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Smart Music Player Based on Emotion Recognition from Facial Expression

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Abstract:- The magical power of music is scientifically proven. People always like to hear the music depending on their emotional feelings. Music is considered to be a tool for stress relief. Many psychological states can be very well controlled by listening to music. . We focus on developing an emotion based music system. The image of the face is captured in a camera and the emotions are classified. The classification is done using CNN classifier. Theneural network model is trained and used to find the emotion from the image of the face captured .Depending on the mood of the user a playlist is formed in the music player implemented using PyQt5.

Keywords:- *Machine Learning, Image Processing Convolutional Neural Network, Haar Cascade, PyQt5.*

I. INTRODUCTION

Music is an essential component of our daily life. We listen to songs as per our mood. Music is one of the media of entertainment and even imparts a therapeutic approach. Itis important to play an appropriate song on the particularemotional state.In the present scenario the user has to manuallyselect the music from the play list according to his moodand play the songs. This project is based on the principle of detection of human emotions to play appropriate songs for current emotional state. The current emotional state of human being can be easily observed through their facial expressions. It can be achieved with help of image processing and machine learning techniques Our project aims to recommend and play the appropriate music, based on users current emotional state with the help of image processing techniques through users facial expressions. The emotions are classified into five cate- gories like happy, sad, neutral, angry and surprise respectively.

II. LITERATURE SURVEY

In[4], they have proposed a mood detection system. They have used modern CNN for building framework. Their archi- tecture is fully-convolutional neural network contains 4 resid- ual separable convolutions and each convolution is followed by a batch normalization operation and ReLU activation. Architecture has 60000 parameter, which is corresponds to reduction of 10x of Naive and 80X of original CNN. They have achieved 66% of accuracy in mood detection.

Sentiment-Based Music Play System [**?**] Sentiment-Based Music Play System [1], has implemented RASPBERRY-PI based module for mood detection and generate music playlist. The conversations carried in a room are recorded using a microphone which is connected to Raspberry Pi. The recorded speech is converted to text using Speech Recognition tool in python library. The Naive Bayesian classifier is used to classify the sentiment from the recorded text. The tempo of the songs are assigned a BMP value and this value is usedto relate the song to a particular mood. The system will playa song on the basis of sentimental analysis of text generated from speeches in the room. There is ample work has been done in the field of face-based emotion detection. Proposed mood based music player [2], it scans memory for audio files, and classifies audio files using audio extraction module. After dividing audio files into mood based segregation, it captures image from device camera. Feature detection is done with the help of Viola and jones algorithm [3]. With help of OpenCV libraries, it recognizes the emotional state and device plays music accordingly the mood.

III. BACKGROUND

With the advancement in technology, people are finding shortcuts to do their daily works. With the system, the processof manually searching a song from a large list is reduced. Separate playlists corresponding to every emotion ease the task. In the scenario where everything is automated, its time saving.

IV. OVERVIEW

The proposed system will provide an effective approach to detect and classify human emotions using computer vision and deep learning and then play music according to the current emotion. The system provides a real time platform. Viola Jones algorithm provides Haar cascade feature which is used to detect the face from the input video stream. Image preprocessing techniques such as smoothening, gray scale conversion, image resizing are done on the input test image. Inception v3 is used to train the image dataset. Classification of the test input image provided by the user in realtime is done through convolutional neural network approach. At last music is played based on the classified emotion. Music is linked with

the help of OS module provided by opencv.

A. HAAR CASCADE

Haar cascade is a machine learning based approach whichis used for effective object detection.Here our object is face. The training of the cascade function is done using a large number of images with faces(positive image)and without faces(negative image).

B. INCEPTION V3

The inception V3 convolution neural network is trainedon large number of images from the image data set. The network has 48 layers and can classify images into l000 object categories. We use Classify to classify new images using the inception v3 model. It is a widely used image recognition model that can give an accuracy greater than 78.1% on the image data set given. It consists of two parts: Feature extraction part with a convolutional neural network and classification part with fully connected layers.

C. CONVOLUTIONAL NEURAL NETWORK

The input image obtained through camera is the test image. This image has to be classified into one of those five emotions (neutral, happy, sad, angry and surprise). This is done through convolutions neural network (CNN) approach. A multi layeredCNN is used to evaluate features of the test image with respect to the trained data set. This contains an input layer, hidden layer and an output layer. Input layer brings the initial data (test image) into the system for further processing by subsequent layers. It is the very beginning of the workflow for CNN. The Hidden layer constitutes the classification of theinput with the help of the trained dataset. The test image will be tested against various emotion classes. A set of weighted input is given and an activation function is applied to produce the output. The output layer will consist of the final emotion class to which the test image is mapped into.

V. SYSTEM ARCHITECTURE

Initially the dataset for the five emotions (neutral, happy, sad, angry, surprise) are collected and trained using inception v3. The music folder is made which contains subfolders for each emotion containing music. The User gives the input asa continuous stream of video of about 5 to 10 seconds tothe camera. Haars frontal face classifier is used to detect the presence of face in the image/video stream. On obtaining the input it is converted from RGB to grayscale, resized and then smoothening is performed to remove any distortions if exists. These image preprocessing techniques makes further process of classifying the emotions easier. After this the emotion recognition phase takes place.

The input is then classified to the corresponding emotionby convolutional neural network with the help of the trained dataset. After successfully finding out the emotions the next step is to play the music according to it We have designed our music players GUI using Python PyQt5 package. It is Python binding for Qt5. Music player imports finalized mood and loads recommended playlist from their modules. And plays songs from that generated playlist. To load these sound objects and control playback, Pythons Pygame package is used. From Pygame package, Pygame mixer module is used for loading sound objects and controlling them. By using pygame. mixer module, we have given basic functionalities to our music player so that user can pause the playback, resume the playback, playing previous and next song in playlist, increase and decrease system volume.

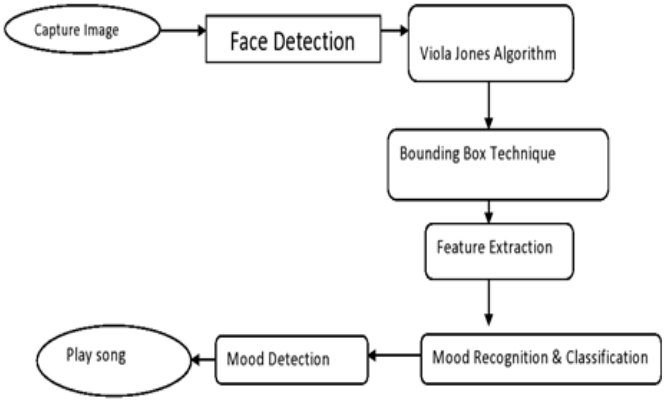

Fig. 1. System Flow diagram

VI. DISCUSSION

Web camera with better technical specifications gives better result. Proper lightning condition is required. Song choices may vary from person to person.

VII. CONCLUSION

The research done in the area of human psychology has proven that music has an intense effect on the listeners. Music and mood are closely dependent. This is the basic idea behind the project. So here a smart music player based on emotion recognition is proposed. This project is relevant in the scenario where people tends to listen to music according to their moods. The entire process of selecting a song from large list of songs is automated.

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