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Emotion Based Music Player Using Facial 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. This input can then be used in many ways. 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. Various algorithms have been developed and proposed for automating the playlist generation process. Facial Expression Based Music Player aims at scanning and interpreting the data and accordingly creating a playlist based the parameters provided. The scanning and interpreting includes audio feature extraction and classification to get a list of songs belonging to a similar genre or to get a list of similar sounding songs. Human emotions are meant for mutual understanding and sharing feelings and intentions. The emotions are manifested in verbal and facial expressions. One can also express his emotions through written text. This paper mainly focuses on what are the methodologies available for detecting human emotions for developing emotion based music player, which are the approaches used by available music players to detect emotions, which approach our music player follows to detect human emotions and 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. The application is thus developed in such a way that it can manage content accessed by user, analyse the image properties and determine the mood of the user based on mp3 file properties so that they can be added into appropriate play lists according to the mood.

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

I. INTRODUCTION

Recognition of facial expressions is used to identify the basic human emotions. Facial expressions give important rules about emotions. Computer systems based on affective interaction could play an important role in the next generation of computer vision systems. Face emotion can be used in areas of security, entertainment and human machine interface (HMI). A human can express his/her emotion through lip and eye. Generally people have a large number of songs in their database or playlists. Thus to avoid trouble of selecting a song, most people will just randomly select a song from their playlist and some of the songs may not be appropriate for the current mood of the user and it may disappoint the user. As a result, some of the songs are not matching to the user's current emotion. Moreover, there is no commonly used application which is able to play songs based on the current emotions of the user. 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 Although these features satisfy the user's basic requirements, yet the user has to face the task of manually browsing through the playlist of songs and select songs based on his current mood and behaviour.

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Fig: Different expressions of human

The main objective of this paper is to design an efficient and accurate algorithm that would generate a playlist based on current emotional state and behavior of the user. Face detection and facial feature extraction from image is the first step in emotion based music player. For the face detection to work effectively, we need to provide an input image which should not be blur and tilted. We have used algorithm that is used for face detection and facial feature extraction. We have generated landmarks points for facial features. The next step is the classification of emotion for which we have used multiclass SVM classification. The generated landmarks points are provided to the SVM for training purpose. The emotion classified by SVM is then passed to music player and accordingly music will be played.

II. LITERATURE SURVEY

Various techniques and approaches have been proposed and developed to classify human emotional state of behavior. The proposed approaches have focused only on the some of the basic emotions. For the purpose of feature recognition, facial features have been categorized into two major categories such as Appearance-based feature extraction and geometric based feature extraction by zheng . Geometric based feature extraction technique considered only the shape or major prominent points of some important facial features such as mouth and eyes. There is another scheme that is automatically segment an input image, and to recognize facial emotion using detection of color based facial feature map and classification of emotion with simple curve and distance measure is proposed and implemented. In other scheme there is automatic method for real time emotion recognition using facial expression using a new anthropometric model for facial feature extraction.

[1]. Anagha S. Dhavalikar and Dr. R. K. Kulkarni Proposed Automatic Facial Expression recognition system. In This system there are three phase 1.Face detection 2. Feature Extraction and 3.Expression recognition. The First Phase Face Detection are done by YCbCr Color model, lighting compensation for getting face and morphological operations for retaining required face i.e eyes and mouth of the face. This System is also used 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 and detect the face the an expression are given as input AAM Model changes according to expression.

[2]. Yong-Hwan Lee ,Woori Han and Youngseop Kim proposed system based on Bezier curve fitting. This system used two step 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.

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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 The 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.

[3]. Arto Lehtiniemi and Jukka Holm proposed system based on animated mood picture 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 researched center.this system uses textual meta tags for describing the genre and audio signal processing .

[4]. F. Abdat, C. Maaoui and A. Pruski proposed system fully automatic facial expression and recognition system based on three step face detection, facial characteristics extraction and facial expression classification. This system proposed anthropometric model to detect the face feature point combined to shi and Thomasi method. In this metod the variation of 21 distances which describe the facial feature from neutral face and the classification base on SVM (Support Vector Machine).

III. PROPOSED WORK

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.

Facial Expression Recognition:

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

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contrast of the image. Hence, training and classification is performed using 'one-vs-all' approach of SVM which successfully facilitates multi-class classification.

Facial Emotion Recognition:

Various types of experiments were carried out to evaluate the performance of the facial emotion 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.

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.

Emotion Based Music Player:

The Proposed system is tested and experimented against an in-built camera, thus the total cost involved in implementation is almost negligible. Average estimated time for various modules of proposed system.

IV. ARCHITECTURE DESIGN

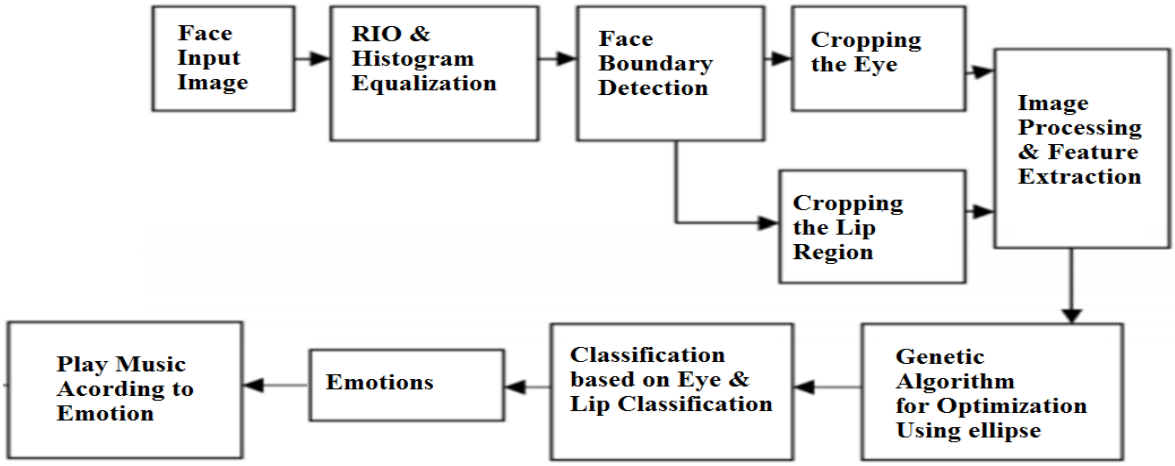

Fig: Architecture

Numerous approaches have been designed to extract facial features and audio features from an audio signal and very few of the systems designed have the capability to generate an emotion based music playlist using human emotions and the existing designs of the systems are capable to generate an automated playlist using an additional hardware like Sensors or EEG systems thereby increasing the cost of the design proposed. Some of the drawbacks of the existing system are as follows.

I. Existing systems are very complex in terms of time and memory requirements for extracting facial features in real time.

II . Based on the current emotional state and behavior of a user, existing systems possess a lesser accuracy in generation of a playlist. Some existing systems tend to employ the use of human speech or sometimes even the use of additional hardware for generation of an automated playlist, thereby increasing the total cost incurred.

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V.HARDWARE AND SOFTWARE REQUIREMENTS

Processor	-	Pentium –III
Speed	-	1.1 Ghz
RAM	-	256 MB(min)
Hard Disk	-	20 GB
Floppy Drive	-	1.44 MB
Mouse	-	Two or Three Button Mouse
Monitor	-	SVGA
Webcam		

VI.MATHEMATICAL MODEL

Set Theory

- Set Theory Analysis

- Let 'S' be the "Image"

S= {…….}
Set S is divided into 2 modules
S= {S1, S2}
S1= Image Capture by camera.
S2= Image Send For processing.

- Identify the inputs.

For S1
Inputs = {X1}
X1= Capture Image

- Identify the output for S1.

Outputs = {Y1}
Y1= Provide Image for next process.

- Identify the inputs.

For S2

Inputs = {X2, X3}
X2=For next process image send to the computer.
X3=Hard disk Check this image.

- Identify the output for S2.

Outputs = {Y2, Y3}
Y2= computer and hard disk integrate the image
Y3= Provide Reflection on surface.

Venn Diagrams :-

Let M be the Mathematical Model which Consists Of Captured Image, Hard Disk.

M= {I,H,S};
I= {Image}
H={Hard Disk}
S={Reflection of image}

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VII.ALGORITHM

1. Capture image using webcam and save.
2. Input image to the application.
3. Face detection.
4. Extract interest points on mouth and eye .
5. Apply bezier curve on the mouth and eye.
6. Apply threshold .
7. Device will recognize the emotions and will play music.
8. According to emotions songs list will be open.

Advantages

- Ease of use,
- No trouble of troublesome selection of songs,
- Can be used in vehicles

Drawbacks

- Mixed mood detection is not provided by the application. It is able to judge only one mood at a time.

VIII.ACKNOWLEDGEMENT

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IX.CONCLUSION AND FUTURE WORK

Genetic algorithm gives optimized value of eye, eyebrow and lip feature. Then this gives input to the neural network and we get emotions. Thus the application developed will reduce the efforts of user in creating and managing playlist. It will provide better enjoyment to the music listeners by providing the most suitable or appropriate song to the user according to his/her current emotion. It will not only help user but also the songs are systematically sorted.

Future Scope for Implementation:

- Facial recognition can be used for authentication purpose.
- Android Development.
- Can detect sleepy mood while driving.
- Can be used to determine mood of physically challenged & mentally challenged people.

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