

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

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## **PROJECT REPORT**

**------ MUSIC RECOMMENDATION BASED ON FACE DETECTION -----**

***Submitted by, Mentored by,***

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**ABSTRACT**

In today’s fast-paced world, everyone is under a ton of stress for different reasons. Listening to music to reduce stress and detox has become a regular activity among people of all ages. However, if the music doesn’t suit the user’s mood, it can have the reverse effect of aggravating the stress in the user’s mind. Moreover, there are no music applications available to the users that recommend songs based on the user’s mood or emotion. Hence, in this work, we propose a mood-based music player application that suggests songs based on the user’s emotion. The application can detect three emotions: angry, happy, and sad. To detect the emotion, the user has the choice of taking a selfie/providing an old image of their face or write a text stating how or what they are feeling. The application uses Deep Learning models (Facial Expression Recognition and Text Sentiment Analysis) to predict the user’s emotion and populates a playlist of songs based on the emotion of the user.

**CHAPTER 1**

**INTRODUCTION**

* 1. **OBJECTIVES**
* The main objective of our music recommendation system is to provide suggestions to the users that fit the user's preferences.
* The analysis of the facial expression/user emotion may lead to understanding the current emotional or mental state of the user.
* Music and videos are one region where there is a significant chance to prescribe abundant choices to clients in light of their inclinations and also recorded information.
* It is well known that humans make use of facial expressions to express more clearly what they want to say and the context in which they meant their words.
* More than 60 percent of the users believe that at a certain point of time the number of songs present in their songs library is so large that they are unable to figure out the song which they have to play.
* By developing a recommendation system, it could assist a user to make a decision regarding which music one should listen to helping the user to reduce his/her stress levels.
  1. **SCOPE OF THE PROJECT**
     + This system, although completely functioning, does have scope for improvement in the future. There are various aspects of the application that can be modified to produce better results and a smoother overall experience for the user.
     + Some of these that an alternative method, based on additional emotions which are excluded in our system as disgust and fear.
     + This emotion included supporting the playing of music automatically. The future scope within the system would style a mechanism that might be helpful in music therapy treatment and help the music therapist to treat the patients suffering from mental stress, anxiety, acute depression, and trauma.
     + The current system does not perform well in extremely bad light conditions and poor camera resolution thereby provides an opportunity to add some functionality as a solution in the future.

**CHAPTER 2**

**SYSTEM ANALYSIS AND SPECIFICATION**

**2.1 PROBLEM DESCRIPTION**

Develop a system that presents a cross-platform music player, which recommends music based on the real-time mood of the user through a web camera using Machine Learning Algorithms

**2.2 FRONT END**

* Processor Type : Core i5
* Speed : 3.40GHZ
* RAM : 4GB DD2 RAM
* Hard disk : 500 GB

**2.3 BACK END**

* Python
* Operating system : Windows10

**CHAPTER 3**

**SYSTEM IMPLEMENTATION**

**3.1 EMOTION DETECTION IMPLEMENTATION**

The emotion function takes care of emotion detection. The pretrained model is loaded using the load\_model function in TensorFlow. HaarCascade classifier is also loaded from the OpenCV package. The emotion function takes an image as input. It pre-processes the image and applies HaarCascade classifier. If no face is found nil label is returned else it takes the last face found and sends it to the loaded vgg16 model. The model makes predictions about the image. The predictions are analysed and emotion label is returned

**3.2 SPOTIFY IMPLEMENTATION**

The requestAuthorization() function takes care of the sets the parameters for requesting authorization and procuring an access token. The callAuthorizationApi() function sends a post request to the Spotify accounts service which returns the access token. This token is used in every request that are sent here after for authentication purposes. The callApi() is used to send requests to the Spotify accounts service for information like tracks in a playlist, all the devices that are currently active, audio features that available for a particular track etc.

**3.3 SERVER IMPLEMENTATION**

The server is built on a flask framework. It has two routes namely home and emotion. The home route returns the application webpage and the emotion route receives an image and returns an emotion label. The emotion route uses the emotion function for emotion detection.

**CHAPTER 4**

**PROJECT DESCRIPTION**

**4.1 MODULE DESCRIPTION**

**4.1.1 OPEN CV**

OpenCV is a huge open-source library for computer vision, machine learning, and image processing. OpenCV supports a wide variety of programming languages like Python, C++, Java, etc. It can process images and videos to identify objects, faces, or even the handwriting of a human. When it is integrated with various libraries, such as [Numpy](https://www.geeksforgeeks.org/python-numpy/) which is a highly optimized library for numerical operations, then the number of weapons increases in your Arsenal i.e whatever operations one can do in Numpy can be combined with OpenCV.

This OpenCV tutorial will help you learn the Image-processing from Basics to Advance, like operations on Images, Videos using a huge set of Opencv-programs and projects.

**4.1.2 DEEPFACE**

DeepFace is the most lightweight face recognition and facial attribute analysis library for Python. The open-sourced DeepFace library includes all leading-edge AI models for face recognition and automatically handles all procedures for facial recognition in the background.

While you can run DeepFace with just a few lines of code, you don’t need to acquire in-depth knowledge about all the processes behind it. In fact, you simply import the library and pass the exact image path as an input; that’s all!

If you run face recognition with DeepFace, you get access to a set of features:

**Face Verification:** The task of face verification refers to comparing a face with another to verify if it is a match or not. Hence, face verification is commonly used to compare a candidate’s face to another. This can be used to confirm that a physical face matches the one in an ID document.

**Face Recognition:** The task refers to finding a face in an image database. Performing face recognition requires running face verification many times.

**Facial Attribute Analysis:** The task of facial attribute analysis refers to describing the visual properties of face images. Accordingly, facial attributes analysis is used to extract attributes such as age, gender classification, emotion analysis, or race/ethnicity prediction.

**Real-Time Face Analysis:** This feature includes testing face recognition and facial attribute analysis with the real-time video feed of your webcam.

**CHAPTER 5**

**IMPLEMENTATION**

import cv2

from deepface import DeepFace

import webbrowser

Screen = cv2.VideoCapture(0)

face\_cascade = cv2.CascadeClassifier(cv2.data.haarcascades + 'haarcascade\_frontalface\_default.xml')

while Screen.isOpened():

\_, frame = Screen.read()

gray = cv2.cvtColor(frame, cv2.COLOR\_BGR2GRAY)

face = face\_cascade.detectMultiScale(gray, scaleFactor=1.1, minNeighbors=5)

for x, y, w, h in face:

img = cv2.rectangle(frame, (x, y), (x + w, y + h), (255, 0, 0), 3)

try:

analyze = DeepFace.analyze(frame, ['emotion'])

cv2.putText(img, analyze[0]["dominant\_emotion"], (int(x), int(y)), cv2.FONT\_HERSHEY\_SIMPLEX, 1, (0, 0, 255), 2)

print(analyze)

print(analyze[0]["dominant\_emotion"])

if analyze[0]["dominant\_emotion"] == 'happy':

print("Showing song recommendations for happy mood....") webbrowser.open("https://open.spotify.com/playlist/0LDMqS1WNqL310ybAuTP0i?si=8F\_hlsK\_Qou5sWVbUwSROQ")

Screen.release()

exit()

if analyze[0]["dominant\_emotion"] == 'sad':

print("Showing song recommendations for sad mood....")

webbrowser.open("<https://open.spotify.com/playlist/0kmOyJVmY9h8X9XF05EPqs?si=HWaorzzCS2a0kGTQD7dZ4g>")

Screen.release()

exit()

if analyze[0]["dominant\_emotion"] == 'angry':

print("Showing song recommendations to calm your anger....")

webbrowser.open("https://open.spotify.com/playlist/37i9dQZF1DWVSNuGesVjDz?si=i-tG9w81RYqjGuDEgQSPKA")

Screen.release()

exit()

except:

print("no face")

cv2.imshow('Screen', frame)

key = cv2.waitKey(10)

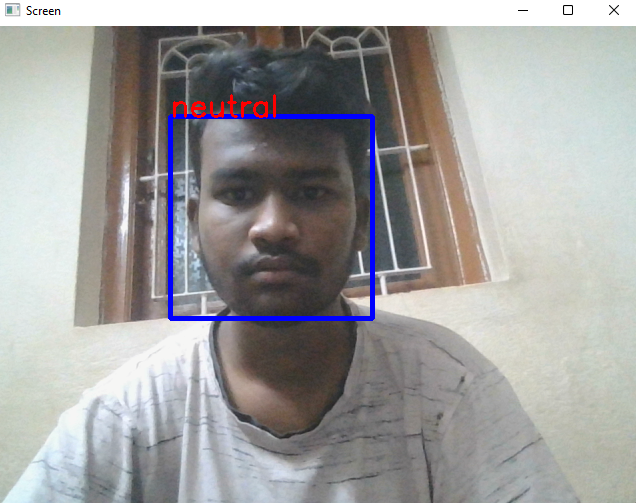
if key == ord('q'):

break

Screen.release()

**CHAPTER 6**

**RESULT**



**CHAPTER 7**

**CONCLUSION AND FUTURE ENHANCEMENT**

Emotion recognition has gained a lot of importance in all aspects of life and if a robust algorithm implemented which can accurately classify the emotions of the person, then a great deal of advancement in the industry can Emotion recognition using facial expressions is one of the important topics of research and has gathered much attention in the past. It can be seen that the problem of emotion recognition with the help of image processing algorithms has been increasing day by day. Researchers are continuously working on ways to resolve this by the use of different kinds of features and image processing methods. The applications of image processing algorithms in the field of both medical science and human science are of vast importance. There are continuously new ways and methods being developed that make use of image processing algorithms to extract the emotion of the user and make use of the extracted emotion to treat the user. be achieved with the help of this. The system has successfully been able to capture the emotion of a user. It has been tested in a real-time environment for this predicate. However, it has to be tested in different lighting conditions to determine the robustness of the developed system. The system has also been able to grab the new images of the user and appropriately update its classifier and training dataset. The system was designed using the facial landmarks scheme and was tested under various scenarios for the result that would be obtained. It is seen that the classifier has an accuracy of more than 80 percent for most of the test cases, which is pretty good accuracy in terms of emotion classification. It can also be seen that the classifier can accurately predict the expression of the user in a real-time scenario when tested live for a user.

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