Heart Player

(An Emotion based music player)

Srilakshmi Dayanandan
Information Technology
SIES Graduate School of Technology
Navi Mumbai, India
daya.srilakshmi@gmail.com

Chodapaneedi .Aishwarya
Information Technology
SIES Graduate School of Technology
Navi Mumbai, India
aishu1918@gmail.com

Rashmin Phadte
Information Technology
SIES Graduate School of Technology
Navi Mumbai, India
phadterashmin@gmail.com

Prof. Saumya Omanakuttan
Information Technology
SIES Graduate School of Technology
Navi Mumbai, India
saumya@siesgst.ac.in

***Abstract*— Emotion based music player uses face detection and mood recognition to determine the user's mood and based on this, it gives a personalized play list. The face detection algorithm is based on OpenCV library and the mood detection part will be based on pattern matching. These implementations are designed in order to generate a playlist according to the user moods and offer functionalities which includes setting the mood of the user and accordingly play the songs.**

I. INTRODUCTION

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. 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 behavior. The introduction of Audio Emotion Recognition (AER) and Music Information Retrieval (MIR) in the traditional music players provided automatically parsing the playlist based on various classes of emotions and moods.

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 behaviour of the user. The algorithm designed requires less memory overheads, less computational and processing time, reducing the cost of any additional hardware like EEG or sensors. The facial expression would categorize into 5 different types of facial expressions like anger, joy, surprise, sad, and excitement. A high accurate audio extraction technique is proposed that extracts significant, critical and relevant information from an audio signal based on certain audio features in a much lesser time. An emotion model is proposed that classifies a song based on any of the 7 classes of emotions are sad, joy-anger, joy-surprise, joy-excitement, joy, anger, and sad-anger. The emotion extraction module and audio feature extraction module is combined using an Emotion-Audio integration module. The proposed mechanism achieves a better efficiency and real time performance than the existing methodologies.

II. NEED OF PROJECT

In the existing system, the user is required to manually select the songs. It is non reliable & time consuming and ,also the randomly played songs may not match to the mood of the user. Hence there is a need for more reliable system which is user friendly. Our system uses face detection and mood recognition to determine the user's mood and based on it gives a personalized play list. It is designed in order to generate a playlist according to the user moods.

III. LITERATURE SURVEY

- Charles Darwin is the first scientist to recognize that facial expression is one of the most powerful and immediate means for human being to communicate their emotions, intentions and opinions to each other. Rosalind Picard (1997) describes why emotions are important to the computing community. There are two aspects of affective computing: giving the computer the ability to detect emotions and giving the computer the ability to express emotions. Not only are emotions crucial for rational decision making as Picard describes, but emotion detection is an important step to an adaptive computer system. An adaptive, smart computer system has been driving our efforts to detect a person’s emotional state. An important element of incorporating emotion into computing is for productivity for a computer user. A study (Dryer & Horowitz, 1997) has shown that

people with personalities that are similar or complement each other collaborate well. Dryer (1999) has also shown that people view their computer as having a personality. For these reasons, it is important to develop computers which can work well with its user.

- In the year 2011 Ligang Zhang and Dian Tjondronegoro developed a facial emotion recognition system (FER) they used dynamic 3D Gabor feature approach and obtained the highest correct recognition rate (CRR) on the JAFFE database and FER is among the top performers on the Cohn-Kanade (CK) database using above approach. They testified the effectiveness of the proposed approach through recognition performance, computational time, and comparison with the state-of the art performance. And concluded that patch-based Gabor features show a better performance over point based Gabor features in terms of extracting regional features, keeping the position information, achieving a better recognition performance, and requiring a less number.
- In 2010, Renu Nagpal, Pooja Nagpal , Sumeet Kaur, gave a novel approach for the detection of emotions using the cascading of Mutation Bacteria Foraging optimization and Adaptive Median Filter in highly corrupted noisy environment. The approach involves removal of noise from the image by the combination of MBFO & AMF and then detects local, global and statistical feature form the image. They found that the proposed method is suitable for identification of emotions in the presence of salt and pepper noise as high as 90%. And further Future work includes that the same technique can be used for detection of emotions in the presence of other noise[2].
- The algorithms which we have selected for detecting emotions are from the papers, Image Edge Detection Algorithm Based on Improved Canny Operator of 2013 and Rapid Object Detection using a Boosted Cascade of Simple Features by Viola and Jones. In Image Edge Detection Algorithm Based on Improved Canny Operator paper improved canny edge detection algorithm is proposed. Because, the traditional canny algorithm has difficulty in treating images which contain the salt & pepper noise, and it does not have the adaptive ability in the variance of the Gaussian filtering. For this reason, a new canny algorithm is presented in this paper, in which open-close filtering instead of Gaussian filtering. In this paper, the traditional canny operator is improved by using morphology filtering to preterit the noise image. The final edge image can reduce effectively the influence of noise, keep the edge strength and more complete details, get a more satisfactory subjective result. And by using objective evaluation standards, compared with the traditional Canny operator, information entropy, average gradient, peak signal to noise ratio, correlation coefficient and the distortion degree also have increased significantly. So, the new algorithm is an effective and practical method of edge detection[4][5].

IV. METHODOLOGY

A. System Requirements:

Hardware:

1. RAM: 512 MB or more
2. Hard disk: 16 GB or more
3. Web Camera.

Software

1. JAVA JDK 1.7
2. Net Beans 7.2
3. OpenCV

B. Modules of system:

1. Extracting Effective Features

In this module, the system will capture the image from webcam .Then the input image is first processed for the facial features. In case if the image does not contain human features, then it does not detect it. If the input image contains Human features, then it detects the features.

2. Feature-Point Detection

In this module, the feature points are detected automatically. For face detection, first we convert the image into binary format image from RGB format image. For converting to binary image, we calculate the average value of RGB for each pixel and if the average value is below than 110, we replace it by black pixel and otherwise we replace it by white pixel. By this method, we get a binary image from RGB image.

3. Lip Feature Detection

Now the next step is to extract the expression features from the lips .To extract the feature we just have to measure the distance between upper lip & lower lip. Also the system will consider the position of contour points of lip.

4. Eye Feature Detection

Even with an upper face we can obtain certain facial feature like sleepy and surprised. For this again we have to calculate distance between major axis and minor axis considering that eye as an ellipse.

5. Music Player and Playlists

Music Player is developed in java language. It is a simple Music player which provides user the facility of managing the database of songs (addition of new songs, updating of playlists, deleting song from playlist, etc.).

V. DESIGN

A software design is a description of the structure of the software to be implemented, the data which is part of the

system, the interfaces between the system components and sometimes the algorithms used.

A. *Block Diagram*

The block diagram shows the interaction between user and the features detected when emotions are captured from the webcam. The OpenCV library consist of modules which include extracting effective features, lip, eye and feature point detection.

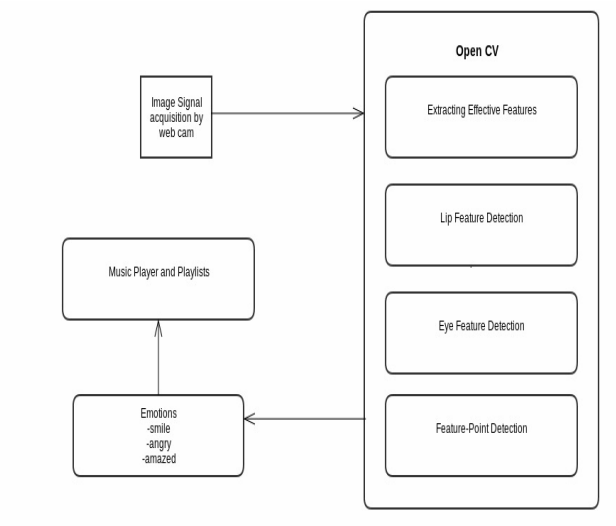

Figure 1.Block diagram

B . *Data flow diagram*

A data flow diagram (DFD) is a graphical representation of the flow of data through an information system. A data flow diagram can also be used for the visualization of data processing (structured design).In level 0 DFD the openCV library provides interaction between user and the web cam. In level 1 DFD the interaction between training and testing phase is shown.

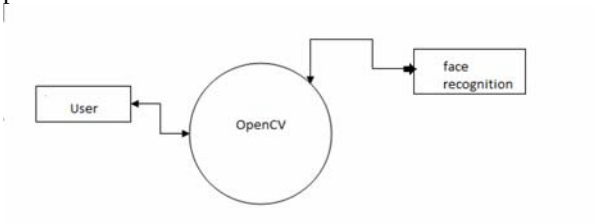

Fig 2.Level 0 DFd

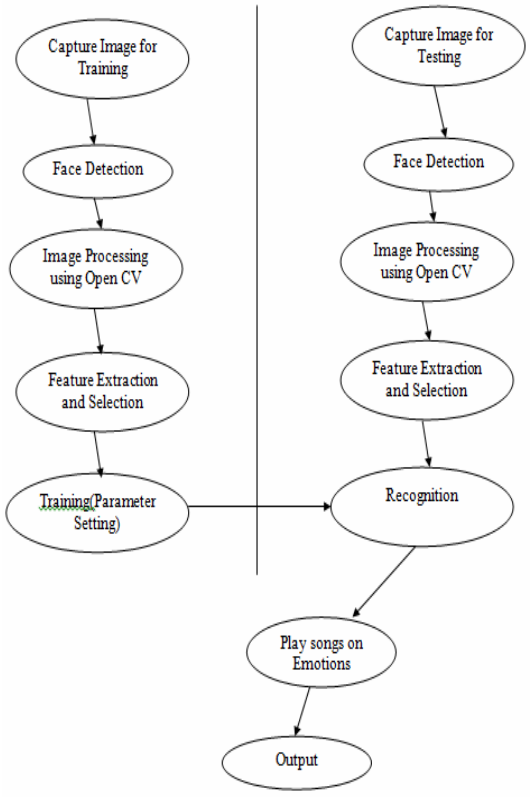

Figure 3.Level 1 DFD

VI. IMPLEMENTATION

Our system consists of two stages namely training and testing stage. In the training stage the first step is to capture the user's face through the web camera. Then the image is processed and then the final parameter setting is done .In the testing stage also the face is detected and accordingly matches to the image already stored to recognize the emotion of the user. Finally the image captured in the testing stage is matched with the training stage. If the image matches then the songs are played from the already fed playlist according to the mood detected by the camera.

.

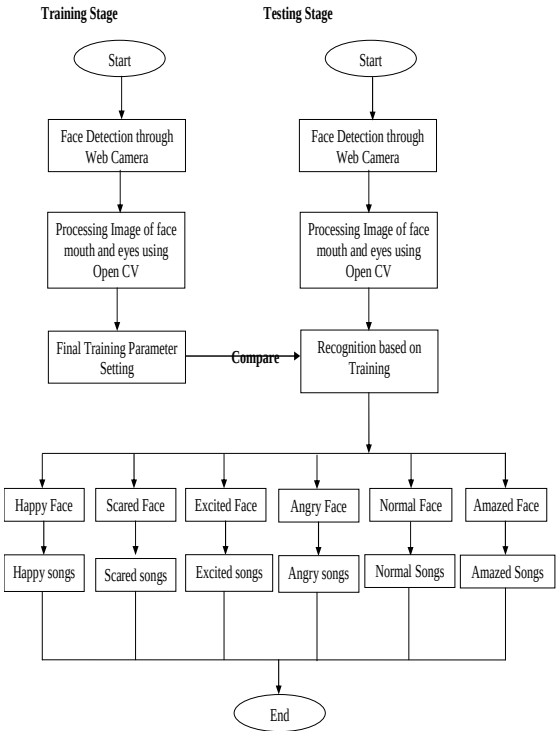

Figure 4. Flowchart

VII. FUTURE MODIFICATION

- 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.
- Extend to detect more facial features, gestures and other emotional states (stress level, lie detection, etc.)
- 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.

VIII. CONCLUSION

The aim of this paper was to explore the area of automatic facial expression recognition for implementation of an emotion based music player. Beginning with the psychological motivation for facial behavior analysis, this field of science has been extensively studied in terms of application and automation. Manual face analysis used by psychologists was quickly replaced by suitable computer software. A wide variety of image processing techniques was developed to meet the facial expression recognition system requirements.

Apart from theoretical background, this work provides ways to design and implement Emotion based music player. Proposed system will be able to process the video of facial behavior, recognize displayed actions in terms of basic emotions and then play music based on these emotions. Major strengths of the system are full automation as well as user and environment independence.

IX. ACKNOWLEDGMENT

We would like to express our deepest appreciation to all those who provided us with the possibility to complete this report. A special gratitude given to our final year project guide, Prof Saumya Omanakuttan, whose contribution in stimulating suggestions and encouragement, helped us to coordinate my project especially in writing this report. Also, we have to appreciate the guidance given by other supervisor as well as the panels especially in our project presentation that has improved our presentation skills thanks to their comments and advices.

X. REFERENCES

[1]. International Journal of Engineering Research and General Science Volume 3, Issue 1, January-February, 2015 .
[2]. Facial Expression Recognition Using Facial Movement Features , Ligang Zhang, Student Member, IEEE, and Dian Tjondronegoro, IEEE TRANSACTIONS ON AFFECTIVE COMPUTING, VOL. 2, NO. 4, OCTOBER-DECEMBER 2011
[3]. Ligang Zhang," Facial Expression Recognition Using Facial Movement Features", IEEE Vol-2, Oct'11
[4]. Image Edge Detection Algorithm Based on Improved Canny Operator of 2013.
[5]. Viola and M. Jones, "Rapid Object Detection using a Boosted Cascade of Simple Features", Conference on computer vision and pattern recognition,2001
[6]. Computer Sciences and Applications (CSA), 2013 International Conference on 14-15 Dec. 2013 by Ying-Wen.
[7]. Vision System of Blue Eyes Kritika R.Srivastava, Karishma A. Chaudhary, Prof. H.J.Baldaniya Computer Engineering Department, Government Polytechnic For Girls, India .
[8]. C.C. Liu, Y.H. Yang, P.H. Wu, and H.H. Chen.Detecting and classifying emotion in popular music. In JCIS, 2006.