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Emotion Based Smart Music Player

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ABSTRACT

Every individual human might have completely different faces; however, their expressions tell us the same story and it notably plays a significant role in extraction of an individual's emotions and behavior. Music is the purest form of art and a medium of expression, which is known to have a greater connection with a person's emotions. It has a novel ability to lift one's mood. This project system focuses on building an efficient music player which works on emotion of user using facial recognition techniques. The facial features extracted will generate a system thereby reducing the effort and time involved in doing it manually. Facial data is captured by employing a camera. The emotion module makes use of deep learning techniques to spot the exact mood relative to that expression. The accuracy of mood detection module in the system for real time footage is above 80%; while for static pictures it is 95 to one hundred percent. Therefore, it brings out higher accuracy relating to time and performance.

Keywords : Face Recognition, Emotion and Mood Detection, Mood Extraction Module, Computer Vision, Deep Leaning Techniques.

I. INTRODUCTION

Facial expressions tell us about the mood and gives us clue to know a person's emotion. People tends to express their emotions through facial expressions. Music is one thing that can alter a person's mood. Lips and Eyes do not just have sensory receptors, they also show us in what mood that person is in. The work describes a computer application in the form of "Emotion based Smart Music Player" which provides the users an added ease in creating playlist and playing music. The project aims to capture a person's emotions through facial expressions and lighten the mood of the user, by playing song which suits to that situation. It captures and recognizes the emotion that a person is expressing, and can gradually calm the user's mind, so it usually has a pleasant effect. The music player is designed to capture human emotions with the help of webcam interface available in the computer system. When the application starts, the system captures the user's picture. The picture was taken via webcam. The previously captured image will be saved and rendering phase will start. After a period, the user's mood may change, and it may or may not change. Therefore, the image is captured after every song or decided interval of time. And the

image will be forwarded to the next phase. In some cases, mood alteration may also help in overcoming situations like depression and sadness. Expression analysis can avoid many health risks and take measures to improve the user's mood.

The image recognition system is classified into two types, feature-based system, and image-based system. In the initial system, options extracted from the image parts, nose, mouth, lips, etc. That are then sculpturesque to confirm the relation between these options. Whereas in the second system, image pixels are used and represented as inbound methods such as Principal Component Analysis, Wavelet transformation etc. That is then used for image classification and identification.

In the model few sample models are included such as Happy, Sad, Angry, and Neutral. It also has mixed mood feature. Every sample model is assigned with some songs according to the classification of user. Emotion based music players available now in use are more time consuming than our proposed system.

II. PROPOSED SYSTEM

The proposed system can capture the user's facial expressions, and based on his facial expressions, extract facial reference points, and then classify them to obtain the user's specific emotions. After the emotions are classified, songs corresponding to the user's emotions are displayed to the user.

2.1 Methodologies

2.1.1 What is Open CV

Open-Source Computer Vision Library is a library of programming functions that focuses on real-time computer vision. The library is a cross-platform. Its main purpose is real-time image processing. If the native Intel performance primitives are installed on the system through self-optimized routines, library performance can be improved.

Why Open CV ?

Open CV provides many functions for facial detection and facial recognition. It comes with a trainer and a detector. If you want to train your own classified objects such as mobile phones, pens, etc... you can use Open CV to create it.

2.1.2 Facial Recognition using Haar Cascade

The object recognition using cascaded classifiers based on Haar function is an effective method of object recognition. This algorithm follows machine learning approach to increase its efficiency and precision. Different degree images are used to train the function. In this method, the cascade function is trained on a large number of positive and negative images. Both face images and images with no face are used to train at the beginning. Then extract features from it. For this Haar-traits(drawing properties) are used. They are similar to our convolution kernel, each feature is a separate and single value, which is obtained by removing the sum of the pixels falling under the white rectangle from the sum of pixels falling under the black rectangle.

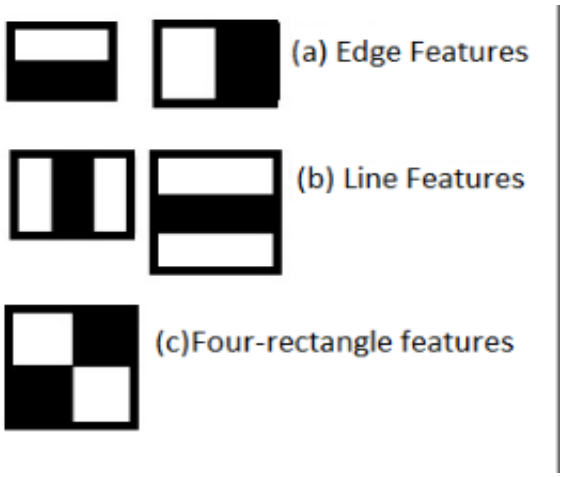

Figure 2.1.2.1 A Simple Haar Feature

Detection of feature points:

It detects feature points on its own. For facial recognition, the RGB image is first converted into a binary image. If the average pixel value is less than

110, black pixels are used as substitute pixels, otherwise, white pixels are used as substitute pixels.

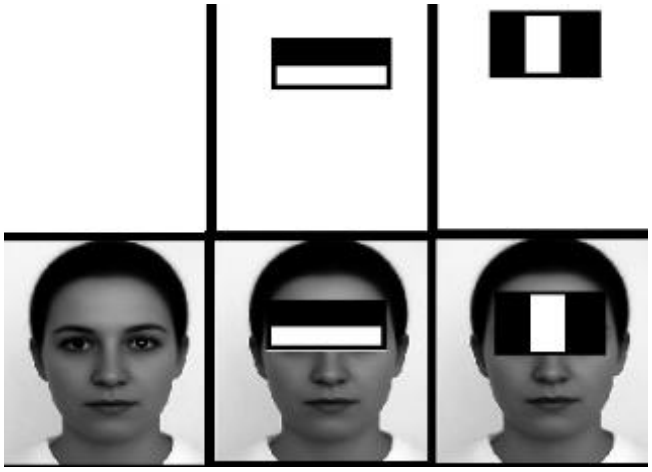

Figure 2.1.2.2 Haar Feature extraction of face

Now, every possible models and positions of all cores are used to estimate many functions. But of all these functions we calculated, most of them are not relevant. The figure below shows two good attributes in the first row. The first function selected seems to focus on the attribute that the eye area is usually darker than the nose and cheek areas. The second function selected is based on the fact that the eyes are darker than the bridge of the nose.

2.1.3 Emotion detection using Fisherface Method

Fisherface is one of the simplified and most preferred algorithms used in facial and emotion recognition. It is a higher-level and better technique because it works and performs great in maximizing the difference between the classes in the training process. Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA) methods are used to reduce the face space dimension. Minimum Euclidean is calculated and used to identify the matching image in fisherfaces algorithm. Fisherface Method works as a merger between PCA and LDA methods.

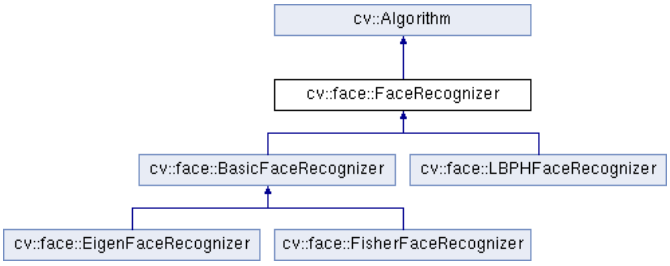

Figure 2.1: Inheritance diagram of FisherFaceRecognizer

LDA analyse and makes the prediction by calculating the probability from the set of inputs given to every class. After estimating the class with the highest probability is the output class and the prediction is made. PCA is most used technique for dimension reduction, it finds all the group of variables with maximum variance possible using orthogonal transformation.

2.2 Comparison with existing system

The music players which are developed in previous days have very less features compared to this newly build music player. It has both the old school features and latest emotion-based auto music playing feature. Most of the music players available only have manual selection of the playlist and random song shuffle. Besides that, this music player can judge user's mood and using previous data it creates the playlist.

Differences found when compared to other similar emotion-based music players available (problems music players available have) :

- They cannot do well in different databases.
- Only few songs due to less storage space available.
- Unable to identify complex and mixed emotions.
- The features available uses only a single monochrome intensity image and do not use invariant illumination.
- Unable to judge only one mood at a time.

Future Work could be done to solve problems:

- Use of Convolutional Neural Network (CNN) to solve database problem.
- In case of storage problem, the songs can be exported to cloud storage and users will have the option of downloading songs as of their choice.
- Train to individually learn the features for recognizing different objects and categories.

III. RESULTS AND DISCUSSION

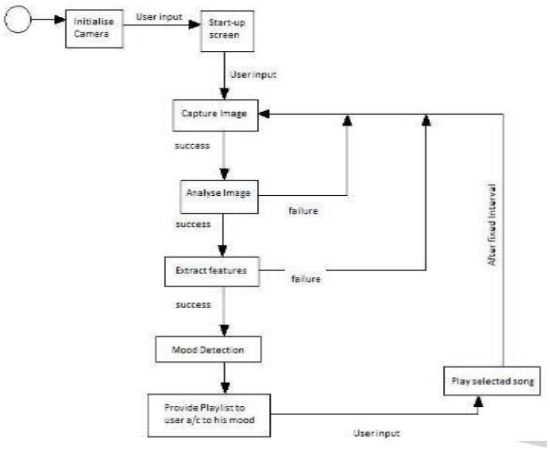

Figure 3.1: Implementation and Architecture Flowchart

After initialising the camera, according to the user input it captures the images and sent for analysing. For every success capturing of image the new image will be created. If the analysing of captured image sets fails, then again, a new image will be captured and it continues until it captures a perfect image which can be analysed further (as shown in figure 3.1).

Resizing the images: Whatever image we have got chosen for the dataset it principally involving the dimensions which may offer a precise output. The size is chosen such that the model can able to simply distinguish face from image by haarcascade model. And therefore, the size we tend to get from real-time-scan is not always same as data, but it has very less difference. In our model it takes 350*350 as size of the image.

Gray Scaling of images: This is the requirement of the model because it helps in acquiring better results. The shaded face and contrast can give us reliable results. As RGB are three dimensional while grayscale images are single dimensional it helps as Dimension Reduction. And it also reduces model complexity.

$$\varepsilon_i = \sqrt{\|U - U_{inp}\|^2}; \quad i = 1 \ldots M$$

Figure 3.2: Euclidean Distance

Euclidean algorithm formula (figure 3.2) is used to find the distance of difference between the image testing with training face image. The result will be the image that has the smallest distance with the test mage displayed by the system.

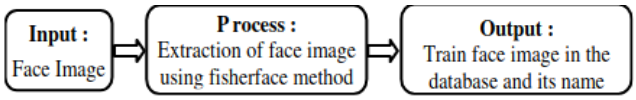

Figure 3.3

Fisher face method is used for analysing the extracted image and performs training. It follows a three-step process for training the perfect images (as shown in figure 3.3).

Those extracted features are used in mood detection module to detect the mood of the user and it passes the result to the backend of music player. With the results obtained it checks for the lists which are assigned to each mood, after checking the mood it plays the songs available in that list. User can also change the list of his favourite songs. Some sample moods available are Happy, Sad, Angry, Neutral.

3.1 Real Life Example

How it can save lives of vehicle drivers?

If a driver gets angry and hits his aggression on others on roadway, that aggressive and rash driving is known as road rage. Road rage distracts a driver's focus on safety and disturbs his clear-thinking mind.

It can put that driver or everyone else on the road into a danger. According to National Highway Traffic Safety Administration more than 55% of the accidents around 106,729 are happened because of aggressive driving and anger might be the reason for it. This project of music player has a special mode which makes it as a unique feature, it works on user's mood. If it finds user's mood is angry it can play soothing and calming music which can turn user's mood into calm and cool. It might reduce the anger of driver which can stop him from rash driving and can save lives.

Java Script programming language is used to write the code of music player in the backend. It has three other different modes of playing songs besides mood-based feature. It has supports adding songs in the queue and songs can also be picked randomly. As we know that CSS, HTML give a great look to communicate through JavaScript and help us to interact with user which adds extra friendly nature and ease of access to user. It not only runs on the console it gives the user privilege so that user can control it manually.

Light and camera quality can be the factors which can affect the result. Good lighting in the room can give satisfactory results.

IV. CONCLUSION

The proposed system processes images of facial expressions, recognizes the actions related to basic emotions, and then plays music based on these emotions. The main advantage of this system is that it is completely independent of automation. In the future, the application can export songs to a dedicated cloud database and allows users to download desired songs, as well as to recognize complex and mixed emotions. Therefore, the developed application will provide users with the most suitable songs based on their current emotions, thereby reducing the workload of users creating and managing playlists, bringing more fun to music listeners, not only helping users, but also songs can be organized systematically. And this model also has productive future scope, facial recognition can be used for authentication purpose, an android app can be developed for mobile uses, it can also detect sleepy mood if the driver is not focused on driving. Even people who are physically challenged can use this, for them this is very better than voice-based applications.

V. REFERENCES

[1]. F Mahmud, M T Khatun, S T Zuhori, S Afroge, M Aktar dan B Pal, 2015 Face recognition using Principal Component Analysis and Linear Discriminant Analysis Electrical Engineering and Information Communication Technology (ICEEICT), International Conference on, pp. 1-4.

[2]. Wilson, P and Fernandez, J. Establishing a face recognition research environment using open-source software. ASEE Gulf-Southwest Annual Conference, March,2005.

[3]. Menezes, P., Barreto, J.C. and Dias, J. Face tracking based on Haar-like features and eigenfaces. 5th IFAC Symposium on Intelligent Autonomous Vehicles, Lisbon, Portugal, July 5-7, 2004.

[4]. Byeong-jun Han, Seungmin Rho, Roger B. Dannenberg and Eenjun Hwang, —SMERS: music emotion Recognition using support vector regression, 10thISMIR, 2009.

[5]. Patil, J. V., & Bailke, P. (2016). Real time facial expression recognition using RealSense camera and ANN. 2016 International Conference on Inventive Computation Technologies (ICICT).

[6]. Puja, Er. Rachna Rajput 2016 Feature Extraction in Face Recognition using SVM-LBP

Detection Technique International Journal of Innovative Research in Computer and Communication Engineering Vol. 4.

[7]. Jyoti Rani and Kanwal Garg 2014 Emotion Detection Using Facial Expressions A Review International Journal of Advanced Researching Computer Science and Software Engineering 4

[8]. Vivek JD, Gokilavani A, Kavitha S, Lakshmanan S and Karthik S2017 A novel emotion recognition-based mind and soul-relaxing systemIn2017 International Conference on Innovations in Information, Embedded and Communication Systems1-5 IEEE

[9]. Lucey P, Cohn JF, Kanade T, Saragih J, Ambadar Z and Matthews I2010 the extended Cohn Kanade dataset (ck+) A complete dataset for action unit and emotion-specified expressionIn2010 IEEE computer society conference on computer vision and pattern recognition-workshops94-101 IEEE

[10]. Anwar S, Milanova M, Bigazzi A, Bocchi L and Guazzini A 2016 Real time intention recognition In IECON 2016-42nd Annual Conference of the IEEE Industrial Electronics Society1021-1024 IEEE

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