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EMOTION BASED MUSICPLAYER

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Abstract

Recent studies confirm that humans respond and react to music and this music has a high impact on human's brain activity. The average urban human listens up to four hours of music every day. People is ten to music based upon their mood and interests. This project mainly concentrates on creating an application to play songs for user based on their mood by capturing facial expressions. Facial expression is a form of non verbal communication. Computer vision is an interdisciplinary field that helps to convey a high-level under-standing of digital images or videos to computers. In this system, computer vision components are used to determine the user's emotion by facial expressions. Once the emotion is recognized, the system plays a song for that emotion, saving a lot of time for a user over selecting and playing songs manually. Emotion-Based Music Player also keeps track of song details and has modes like queue mode and random mode .Evaluation allows the testing of the model against data that has never been seen and used for training and is meant to be representative of how the model might perform when in the real world. According to the emotion, the music will be played from the predefined directories.

Keywords: Emotion recognition, Webcam,

I INTRODUCTION

Emotions are the bodily feelings associated with mood, temperament, personality or character. PaulEkman had developed the classifications of basic emotions which are anger, disgust, fear, happiness, sadness and surprise in 1972. A facial expression can be expressed through the motions or from ne or more motions, movements or even positions of the muscles of the face. These movements transmit of the emotional status of an individual. Facial expression can be adopted as voluntary action

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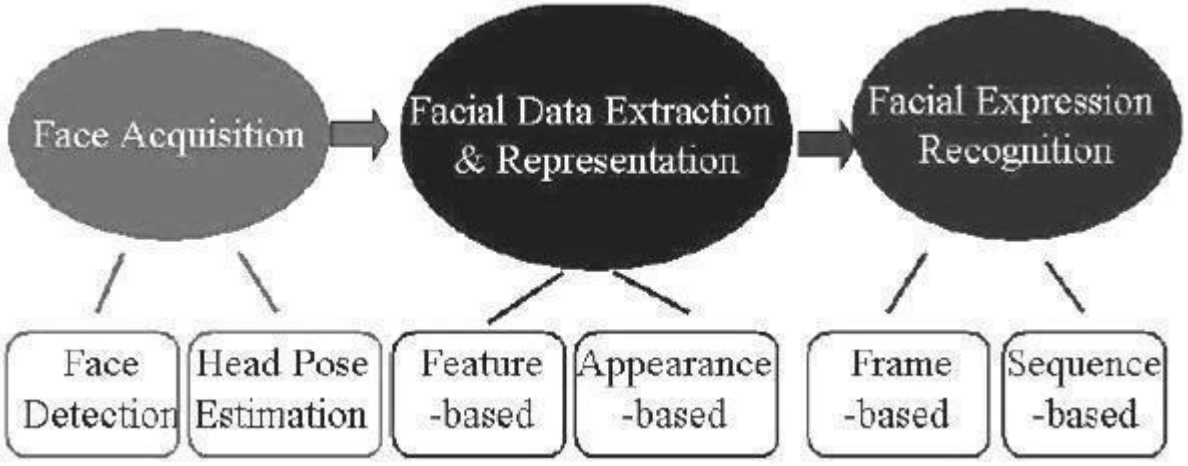
as individual can control his facial expression and to show the facial expression according to his will. For an example, a person can make the eyebrow close rand frown to show through the facial expression that he is angry. On the other hand, an individual will try to relax the face's muscle to indicate that he is not influence by the current situation. However, since facial expression is closely associated with the emotion, thus it is mostly an involuntary action. It is nearly impossible for an individual to insulate himself from expressing the emotions. An individual may have a strong desire or will to not to express his current feelings through emotions but it is hard to do so. An individual may show his expression in first few micro-second before resume to a neutral expression. In 1978, Suwa et al. presented his early attempt on the idea of automatically facial expressions analysis by tracking the motion of twenty identified spots on an images e-quence.AfterSuwa's attempt, the reare lots progresses. Computer systems in order to help human to recognize and read the individual's facial expression, which is a useful and natural medium in communication. Facial expression analysis includes both detection and interpretation of facial motion and recognition of expression. The three approaches which enabled the automatic facial expression analysis (AFEA) include i) face acquisition, ii) facial data extraction and representation, and iii) facial expression recognition.



Source fromYing-LiTian,Takeo Kanade,andJeffreyF.Cohn(2003)

.1Basicstructureoffacialexpressionanalysissystem

Face features detection such as the mouth and the eyes is always one of the key issues in facial image Processing as it involves wide and various areas such as the emotion recognition and face identification. Joseph C. Hager (2003) stated that face detection feature is used as one of the input to other image processing functions such as the face and emotion detection. Different researchers had

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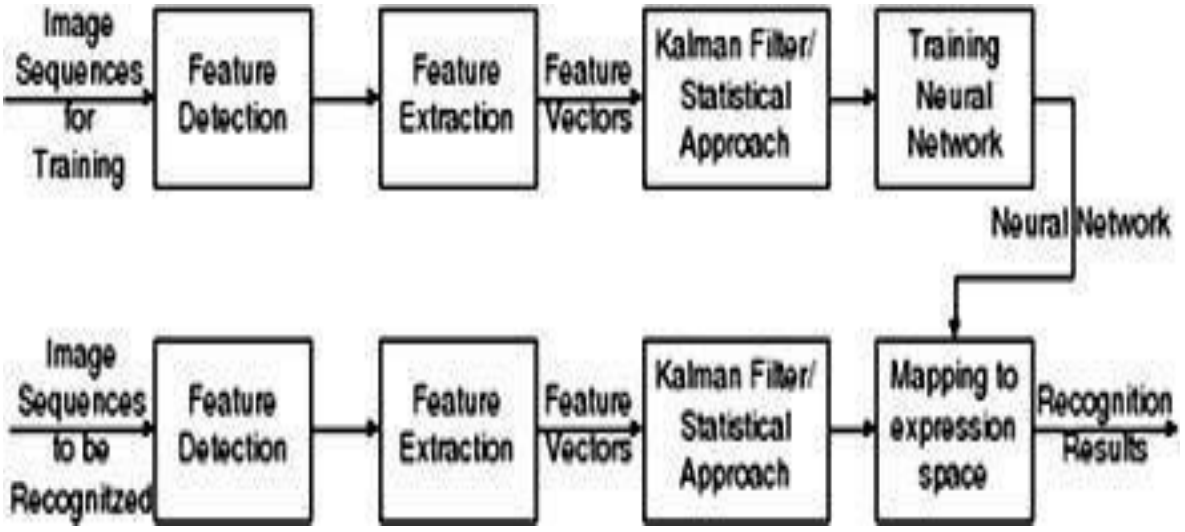
studies on the different approaches in facial expression detection. Each approach can be applied effectively in different situation. In the year of 2004, W.K. Teo, Liyanage C De Silva and PrahladVadakkepat had proposed a method of combining the feature detection and extraction with the facial expression recognition into an integrated system which can improve the recognition output in terms of the recognition process. With this system, the recognition process is not influenced by the subjective aspects and the bound of the are as a re invariant during the sequence. W.K. Teo, Liyanage C De Silva and PrahladVadakkepat (2004) "We propose a method for facial expression recognition that uses integral projection, statistical computation, a neural lnetwork and kalman filtering. The face feature detection method uses multi-stage integral projection.Opticalflowcomputationwillbeusedonthedetectedfeaturenamely,theeyebrowsandtheliptoextractmovement."



Block diagram of the proposed facial expression recognition system.

II LITERATURESURVEY

Apart from the approach introduced by W.K. Teo and etc., in the year of 2010, Jagdish Lal Raheja andUmesh Kumar had introduced the Back Propagation Neural Network technique in human facial expression detection from captured image. The approach used is based on the usage of add-boosted classifier and finding and matching the token when detecting the facial expression while applying neural network. In face detection, the method proposed is by usig n the Viola and Jones method. It is a better implementation when comparing to other techniques as it is feature based. Besides, it is able to perform the analy-sis relatively faster as compared to others. Edge detection, thinning, and token detection are carried out during the image processing process. Edge detection is aimed at identifying the points in a digital image at which the image brightness changes sharply or more formally has discontinuities. Thinning is appliedin order to reduce the width of an edge, which is

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from multiple lines to single line. Token which generated after the thinning process divides the data set into smallest unit of information which needed for the following processes. After the three procedures, the recognition is performed. “It is a tedious task to decide the best threshold value to generate the tokens. So as a next process or the future work is to determine the best threshold value,so thatwithouttheinteractionofuserthesystemcangeneratetheto-kens.”Besides above, hengyou Zhang (1998) had reported on the investigation on the feature-based facial expression recognition with inanarchitecturebased on the two-layer preceptron.Two types of factors are being derived from the face images during theinvestigation,i.e.thegeometricpositionsofasetoffiducialpoints on a face as well as the set of set of multi-scale and multi-orientation Gabor wavelet coefficient sat these points. Zhengyou Zhang (1998) “The recognition performance with different types of features has been compared,which shows that Gaborwavelet coefficient are much more powerful than geometric positions.” Secondly, the sensitivity of individual's fiducially point to the facial expression detection is examined. Through the sensitivity analysis, the author found out that the points on cheeks and fore head carry little use fulinformation.In addition, Caifeng Shan, Shaogang Gong, Peter W. McOwan (2008) reported on the Facial expression recognition based onLocal Binary Patterns:A comprehensive study. Local Binary Patternsisthetexture operator that tags the pixels of an image by thresholding the neighborhood’s pixel and represents the re-sult in binary format. Result from the authors’ experiments show that Local Binary Patterns features perform stably and robustly over a use fulrangeo flower solutions of face images. This means image with low re solution can as well be processed and accurately identified the emotion.

III PROBLEMSTATEMENT

Using traditional music players’ a user had to manually browse through his playlist and select songs thatwouldsoothehismoodandemotional.Intoday’sworld,andtechnology,variousmusicplayershavebeende veloped with features like fast forward, reverse, variable playback, streaming play back with multicast streams and including volume modulation, genre classification etc. Although these features satisfy the user’s has to face the task of manually browsing through the play-list of songs and select songs based onhiscurrentmoodandbehaviour.Foraccessingthisapplicationuserhastofirst login or sign-up. User can see various types of moods in Mood tab after login. Such as Chill, Romance ,Energy Booster, many more. And when a user clicks on mood as per their choice list of songs would be displayed and user can enjoy their time by listing music. User can download as well as share there play-list. User can do search with music as well as artist also.

PROBLEMOBJECTIVE

Project EBMP [Emotion Based Music Player] is a novel approach which helps user to play the songs according to their emotion / mood. In android we can apply many features. This application is made for android users only from seventh version further more. Firstly user have to sign up or login to

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access the application and then can according search songs or by just clicking on moods user can also access songs play list. user can also access this application on desktop too. To access in desktop user need windows7or further version. User can also upload his / her playlist from device. Also can download songs and also can share from our application. In this application dark as well as light theme are provided for user eye comfort. Users can boost their sound in equalizer. Our application does not contain any add because we have observed in many famous application they put add in middle and we get disturbed so just to make user happy we haven't collaborated with any type of article add.And we believe in equality so we haven't added any premium package this application is same for all user.

MOTIVATION

Music listeners have tough time creating and segregating the play-list manually when they have hundreds of songs. It is also difficult to keep track of all the songs sometimes songs that are added and never used, wasting a lot of device memory and forcing the user to find and delete songs manually. User has to manually select songs every time based on interest and mood. User's also have difficulty to reorganize and playing music when play-style varies. Currently in existing application, music is organized using playlist and different types of moods. When user will click to their current type of mood it might happen that they don't like the play– list created by the developer because here developer is also playing the role of user so it's hard to define that's what kind of play list user would like. Everyone have their own choice about them, contrast colour.This also become necessity to give choices about them dark, light, colorful .As a music lover It thought to give a effortless music player likes peech to play music and more impressive function. A music player should be build in such a manner which satisfies user with perfect sound quality and many more option of improving bass. Many people like high bass, live, Custom, Rock Jazz, Electronic and many more types of effects in sound mode so it is challenging parts to provide all in equaliz-er.

IV EXISTINGSYSTEM

We have came up with advanced technology where we can develop any type of apps. At present Spotifyis the best music player where can listen only online music but can download songs in device. In spotify we get to seem any feature like Recently played songs ,Shows you might like,Your2020wrapped,FreeKicks , Popular playlists , Best of artist , Popular an trending . Here you can get premium to after payingonline.Usercanmakeyourplaylistaccordingtoyourfavouriteartist. Even you can create your profile,account . Best thing you get an Equalizer to control your music sound

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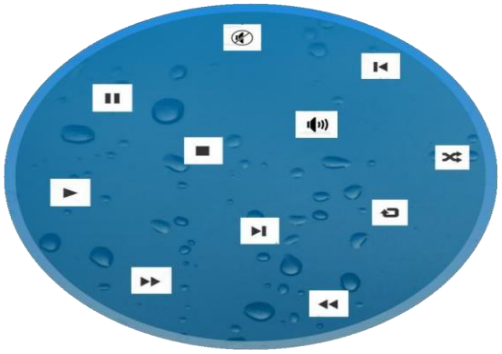
effects. User can connect anotherdevices through Bluetooth and wifi. Here we get many buttons like shuffle , loop , next , previous , re-sume,stop,like button to add liked songs in liked playlist, Seek Bar,many more features are available in spottily music player which comes at the top in music player. Languages used at backend in Spotify isPython and other then JAVA , C ++ , and C is used to make available in OS, macOS , Linux. Spotify isfamousin world wide.Now adays in



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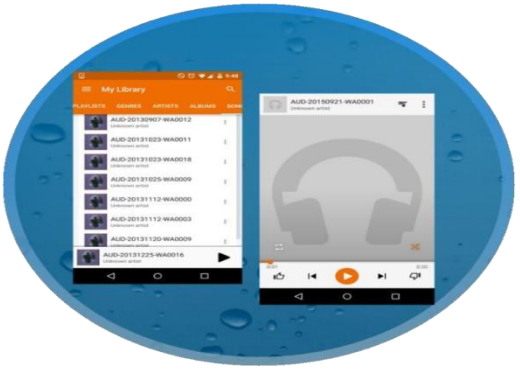

Example of music player Application

DISADVANTAGES OF EXISTINGSYSTEM

Using existing music players, a user had to manually search through his playlist and select songs thatwould match his mood and emotion. In today's world, with increasing advancements in the field ofmultimedia 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 and including volume modulation, genre classification etc.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.Thatis the requirements of an individual, a user sporadically suffered through the need and desire of browsingthroughhis playlist, according to his mood and emotions.

V PROPOSEDWORK

The objective of this work is to detect emotion and select music to be played based on the detectedemotion. Human emotions can be described through music. We are trying to build and

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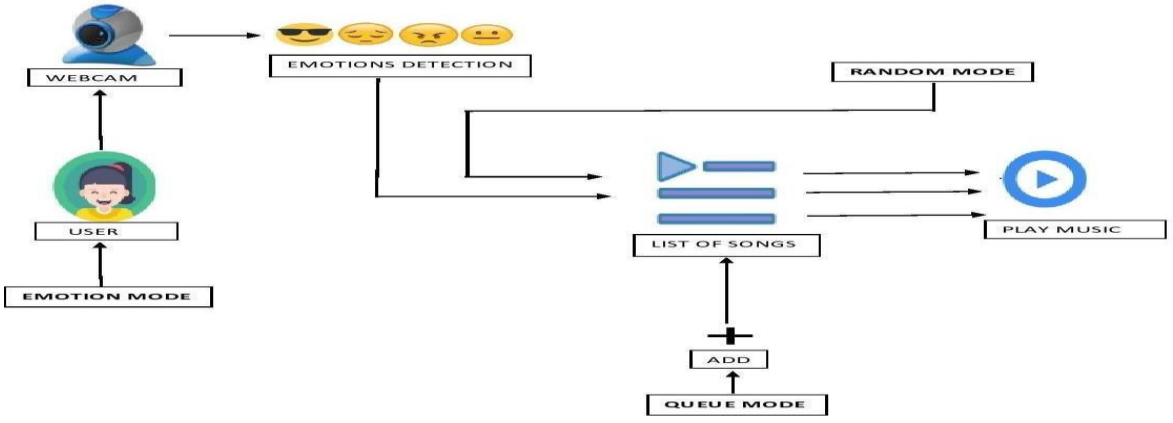
applicationwhichwilldetecttheuseremotionandplaythesongaccordingtothemoodandalsohelpstosearchsongbasedonusers wish by using queue and random mode. From the developer side, the proposed model will be focusing on two main functions, first is the ex-pression detection and secondly the list of songs played for each category of emotion. As for the ex-pression detection, the system is designed mainly to detect on the four major expressions, which are the happy, sad, angry and neutral. On the other hand, there will be songs ready available in each category.After the emotion of the individual is detected, the system will then play the songs through music play-er.



Working of the proposed model

ADVANTAGES OF THE PROPOSEDSYSTEM

- ItcanbeusedforAutomaticplayingofsongsbasedontheemotionoftheuser.
- This emotion-based music player can act as a plugin for website.
- OurprojectcanbeimprovedbyimplementingthisinrecommendationforYouTube.
- Can be implemented in SmartTVfor good experience.
- Thisemotion-basedmusicplayercanactasaPersonalAssistant.

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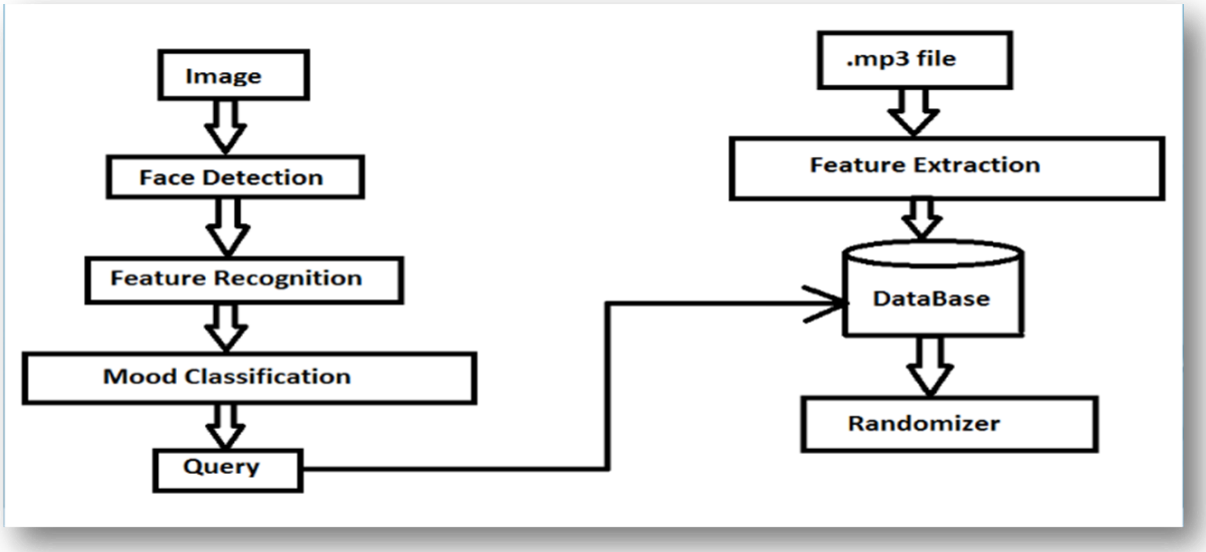
Mixed mood detection

VI IMPLEMENTATION

The proposed system has the following architecture where image is captured from which face is detect-ed and mood is classified using Fisher face classifier. Once the mood is classified song is selected from database according to that mood and randomizer givesan output song.



DATAPREPROCESSING

(i)Collecting data: Facial expression detection in Fisher face works with the help of trained models.Reason behind this is to allow user to take dataset according to their use. Suppose if we take a hugeamount of dataset of around 25-30k it will give nice accuracy no doubt but if the situation is like that theuser of the devices are a few people. Now in such condition if we take some precise dataset with around400-450 images as input related to the user then it will also give good accuracy with the benefit of lessamount of dataset and less storage on memory to operate. As well as small memory of data give outputfastwhich resultin quickresponsetime. Herewefirst triedwith Cohn-Kanadedatasetthenwemade

Some classification in the as our need make it to train our model.

(i) Loading andsaving trainedmodel:

Fortraining,wehaveusedFisherfacemethodof cv2library.

```
fishface = cv2.face.FisherFaceRecognizer_create()
```

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For training data model, we have made a python code which grabs all the classified images from foldersand map it with its emotion. These data we at an instance stored in dictionary and then use .train methodtotrain model.

```
fishface.train(training_data, np.asarray(training_label))
```

Tosavethe modelfor later usewehaveimplemented .savemethod.

```
fishface.save("model1.xml")
```

Nowat thedetection timefirst wehaveload modelin memory using.read method.

```
fishface.read("model.xml")
```

Prediction of result is based on the prediction and confidence value which .predict method return.

```
pred, conf=fishface.predict(facedict[i])
```

(iii) Haar cascade model:

Haarcascade model is precise face detection trained model which is provided by Open-cv. It returns theco-ordinates in terms of (x, y) at (left, bottom) of face frame and it's width and height from those co-ordinates.

```
clahe_image=grab_face()
face=facecascade.detectMultiScale(clahe_image, scaleFactor=1.1, minNeighbors=15,
 minSize=(10, 10), flags=cv2.CASCADE_SCALE_IMAGE)
```

As here in the .detectMultiScale() method it is capable of detect multiple faces and it return an array ofallthe faces(co-ordinates) as an element.

The arguments have set according to the threshold what we need for our checking purpose. We have setitsuch likeit doesn't affect our modelaccuracy.

(iv) Resizing images:

Whatever the image we have chosen for dataset it mostly related to the size which can give a preciseoutput. The size is chosen such like the model can able to easily distinguish face from image by haar-cascademodel. Andthesizewhatwegetfromrealtime scan isnot alwayssameas data (very less difference)so,weresize ittotheexact modeldata size.Inourcasewehavechosen350*350.

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```
def crop(clahe_image, face):
    for (x, y, w, h) in face:
        faceslice=clahe_image[y:y+h, x:x+w]
        faceslice=cv2.resize(faceslice, (350, 350))
        facedict["face%s" %(len(facedict)+1)]=faceslice
    return faceslice
```

Here In this method, we have implemented the cropping of image by given parametersofhaarcascade byclahe_image[] and use of cv2's method .resize() to the given size. Finally, we have stored those imagesindictionary and after some count (=10) takeit to check result.

(v) Grayscalingimages:

It was the need for the method and because of its contrast and shaded face, it results in benefit foralgo-rithm to getoutput.

Facedetection:

```
def grab_face():
    ret, frame=video_capture.read()
    #cv2.imshow("Video", frame)
    cv2.imwrite('test.jpg', frame)
    cv2.imwrite("images/main%s.jpg" %count, frame)
    gray=cv2.imread('test.jpg',0)
    #gray=cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
    clahe=cv2.createCLAHE(clipLimit=2.0, tileGridSize=(8,8))
    clahe_image=clahe.apply(gray)
    return clahe_image
```

Asthegiveninthecodegrab_face()methodsusestogettheimagesanddoalloperationandfinallyreturncropped, grayed fac evalue in dictionary.

Train andpredictmethods:

```
pred, conf=fishface.predict(facedict[i])
```

This code is use to get prediction and confidence value for given amount of image. Then get the max

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function with obtained output and final result is shownto theuser.

In capture mode the user face would be detected using the OpenCV library. The image would be capture and using Fisher Face Algorithm the mood will be detected and the songs will be played.

(i) FaceDetection

OpenCV – It uses machine learning algorithms to detect and recognize face, identify objects, classify human actions in videos, from camera to find similar images from an image database. OpenCVusesHaarCascade classifier. Aar cascade classifier is a machine learning concept where a cascade function istrained from images both positive and negative. Based on the training it is then used to detect the objectsin the other images. The algorithms break the task of identifying the face into thousands of smaller, bite-sized tasks, each of which is easy to solve. These tasks are also called classifier this is what the initial data set looks like. The data set has various fields which need to be cleaned and all the category types have been converted to numeric.

StepsforOpenCVAlgorithm

• Detect face using Haarcascadeclassifier.

• Loadtheimageandconvertit intograyscale.

• OncetheimageisconvertedfromRGBtogrey,the system will locate the features in face using “detect Multiscale” function.

• From the above step, the function detect Multiscale returns 4 values – X-coordinate, Y-coordinate, width(w)and height(h) of the detected features of the face.Basedon these4 values systems willdraw a rectangle around the face.

(ii) Face Recognition

Fisher Face – This algorithm extracts principle components that distinguish one user from another. So,now a user’s features can't suppress another user’s features. By applying PCA method face spaces arereduceandthenobtainingthefeatureofimagebyapplyingLDAmethod.StepsforFisherFaceAlgorithm

• Usingwebcamoralreadysavedimagethesimilardatagetscollected inthe formofimages.

• ImageProcessing

Pre-processing stage: The collected images are then converted into greyscale and then divided into

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twosubparts training data and testing data. Processing stage: Vector of facial image is generated by applying the facial method and later it is match with the vector of traits of training image with vector characteristic of test image using Euclidean distance formula.

(iii) Dataset

In FER-2013 dataset the training dataset consist of 28,000 images, the development set contains 3,500images, and 3,500 images in the test set. The dataset has seven emotions: happy, sad, angry, afraid, surprise, disgust, and neutral, with happy being the most prevalent emotion, providing a base line for random guessing of 24.4%. The images in FER-2013 consist of both posed and un posed headshots, which are in gray scale and 48x48 pixels.TheFER-2013data set was created by gathering the results of a Googleim-age search of each emotion and synonyms of theemotions.

1Imagesin Dataset

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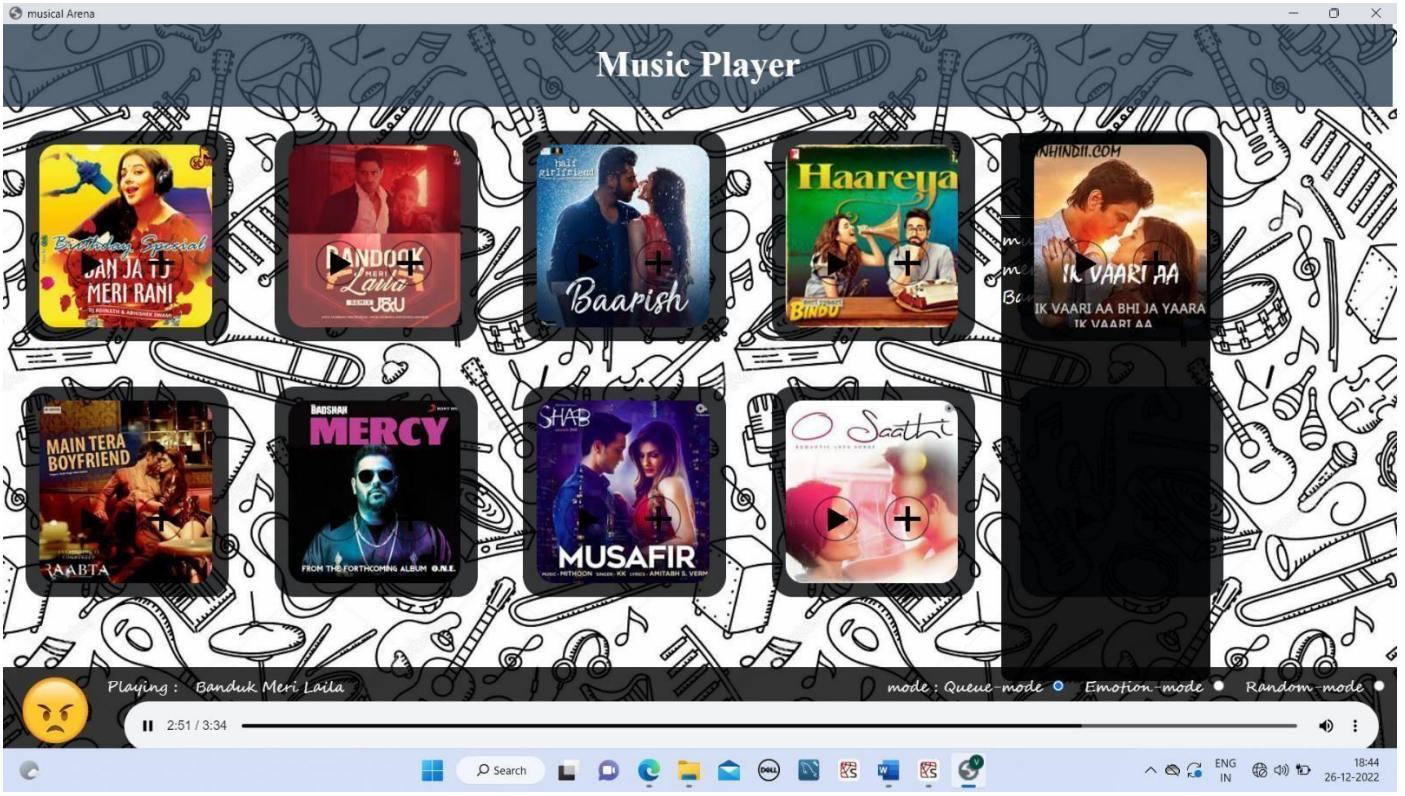
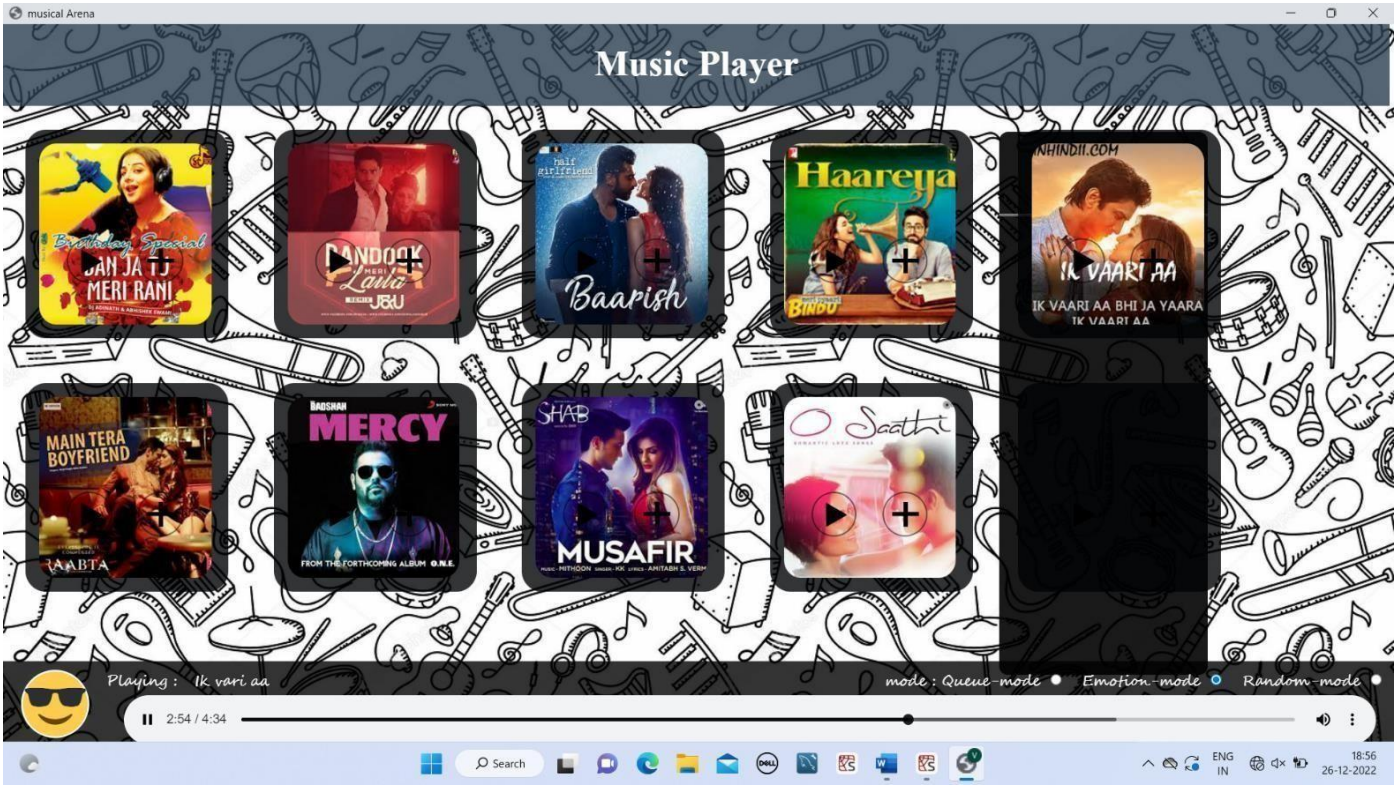
VII RESULTS



Queue Mode



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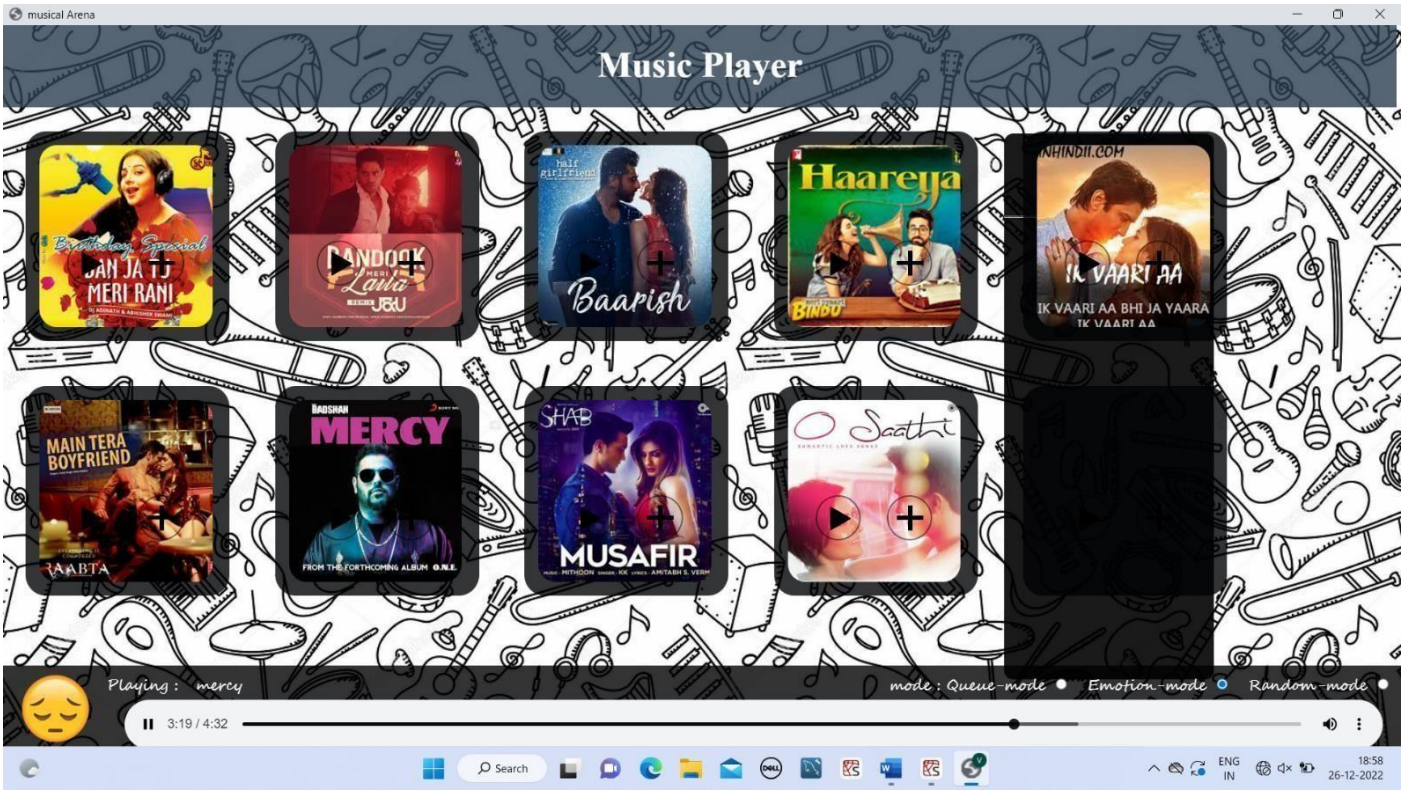
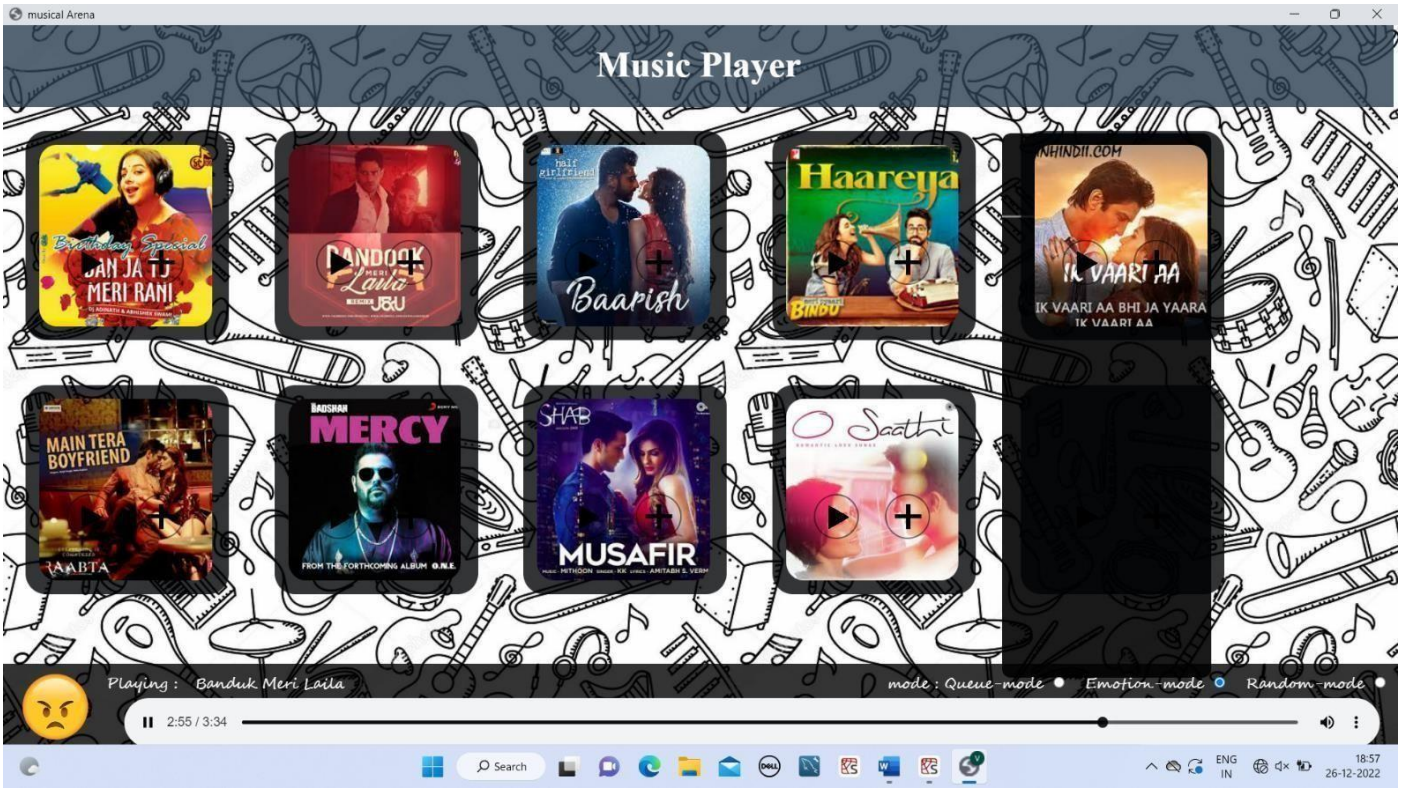
Happy Mood



Sad mood



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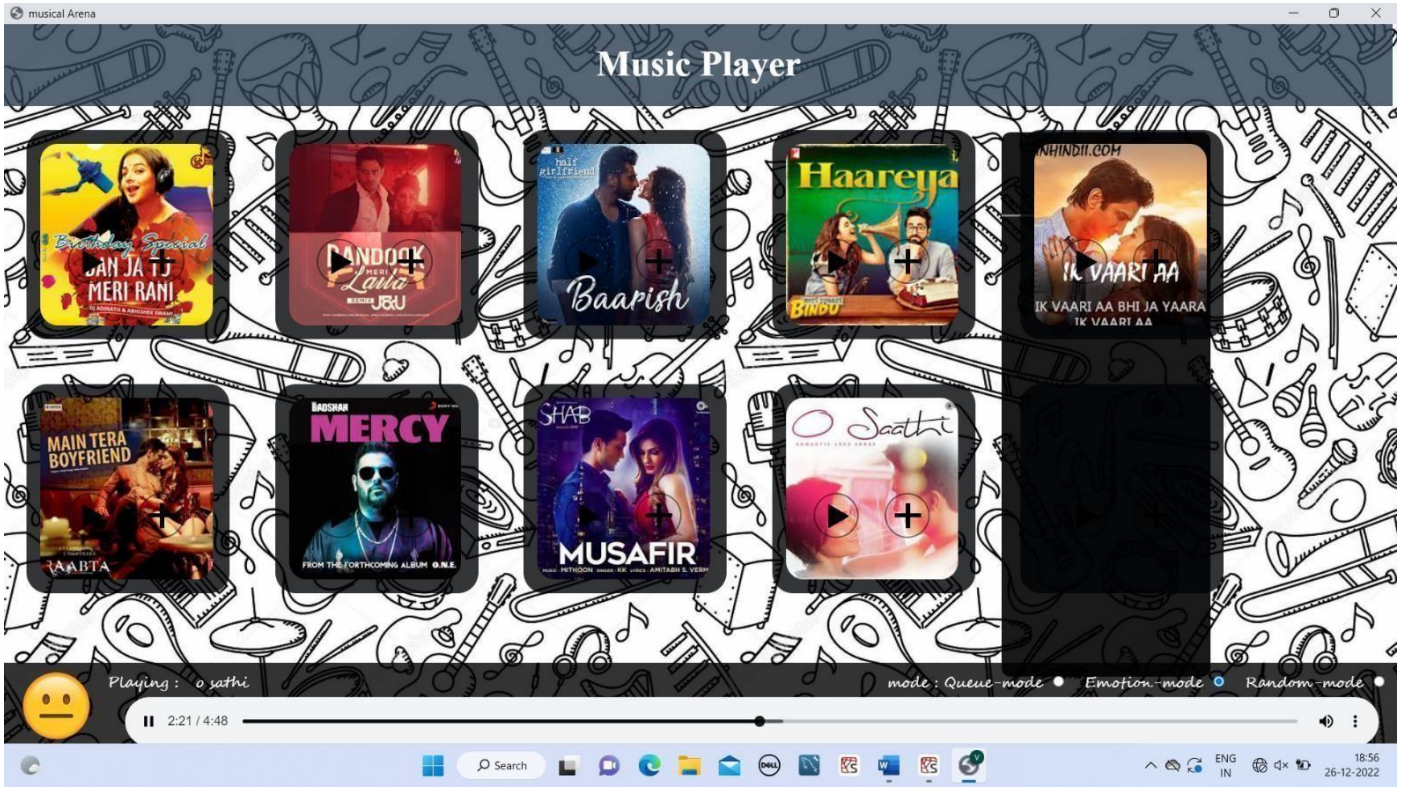
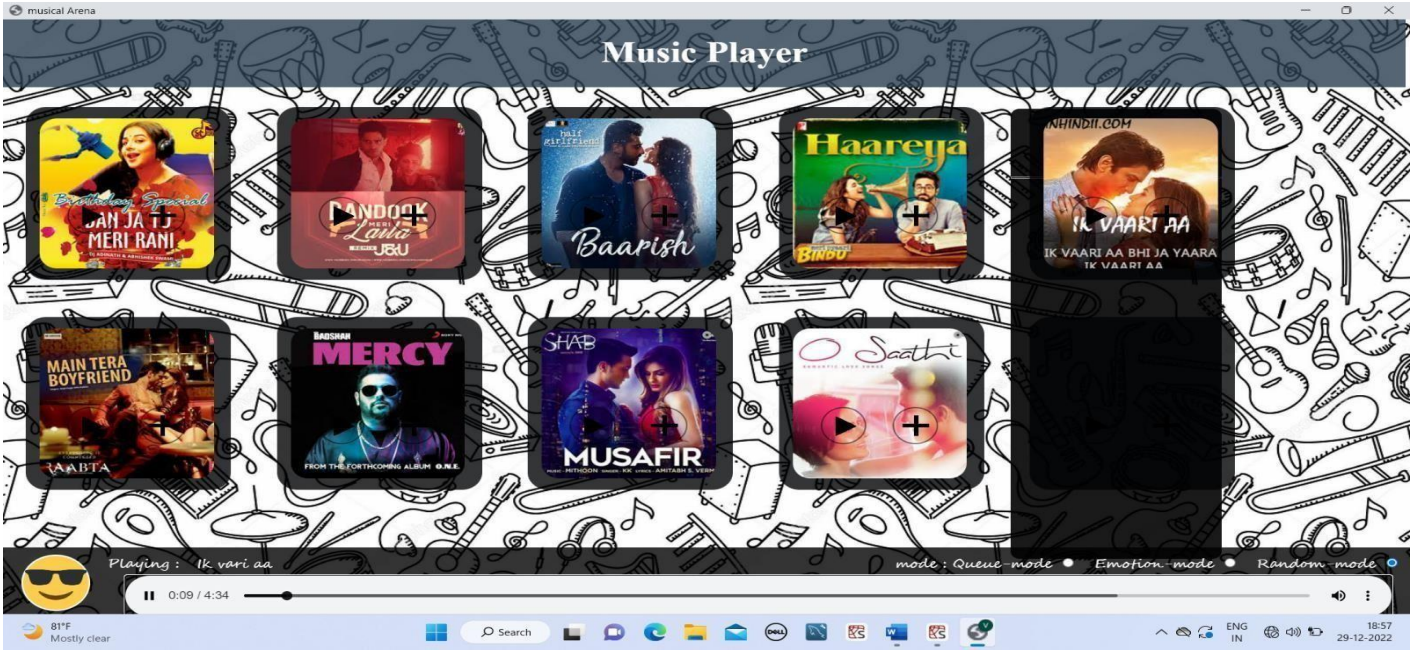
Angry mood



Neutral mood

Musicplayer will randomly play the songs from the database of various songs available.



Random mode

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VIII CONCLUSION

Thesignificantofthisprojectistheemotiondetectionoftheimagesloadedintotheproposedmodel.Themain purpose is on its emotion detection functionality. Through the integration between emotion detec-tion technology and music player, the proposed model is aimed to provide betterment in the individual's entertainment. The Emotion-Based Music Player is used to automate and give a better music player experience for the end user. The application solves the basic needs of music listeners without troubling themas existing applications do: it uses technology to increase the interaction of the system with the user inmany ways. It eases the work of the end-user by capturing the image using a camera, determining their emotion, and suggesting a customized play-list through a more advanced and interactive system. This pro-jectis developed to give us great advancement in the field of machine learning technology .Emotion based music player fulfils to sort out the music based on the emotions of the user such as whether it is happy or sad or angry. So, our work totally aims to develop a player which is based on user need and it helps torevive in case of free time or leisure time if we want to hear music based on our current mood. The proposed is able to detect the four emotionsi.e.normal, happy, and sad. Once theproposedmodeldetectedtheemotion,musicplayerwillplaythesong(s)accordingly.Asfortheusabilityanda ccuracy,bothsystemtestingandemotionaccuracytestinghasbeendonetotheproposedmodelandreturnasatis-fying result. The proposed model able to recognized 34out of 40 images loaded in to it, which give a Recognition Rate of 85%. Besides, the proposed model is a computer application which can works well in all kinds of windows and computers. Thus with this Emotion Based Music Player, users can have anal-tentative way of selecting songs, which is in a more interactive and simpler way. It can help the music lovers to searchandplay songs accordingto their emotionsautomatically.

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