Intelligent Music Player Based on Emotions

Mahima Chandane, Ankita Chavan, Renuka Kamath, Dipali Madane, Madhuri Badole

Abstract*: This project presents a system to automatically detect emotional dichotomy and mixed emotional experience using a Linux based system. Facial expressions, head movements and facial gestures were captured from pictorial input in order to create attributes such as distance, coordinates and movement of tracked points. Web camera is used to extract spectral attributes. Features are calculated using Fisherface algorithm. Emotion detected by cascade classifier and feature level fusion was used to create a combined feature vector. Live actions of user are to be used for recording emotions. As per calculated result system will play songs and display books list.

***Keywords*: Smart Emotion, Face Detection, Face Recognition, Emotion Prediction, OpenCV.**

I. INTRODUCTION

Health, education, surveillance, security and marketing are some of the fields in which emotion recognition has quite importance. Interaction between human and computer can be improved precisely by recognizing emotions and answering them using machines. Single emotion can be detected automatically as inspected in the current study. Humans can simultaneously feel and show varied emotion according to behavioral and psychological studies. For example, at the same time an individual can sense happiness and sadness. Emotions such as happy, sad, neutral, surprise, anger, fear and disgust were taken into consideration for the proposed system. Multiple emotions can be recognized using the data captured from facial expression for developing features. "A single class label is related with each annotated feature vector instance for single label classification problem" [1]. "The multiple concurrent emotion recognition comes under multi-label classification problem" [1]. "Multi-label are linked with each feature vector instance depending on the existence or non-existence of the six primary emotions (happy, sad, neutral, surprise, anger, fear and disgust)" [1]. The multi-label classification is getting improved consideration and has its applications in various fields such as bioinformatics, video-based systems, text, security, music, and pictures. Previously we used static systems to play songs as simple music player by manual selection of songs, and user decides to play songs according to his/her choice. According to proposed system, the process of deciding and playing the songs will done by system itself by recognizing facial expression (happy, sad, neutral, surprise, anger, fear and disgust).

Revised Manuscript Received on September 25, 2020.

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II. DESIGN SYSTEM

A. User

Use this system.

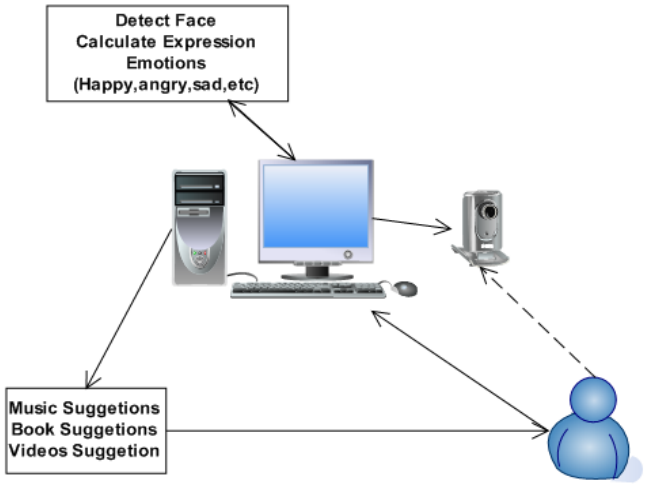

Fig. 1. System Architecture

B. Server

Connection between user and database.

C. Database

Storage of information related to facial characteristics, songs and books uploaded.

Our system has mainly three modules, user module, mood detection module and video suggestion module. Various processes involved in these two modules are:

D. ***User Module:*** User can use system, store songs and books in the system.

E. ***Mood detection Module***: As per the facial expression it will recognize mood of the user and accordingly will display songs, books and video suggestion.

F. ***Video suggestion Module:*** According to the user's mood it will give suggestions of videos.

III. METHODOLOGY

The capability of music to enhance mood is important, as positive mood improves several cognitive functions, cause optimistic feelings. However, as our personal music databases increase in size, it becomes hard to select songs. To deal with this, music player has been developed to direct towards a target state. In the proposed system, the effective music player will be broadly validated to show whether it can direct mood towards a desired state, and thus enable personal music selection. Proposed system uses Haar Cascade and face recognition algorithm to detect face and mood of a user. System will able to add, delete songs for respective mood. User is able to give image as input (e.g. Selfie image). Image will be uploaded through services. Using Linux based system user will able to listen songs with detected mood. The significant stage while performing facial recognition is face detection. Thus, Haar cascade is used for face detection and Fisherface algorithm for face recognition.

IV. ALGORITHM

1. Haar Cascade :

In machine learning, Haar Cascade is an object detection algorithm used to recognize objects in an image or video. It is a method based on machine learning in which several positive and negative images are used to train the cascade function. Then it is used on other images to detect objects.

The algorithm has four stages:

(a) Haar Feature Selection

(b) Creating Integral Pictures

(c) Adaboost Training

(d) Cascading Classifiers

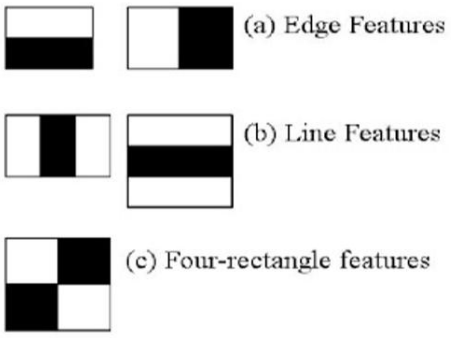

Fig. 2. Haar Features

First accumulate the Haar Features. Haar feature incorporates studies of neighboring rectangular areas at a single position in a detection window, summaries intensities of pixel in each region and measures the dissimilarity between the sums. Best features are selected by adaboost which are linear combination of weighted simple weak classifier which are used in order to construct a strong classifier. During the detection process, the target size window is relocated over the input image, Haar features are measured for each sub-section of the image. This variance is then compared to the learned threshold that separates non-objects among objects. As every Haar feature is a "weak classifier" a huge number of Haar features are required to classify an object with adequate accuracy and therefore cascade classifier are grouped together to create a strong classifier.

2. Fisherface :

Fisherface algorithm extracts principle components that separates one entity from another. So now an entity's features cannot dominate another person's features.

Image recognition using this algorithm is based on reduction of face space dimensions using PCA method and then applying LDA method also known as Fisher Linear Discriminant (FDL) method to obtain characteristic attributes of image.

LDA is used to find a linear combination of features that splits two or more classes or objects. It can be used for dimension reduction before further classification. It attempts to model the difference among classes of data.

Process

(a) Retrieve data:

Collection of data is done in form of face images. Data gathering can be done using images already saved or from a web camera. User's face must be fully visible and should be facing the camera.

(b) Image Processing:

i. Preprocessing stage: Capturing images using web camera or saved pictures and converting them from RGB to grayscale. Image data is divided into training and test data.

ii. Processing stage: Fisherface algorithm will be applied to generate feature vector of facial image data which will be used by system and then to match vector of characteristics of training image with vector characteristic of test image using Euclidean distance formula.

(c) Feature generation:

Fascial features of the faces are extracted.

Now we can see how do face recognition function work: cv2.face. create FisherFaceFaceRecognizer()[3]

1. Many components are used for LDA to generate a fisherface.

2. Similar to eigenface it will return -1 if the threshold is approved.

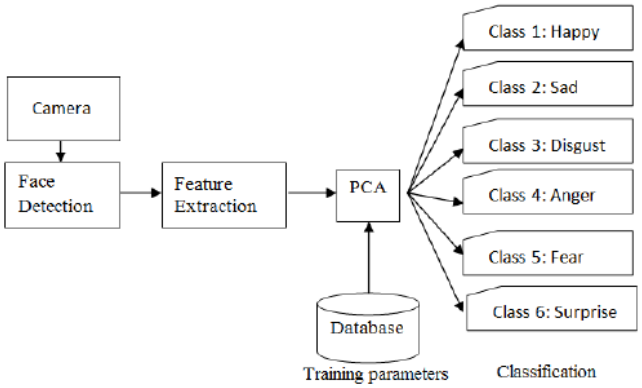

Fig. 3. Activity Diagram

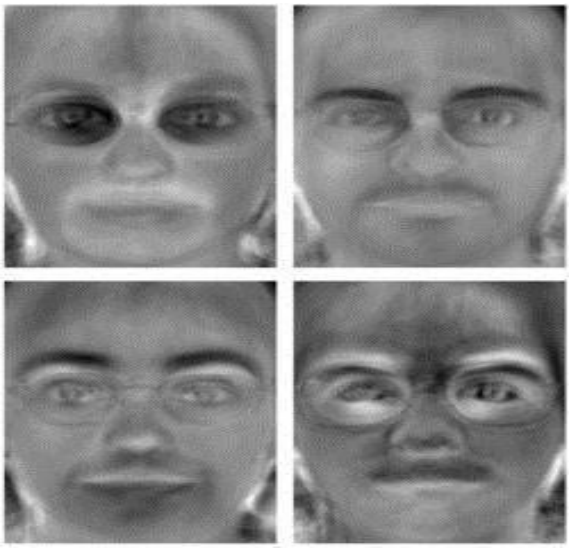

Fig. 4. Pattern Recognition Image

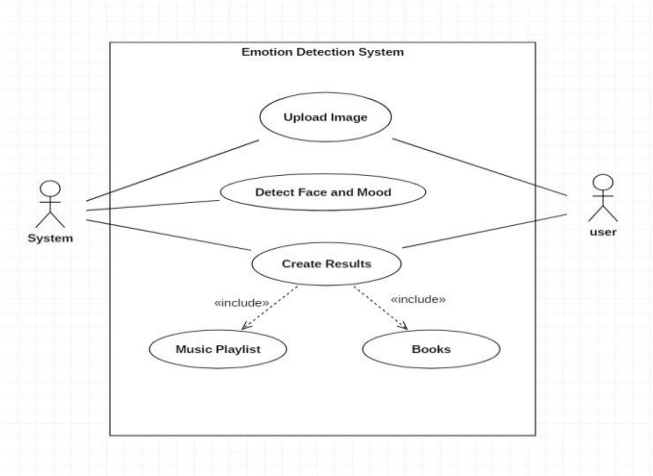

Fig. 5. Use Case Diagram

V. RESULT

This table is prepared from the test results from the implementation part.

SR NO	OBJECTIVE	DESCRIPTION	OBSERVED OUTPUT	EXPECTED OUTPUT	RESULT
1	Wrong username and password	User enters wrong username and password	Error message is shown and user is not able to login the system	System should display an error message	Pass
2	Emotion recognition	User clicks on start camera	Users face emotions are captured	System captures emotions	Pass
3	Play songs without emotion recognition	User clicks on play songs without emotion recognition	Error message is shown and user is not able to play songs	System should display an error message	Pass
4	Books recommendation without emotion recognition	User clicks on book recommendation without emotion recognition	Error message is shown and user is not able to play songs	System should display an error message	Pass
5	Play songs	Once emotion is recognised user clicks on play songs	Songs are played according to emotion	System plays songs and suggests books and video according to emotion	Pass

Fig. 6. Test Case Diagram

VI. CONCLUSION

In the proposed system, we authenticate the concept of an effective music player which is based on emotions of the user. In this system we are going to play music stored in the system according to the mood detected by means of input image. We will be using face detection and face recognition algorithms to detect mood. Input image will be given (e.g. selfie image) to the application and will be uploaded through the service to local server. Server will do analysis of image and after detecting mood from image it will reply to system with detected mood. Then our proposed system will automatically play music stored in particular mood category and also suggest books and videos to the user. Users can update list of songs.

ACKNOWLEDGMENT

We would like to thank everyone who contributed in this research paper. We would also like to show gratitude towards our guide prof Madhuri Badole, Department of Computer Engineering, Pimpri Chinchwad College of Engineering and Research for her constant support and guidance.

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