help of this input, expression of a face is determined.Changes in contents of the datafile reflects the changes in expression.

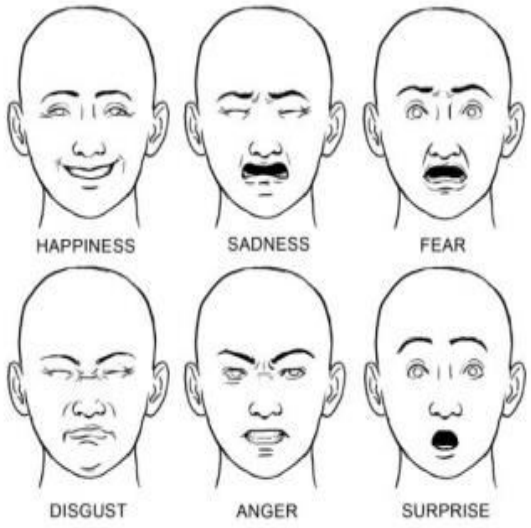

Fig 1. Representation of different emotions stored in datafile

- **Using Animated Mood Pictures in Music Recommendation –** On this system the user interact with a collection of images to receive music recommendation with respect to genre of picture.This music recommendation system is developed by Nokia research center.It uses textual meta tags for describing the genre and audio signal processing . Thus, this system is helpful only for analyzing the behavioural state of the still image stored on the memory which is fed as an input to the system.It would not be interactive.

- **Bezier Curve Fitting -** . This system uses two steps for facial expression and emotion , first one is detection and analysis of facial area from input original image and next phase is verification of facial emotion of characteristics feature in the region of interest.

The first phase for face detection it uses color still image based on skin color pixel by initialized spatial filtering ,based on result of lighting compassion then to estimate face position and facial location of eye and mouth it used feature map After extracting region of interest this system extract points of the feature map to apply Bezier curve on eye and mouth. For understanding of emotion, this system uses training and measuring the difference of Hausdorff distance With Bezier

curve between entered face image and image from database.

- **Using physiological sensors –** this existing system uses additional hardwares such as wearable physiological sensors.It uses Galvanic Skin Response (GSR) and Photo Plethysmography (PPG) to recognize the behavioural state of the user.By using Audio Emotion Recognition (AER) AND Music Information Retrieval (MIR) corresponding song is played.With the help of AER the audio signals are classified according to different characterics of the stereophonic signal.Based on the signals gathered from the sensor the emotion is detected and the songs are chosen accordingly.

- **MoodPlay -**A large body of research in recommender systems focuses on optimizing, prediction and ranking. However, recent work has highlighted the importance of other aspects of the recommendations, including transparency, control and user experience in general. Building on these aspects, this paper introduces MoodPlay, a hybrid recommender system music which integrates content and mood-based filtering in an interactive interface. It allows the user to explore a music collection by latent affective dimensions, and explains how to integrate user input at recommendation time with predictions based on a pre-existing user profile. Results of a user study are discussed, with four conditions being evaluated with varying degrees of visualization, interaction and control.

III. PROPOSED SYSTEM:

The proposed system tries to provide an interactive way for the user to carry out the task of creating a playlist. The working is based on different mechanisms carrying out their function in a pre-defined order to get the desired output.

The working can be stated as follows:

1. The proposed System works by first providing a simple enough interface which prompts the user to scan the memory for audio files when the application is opened.

2. Then after the files are detected, they are scanned for audio features and these features are extracted.

3. Then the extracted feature values are subjected to classification according to the parameters provided.

4. These parameters include a limited set of genre types based on which the audio feature values will be processed.

5. After this, the songs are segregated into different playlists based on the feature extraction process. Hence lists of similar sounding songs or songs belonging to similar genres are generated.

6. In the next step, the user camera is invoked with proper permissions and a real time graphical input (image) is provided to the system.

7. The system first checks for the presence of a face in the input using the face detection process, then classifies the input and generates an output which is an Emotion (mood) based on the expression extracted from the real time graphical input.

8. After this the classified expression acts as an input and is used to select an appropriate playlist from the initially generated playlists and the songs from the playlists are played.

IV. METHODOLOGY:

A. Image Acquisition:

The input image to the system can be captured using a web cam or can be acquired from the hard disk. This image undergoes image enhancement, where tone mapping is applied to images with low contrast to restore the original contrast of the image.

B. Pre-processing:

Pre-Processing plays a key role in overall process. PreProcessing stage enhances the quality of input image and locates data of interest by removing noise and smoothing the image. It removes redundancy from image without the image detail. Pre-Processing

also includes filtering and normalization of image which produces uniform size and rotated image.

C. Segmentation:

Segmentation separates image into meaningful reasons. Segmentation of an image is a method of dividing the image into homogenous, self-consistent regions corresponding to different objects in the image on the bases of texture, edge and intensity.

D. Feature extraction:

The facial image obtained from the face detection stage forms an input to the feature extraction stage. To obtain real time performance and to reduce time complexity, for the intent of expression recognition, only eyes and mouth are considered. The combination of two features is adequate to convey emotions accurately.

E. Emotion classification:

The extracted feature points are processed to obtain the inputs for *support vector machine* for efficient training.

SVM is a supervised learning method applied for data classification. The standard SVM is a binary classifier. A support vector machine constructs a hyper plane or set of hyper planes in a high or infinite-dimensional space, which can be used for classification or regression. Good classification accuracy can be obtained if the hyper plane is maximally distant from the nearest training data from both the classes. When data cannot be classified by a linear classifier the original data can be transformed into a higher dimension where the classes can be separated by a hyper plane.

V. RESULTS:

In this project, we presented a generic model to recommend music based on the user emotions. The core of our proposed approach is to construct the recommendation model from music, for music plays an important role in conveying emotions of the users. The fundamental purpose of the system was to change or maintain the emotional state of the user and match personal music preferences by exploring music tracks with specific attributes.

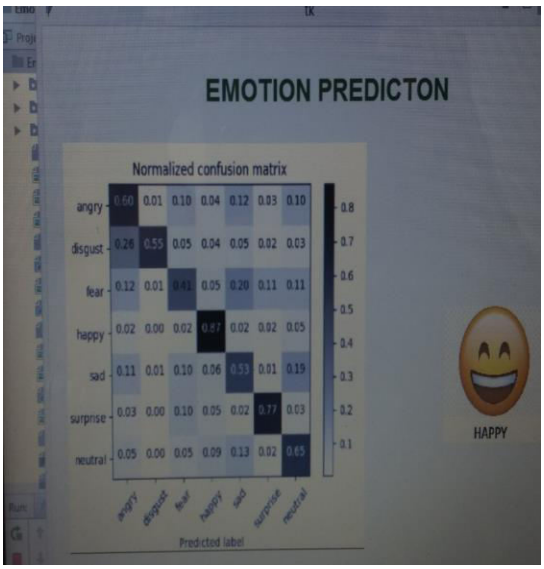

Fig 2. Screenshots of image detecting the mood of an individual

(At first the image is captured by using a webcam and it is processed for the prediction of emotion)

VI. FUTURE SCOPE:

Facial recognition can be used for authentication purpose which are integrated in to devices such as smart phones, tablets etc., to provide security of the data.Another extra features can be added which results in Android Development. It can be also used to detect sleepy mood while driving. Other applications which can integrate this feature in to the system are Social robot Emotion recognition system, Medical practices ,Feedback system for e-learning. Medically, it can be used to identify the emotional state of physically or mentally challenged people which can be used to treat them. Automatic counseling system can also indulge this feature in to the work which enhances the system by giving required counseling appropriately.

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