EMOTION BASED MUSIC PLAYER

A Mini project report submitted for the partial fulfillment of academic requirements of

MASTER OF COMPUTER APPLICATIONS

Submitted by

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The National Institute of Engineering

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Manandavadi Road, Mysuru – 570 008, Karnataka, INDIA

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- New Delhi Grant-in-Aid by Government of Karnataka

Department of Master of Computer Applications

CERTIFICATE

Certified that the Mini project work entitled **'Emotion Based Music Player'** carried out by **Sujayeendra Rao,4NI22MC104**, **Shrivatsa Bhat, 4NI22MC096** a bonafide student at The National Institute of Engineering is submitted in partial fulfillment of academic requirements in Master of Computer Applications, **The National Institute of Engineering, Mysuru,** an autonomous institute under Visvesvaraya Technological University, Belagavi during the year 2022-2023. The project report has been approved as it satisfies the academic requirements in respect of Mini Project work .

Name & Signature of Guide1	Name & Signature of Guide2	Name & Signature of the HOD
Dr. N Asha	**Mrs. Chaithra J P**	**Dr. Sanjay Kumar C K**
Professor	Assistant Professor	Assistant Professor & HOD
Dept. of MCA, NIE	Dept. of MCA, NIE	Dept. of MCA, NIE

DECLARATION

We, **Shrivatsa Bhat and Sujayeendra Rao** bearing USN: **4NI22MC096 , 4NI22MC104** are students at **The National Institute of Engineering**, Department of Master of Computer Appliction, The National Institute of Engineering, Mysuru hereby declare that the mini project work entitled **"Emotion Based Music Player"** has been carried out by us**.** This mini project work is submitted to **The National Institute of Engineering**, Mysuru, (An Autonomous institute under VTU, Belagavi) in partial fulfillment of the course requirements in Master of Computer Applications during the academic year 2022-2023. This written submission represents a record of original work and I have adequately cited and referenced the original sources.

Place: Mysuru

Date: (Signature of the students)

Abstract

The Mood-Based Music Player project with Face Recognition using OpenCV and DeepFace library, is an innovative application that leverages computer vision and deep learning techniques to create a music player that automatically selects and plays music based on the user's facial expressions. By combining OpenCV for face recognition and libraries for expression analysis, the application provides a unique and interactive music listening experience according to the user's emotions.

Introduction

When using conventional music players, the user had to manually browse the playlist and choose songs that would lift his or her spirits and emotional state. The work required a lot of labour, and coming up with a suitable list of tunes was frequently difficult. The development of Music Information Retrieval (MIR) and Audio Emotion Recognition (AER) provided the traditional systems with a function that automatically parsed the playlist based on various emotional classifications. The goal of Audio Emotion Recognition (AER) is to classify audio signals according to distinct emotional categories using certain audio properties. An important aspect of the study of music information recognition (MIR) is the extraction of distinct audio aspects from an audio stream. By eliminating the need for manual playlist segmentation and song annotation based on user emotion, AER and MIR improved the functionality of conventional music players. However, these systems lacked the necessary mechanisms to allow a music player to be controlled by a user's emotions. Information retrieval methods are less efficient since the current algorithms produce unpredictable returns and frequently increase the system's overall memory overheads. They are unable to quickly extract useful information from an auditory source. Current audio emotion recognition algorithms use mood models that are slackly connected to a user's perception. The state-of-theart lacks designs that can create a personalised playlist by deducing human emotions from a facial image without using additional resources. The current designs either use extra hardware or human voice. The project suggests an approach designed to reduce the downsides and flaws of the current technology. The project's main goal is to create a precise algorithm that will produce a playlist of songs from a user's playlist in accordance with that user's emotional state. The algorithm is less computationally intensive, uses less storage, and costs less to use more hardware. It classifies face images into one of four categories: sad, angry, neutral, or happy.

Key Features

- **Emotion Detection:**

  Integrated OpenCV for real-time video stream capture from the user's device camera.

  Utilized DeepFace library to analyse facial expressions and determine the user's emotional state.

- **Music Database:**

  Compiled a diverse collection of music tracks categorized by different emotions (e.g., happy, sad, calm, energetic).

- **Emotion-Music Mapping:**

  Established a mapping between detected emotions and corresponding music categories.

- **Music Playback:**

  Employed Python's audio playback libraries to ensure seamless music playback.

- **User Interaction:**

  Enabled user interaction through the GUI, allowing them to start and stop the emotion-based music experience.

Literature Survey

1. **Title: "Emotion Based Smart Music Player"**

Author: Chavi Ralhan, Kodamanchili Mohan, Kalleda Vinay Raj, Pendli Anirudh Reddy, Pannamaneni Saiprasad

Summary:

The project aims to create an efficient music player using facial recognition techniques to extract emotions from users' facial features. The emotion module uses deep learning techniques to detect moods based on expressions, achieving high accuracy in real-time footage and static pictures. The system utilizes computer vision and deep leaning techniques to improve performance and accuracy.

2. **Title: " Emotion Based Music Player "**

Author: Vinayak Bali, Shubham Haval

Summary: Emotion-based music players can help users maintain a specific emotional state by creating playlists based on captured user photos. This research proposes an algorithm that automates the process of generating audio playlists and classifies newly added songs based on the user's mood. The goal is to reduce computational time and cost while increasing accuracy. The system is tested against user-dependent and user-independent datasets to validate its effectiveness. The main goal is to change the mood of the user if it is negative, such as sad or depressed.

3. **Title: " EMOTION BASED MUSIC PLAYER "**

Authors: Devansh Shukla, Shivam Singh, Shubham Sawant, Shubhangi Chavan

Summary: Manifestation plays an important role in determining one's current status and personality, helping to express and comprehend one's emotions based on various facial features such as eyes, cheeks, forehead or curve of smiles. Music is basically a form of art that calms and calms the mind and body. Taking these two aspects and putting them together our project is about getting a person's feelings through facial expressions and playing music according to a found situation that will calm the

mood or simply calm the person and we can also find a quick song according to the situation, saving. time to look at different songs and keep up with the development of a portable device that can be used anywhere with the help of haar cascade which provides the functionality of playing music according to the received emotion.

4. Title: " EMOTIONS BASED MUSIC PLAYER "

Authors: By Charu Agrawal1, Meghna Varma1

Summary: Human expression plays a crucial role in determining an individual's mood and state, as it helps extract emotions from facial features like eyes, cheeks, forehead, or smile curves. Music, an art form, soothes and calms the human brain and body. This project combines facial expression detection and music playback to alleviate or calm emotions. The software can be used anywhere, providing functionality to play music according to the mood detected. A recommendation system assists users in making decisions about which music to listen to, reducing stress levels. The best track matching the user's mood is detected, and songs are displayed accordingly. The user's image is captured using a webcam, and the appropriate song is shown based on the user's mood and emotion.

5. Title: " Emotion based Music player "

Authors: Polineni Sumanth

Summary: Visual sentiment analysis investigates human emotional responses to visual stimuli, such as images and videos. Current models rely on robust computer vision algorithms to recognize high-level content. However, local areas have received little attention. This project uses a CNN algorithm to analyze emotions in images, searching for faces, identifying them, placing rectangles, and describing the emotions. The output is in audio format, and songs stored in the system are automatically played based on predicted emotions. This approach is crucial for understanding human emotional responses to images and videos**.**

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Requirements

Hardware:

- Processor: 1.6 GHz dual-core processor or higher.
- RAM: At least 4 GB of RAM to ensure smooth performance.
- Storage: A minimum of 100 MB of free disk space for app installation.
- A device with a webcam for real-time video capture.
- Adequate processing power for real-time video processing**.**

Software:

- Python 3.x with relevant libraries installed (OpenCV, DeepFace, Flask).
- Music tracks database in a compatible format (e.g., MP3, WAV).
- IDE (VS Code).

Analysis and Design Models

1.**Face Detection:**

- **Definition:** Face detection is the process of locating and isolating human faces within an image or video frame.
- **Application in the Project:** In this project, face detection is a crucial step where the system uses OpenCV to identify and extract faces from the live video stream captured by the user's camera. This is the initial step in analyzing the user's emotional state.

2. **Feature Extraction:**

- **Definition:** Feature extraction involves identifying and extracting relevant information or characteristics from the data.
- **Application in the Project:** In the context of emotion recognition, feature extraction involves analyzing specific facial features (such as eye movements, mouth shape, etc.) that can indicate the emotional state of a person. DeepFace library is used in this project for feature extraction to analyze the facial expressions.

3. **Emotion Recognition:**

- **Definition:** Emotion recognition is the process of identifying and understanding the emotional state of an individual based on their facial expressions.
- **Application in the Project:** In this project, emotion recognition is the core functionality. DeepFace library is employed to analyze the extracted facial features and determine the dominant emotion (e.g., happy, sad, angry, etc.) expressed by the user.

4. **Expression Mapping:**

- **Definition:** Expression mapping involves associating detected emotions with corresponding actions or responses.
- **Application in the Project:** In this project, expression mapping is used to link the recognized emotions to appropriate music categories. For example, a "happy" emotion might be mapped to a selection of upbeat and cheerful music tracks, while a "sad" emotion might be mapped to more soothing and calming tracks.

5. **Music Recommendation:**

- **Definition:** Music recommendation involves suggesting songs or playlists based on certain criteria, such as user preferences or contextual information.
- **Application in the Project:** In this project, music recommendation is a key component where the system suggests specific tracks based on the detected emotion. The recommendation system uses the expression mapping results to select the most suitable music from the database to match the user's emotional state.

Implementation

1. **User Interaction:**
   The user launches the Emotion-Based Music Player application. The GUI is presented, providing options to start and stop the music experience.

2. **Real-Time Emotion Detection:**
   Upon user interaction, the system initiates the camera feed using OpenCV.
   Frames are continuously captured from the camera.

3. **Emotion Analysis:**
   The DeepFace library processes each frame, extracting facial features and analysing emotions.
   The dominant emotion is determined based on the analysis results.

4. **Music Selection:**
   The system references the emotion-music mapping to select appropriate tracks corresponding to the detected emotion.

5. **Music Playback:**
   The selected music track is retrieved from the database.
   Python's audio playback libraries are used to play the music.

6. **Control and Interaction:**
   The user has the option to stop the music playback at any time through the GUI.

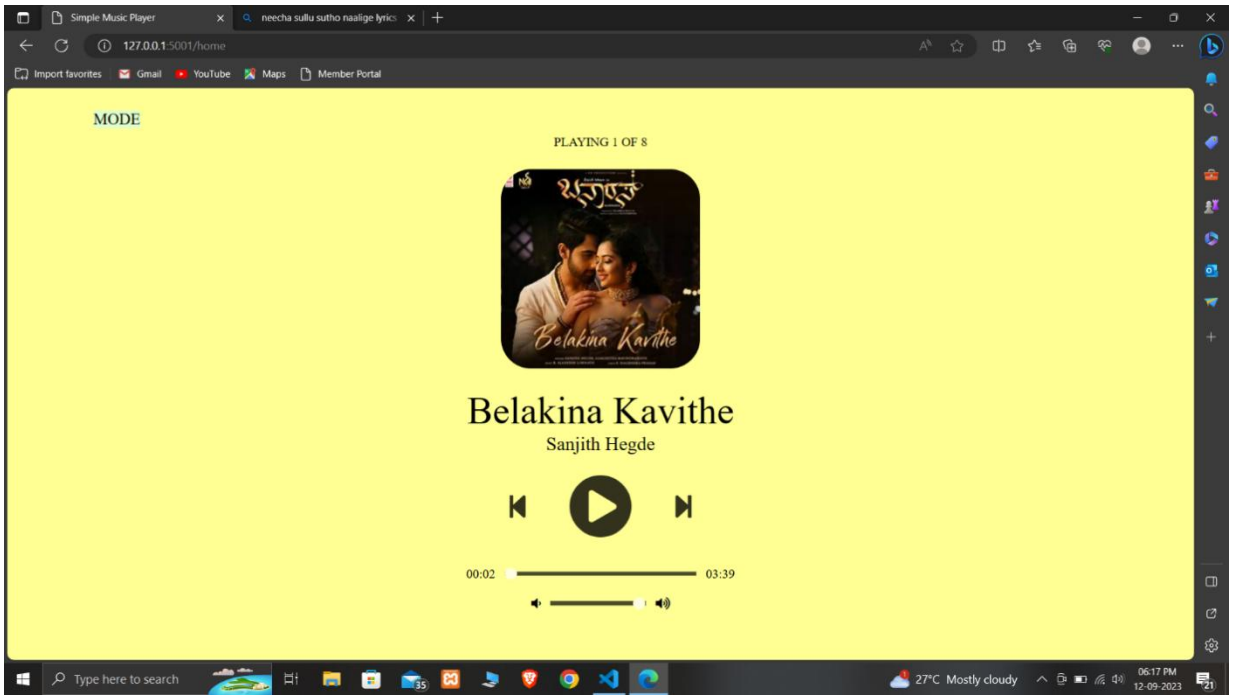
SNIPPET CODE

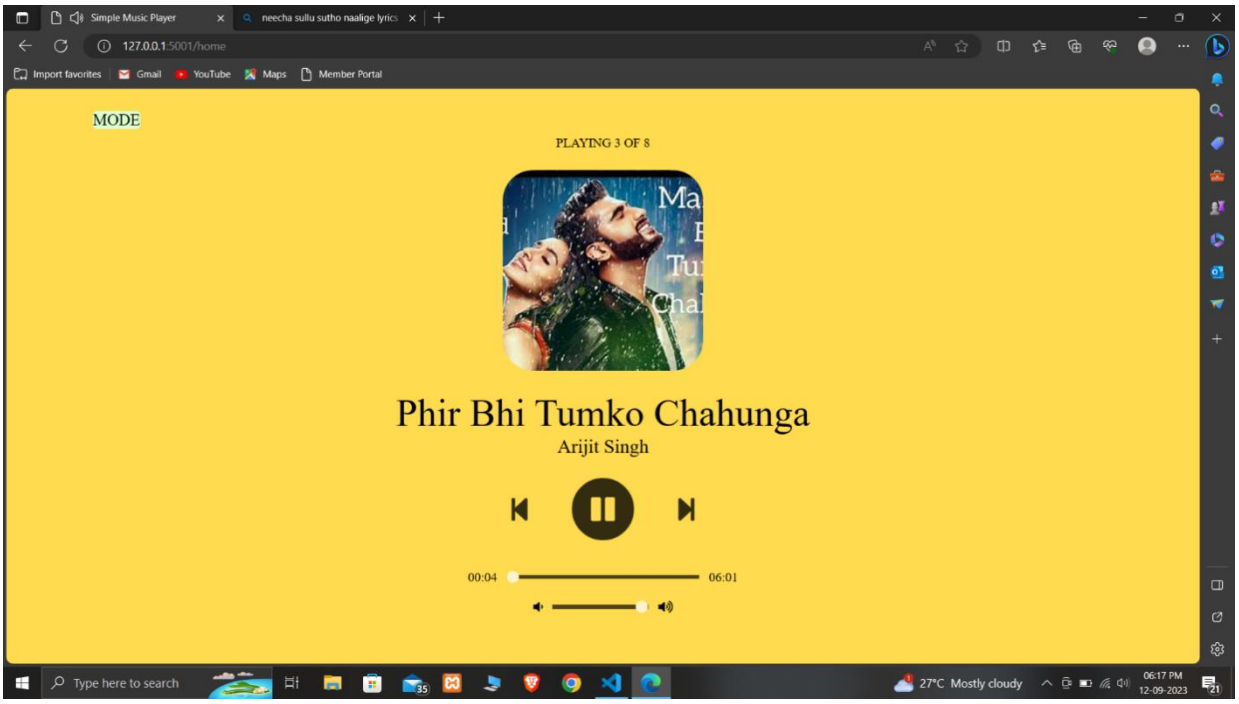
```
import cv2
from deepface import DeepFace
from flask import Flask,render_template
import js2py
estate=False
app=Flask(__name__)
@app.route("/")
@app.route("/home")
def home():

    return render_template("index.html",estate=estate)



@app.route("/moodbased")
def moodbased():
 list1=[]
 count=0
 vid=cv2.VideoCapture(0)
 while count<20:
        faceCascade = cv2.CascadeClassifier(cv2.data.haarcascades +
'haarcascade_frontalface_default.xml')
        ret,frame=vid.read()
        cv2.imshow('frame',frame)
        if cv2.waitKey(1) & 0XFF == ord('q'):
            break
        try:
            result=DeepFace.analyze(frame,actions=['emotion'])
            print(result[0]['dominant_emotion'])
            list1.append(result[0]['dominant_emotion'])
            count+=1

        except:
            print("no face")
            list1.append("noface")
            count+=1
 vid.release()
 cv2.destroyAllWindows()
```

```
 print(list1)
 c=0
 ele=list[0]
 for i in list1:
     curfreq=list1.count(i)
     if curfreq>c:
         c=curfreq
         ele=i

 #print(ele)
 return render_template("index.html",emo=ele,estate=True)



if __name__ == '__main__':
    app.run(debug=True,port=5001)
```

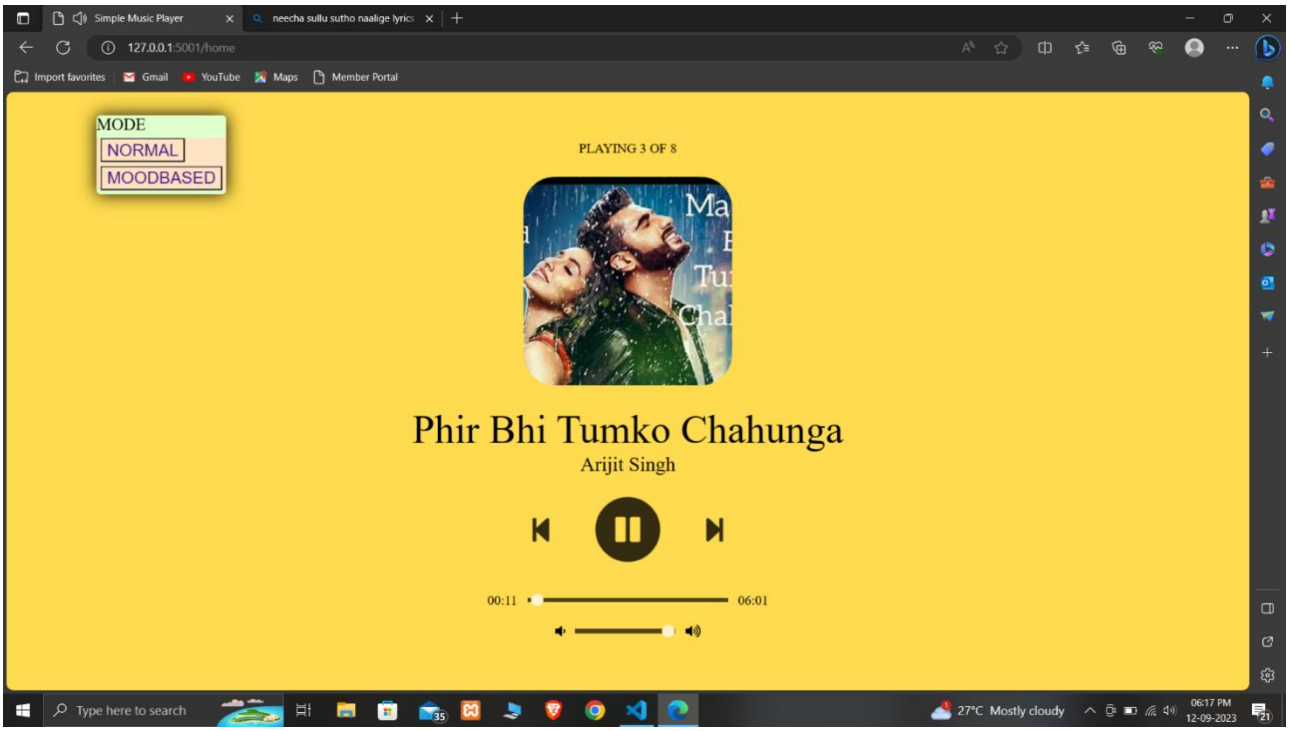
Snapshots and Results

1. Home page

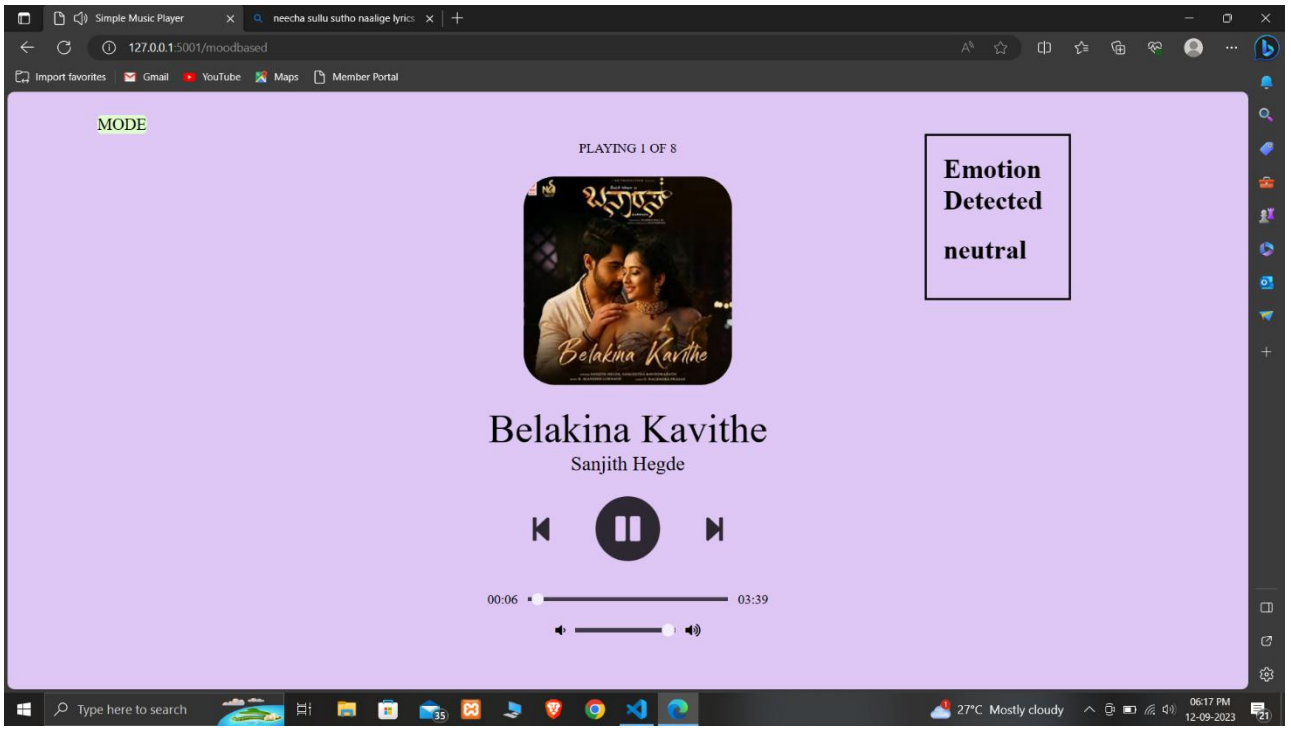




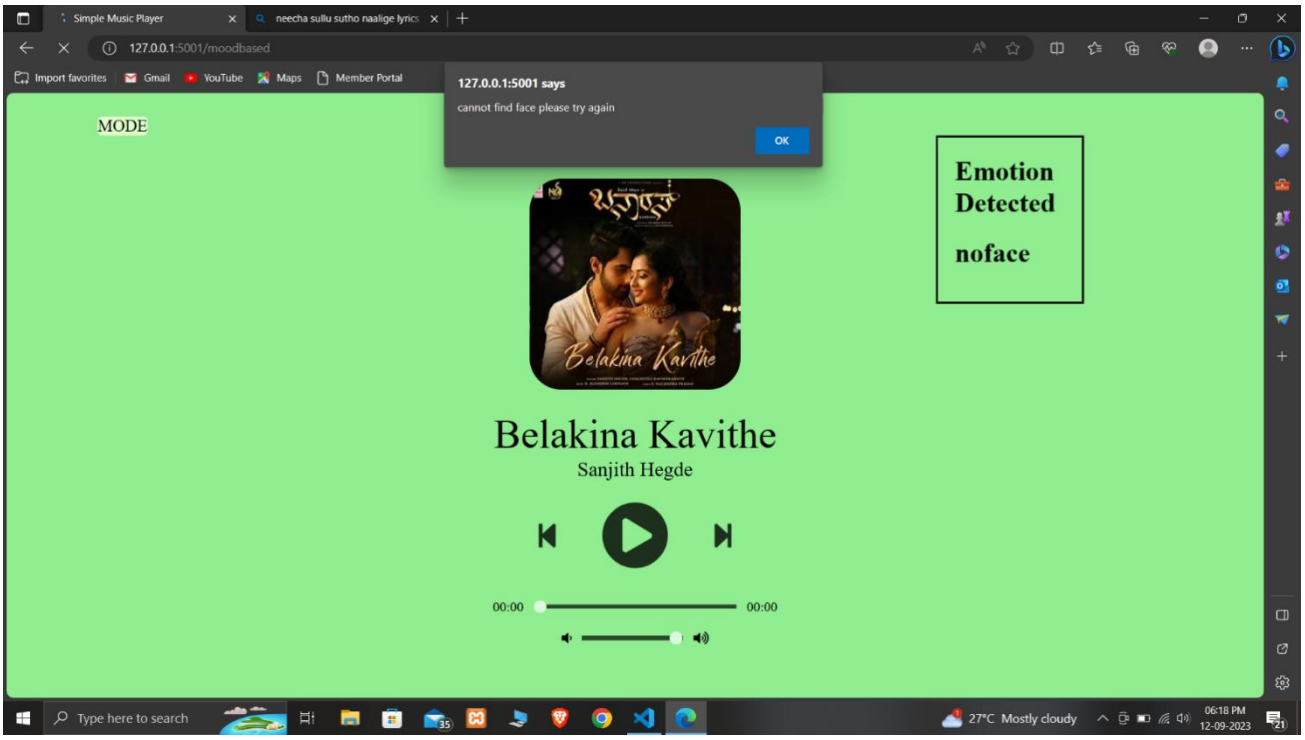
2.Mode Menu



3.Emotion Based Mode



4.No Face Detected Message



1. **Personalized Experience:**

   Users will enjoy a music listening experience tailored to their current emotional state.

2. **Engagement:**

   The interactive nature of the application enhances user engagement and enjoyment.

3. **Mood Regulation:**

   The system can potentially help users regulate their emotions by providing appropriate music selections.

4. **Versatility:**

   The system's modular design allows for easy integration of additional features and improvements.

Conclusion

The Emotion-Based Music Player project is a groundbreaking development in personalized music experiences, utilizing advanced technologies like computer vision and deep learning to understand and respond to users' emotions in real-time. This system enhances user engagement and satisfaction in music applications. The project's modular design allows for easy integration of additional features, potentially incorporating advanced emotion recognition models, expanding the music database, and implementing recommendation systems. The project's versatility extends beyond entertainment, with potential applications in mental health, therapy, and productivity. The project's success and potential for further development make it a significant contribution to interactive technology.

Future Enhancement

- Enhance emotion detection accuracy through additional training or more advanced deep learning models.
- Implement user preferences and playlist customization features.
- Expand the music database to include a wider range of emotions and genres.
- Incorporate a recommendation system for suggesting tracks based on user history.

References

- Emotion Based Smart Music Player By: Chavi Ralhan, Kodamanchili Mohan, Kalleda Vinay Raj, Pendli Anirudh Reddy, Pannamaneni Saiprasad
- Emotion Based Music Player By: Vinayak Bali, Shubham Haval
- EMOTIONS BASED MUSIC PLAYER By Charu Agrawal1, Meghna Varma1
- W3Schools
- Python.Org