MUSIC RECOMMENDATION BASED ON FACIAL EXPRESSION BY USING DEEP LEARNING

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ABSTRACT

We propose a new approach for playing music automatically using facial emotion. Most of the existing approaches involve playing music manually, using wearable computing devices, or classifying based on audio features. Instead, we propose to change the manual sorting and playing. We have used a Convolutional Neural Network for emotion detection. For music recommendations, Deep Learning & Streamlit are used. Our proposed system tends to reduce the computational time involved in obtaining the results and the overall cost of the designed system, thereby increasing the system's overall accuracy. Testing of the system is done on the Required data. Facial expressions are captured using an inbuilt camera. Feature extraction is performed on input face images to detect emotions such as happy, angry, sad, surprise, and neutral. Automatically music playlist is generated by identifying the current emotion of the user. It yields better performance in terms of computational time, as compared to the algorithm in the existing literature. An Application Which Detects our emotions at real time using webcam feed and smarty classifies. Will Further Move to Streamlit Web App(Web Page).The output will be displayed both audio and video in youtube website.

Broad Academic Area of Work : Deep learning with python

Keywords: Face Recognition, Emotion Detection, Streamlit-Webrtc, Streamlit (For Music),Web Camera.

I.   INTRODUCTION

People tend to express their emotions, mainly by their facial expressions. Music has always been known to alter the mood of an individual. Capturing and recognizing the emotion being voiced by a person and displaying appropriate songs matching the one's mood and can increasingly calm the mind of a user and overall end up giving a pleasing effect. The project aims to capture the emotion expressed by a person through facial expressions. A music player is designed to capture human emotion through the web camera interface available on computing systems. The software captures the image of the user and then with the help of image segmentation and image processing techniques extracts features from the face of a target human being and tries to detect the emotion that the person is trying to express. The project aims to lighten the mood of the user, by playing songs that match the requirements of the user by capturing the image of the user. Since ancient times the best form of expression analysis known to humankind is facial expression recognition. The best possible way in which people tend to analyse or conclude the emotion or the feeling or the thoughts that another person is trying to express is by facial expression. In some cases, mood alteration may also help in overcoming situations like depression and sadness. With the aid of expression analysis, many health risks can be avoided, and also there can be steps taken that help brings the mood of a user to a better stage.

II.   SYSTEM REQUIREMENTS

1. Hardware Requirements

These are the Hardware interfaces used Processor:

- ➢ Processor - Intel Pentium 4 or equivalent
- ➢ RAM - Minimum of 4 GB or higher
- ➢ HDD - 100 GB or higher
- ➢ Architecture - 32-bit or 64-bit
- ➢ Monitor - 15'' or 17'' color monitor
- ➢ Mouse - Scroll or optical mouse

➢ Keyboard - Standard 110 keys keyboard

➢ Web camera

2. Software Requirements

➢ Operating System – Windows 10 or 11

➢ Programming Language - Python – 3.10.9

➢ Microsoft C++ 14.0 Build Tools

➢ Mediapipe

➢ Tensorflow

➢ Streamlit Webrtc

➢ Streamlit-1.2.0

III.   PROPOSED SYSTEM

Proposed Statement:

To design and implement a real time music player which plays music according to the emotion of the user, using convolutional neural network. This article

Aims:

• To provide a solution for the substantial method of using a music player by incorporating emotion detection.

• To learn in detail compare emotion detection using different deep learning techniques.

• To design and implement a reliable CNN classifier to distinguish between different facial expressions.

• To identify the conditions under which the realization of an application for emotion detection can lead to improvements in subjective and/or objective measures of system usability.

Proposed Solution:

As an implementation of convolutional neural network for facial expression recognition, a music player is constructed which plays songs with video according to the emotion of the user. The system is divided into different modules and each performs specific tasks in an operating sequence. At first, the system detects the face of the user and captures the region of interest of the image. The face detection is done using Convolution Neural Network Algorithm and By Using Mediapipe. The captured image is input to CNN which learns features directly. The features are analysed to determine the current emotion of the user. Each emotion detected will be mapped to the music player which plays corresponding music with Video Via YouTube Web browser automatically. The designed music player overcomes the effort associated with manual selection of songs from a playlist, especially if there are more number of songs. Hence the system opts for better user experience by invoking human computer interaction.
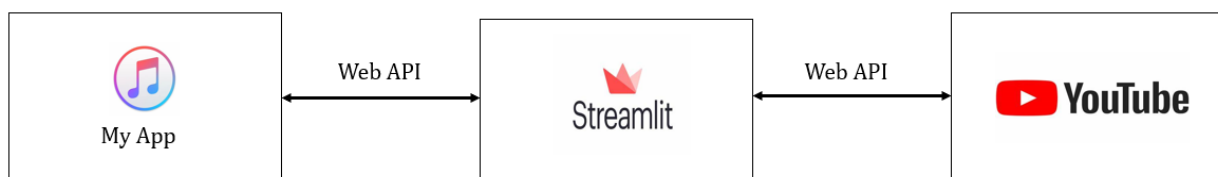

Figure 1: Youtube API
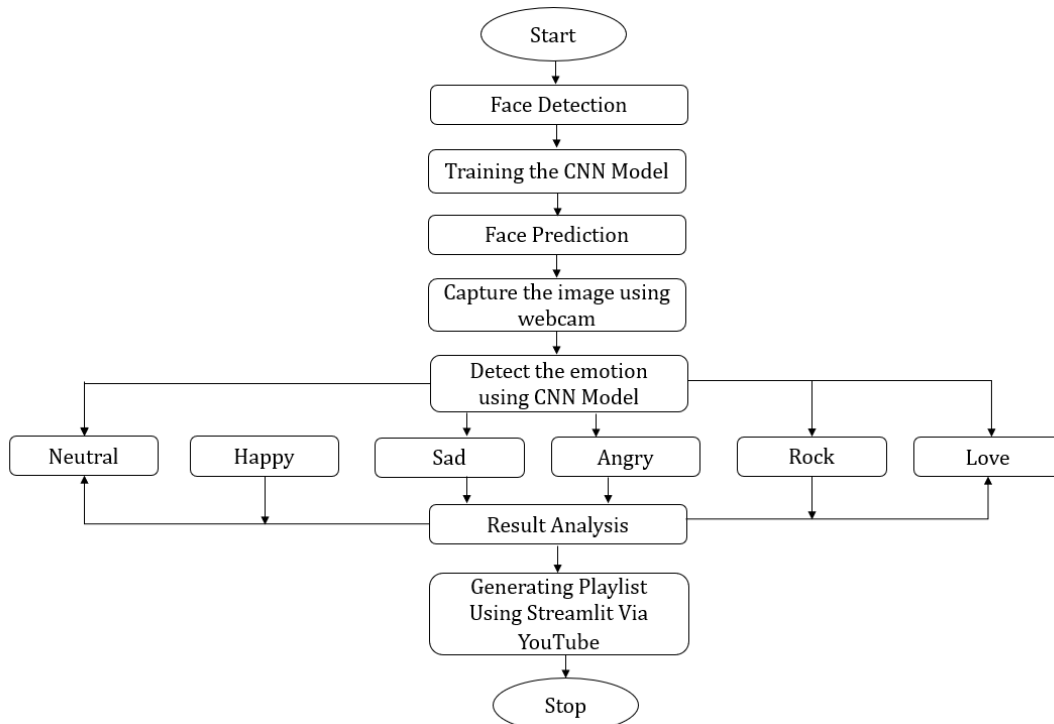
IV.   METHODOLOGY

Figure 2: Flow Chart

1. Face Detection:

Face detection is one of the applications which is considered under computer vision technology. This is the process in which algorithms are developed and trained to properly locate faces or objects in object detection or related system in images. This detection can be real-time from a video frame or images. For detecting the images we are using Convolutional Neural Network Algorithm and Mediapipe Library. For webcam we are using streamlit-webrtc and streamlit Packages.

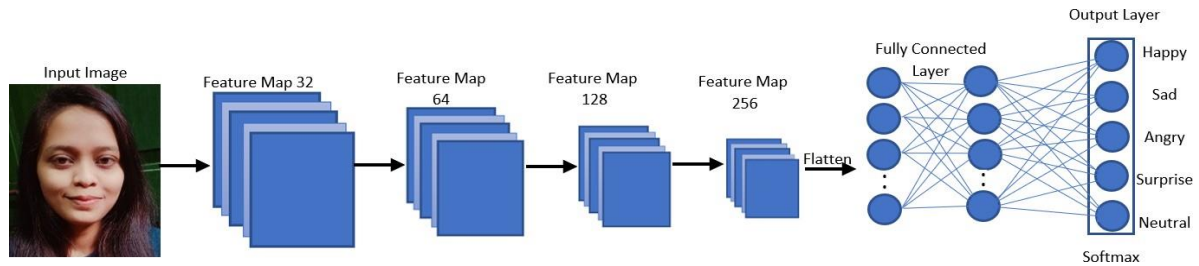**Figure 3:** Data Collection

2. Face Prediction:

Figure 4: Face Extraction

Convolution neural network architecture applies filters or feature detectors to the input image to get the feature maps or activation maps using the Relu activation function [11]. Feature detectors or filters help in identifying various features pre- sent in the image such as edges, vertical lines, horizontal lines, bends, etc.

For Predicting the images we are using OS Module, Numpy, Keras, Mediapipe and Streamlit.

3. Main Screen

When user opens web application he will get main screen which is welcome screen with options to enter the details of language, singer capture the image and recommend me songs.
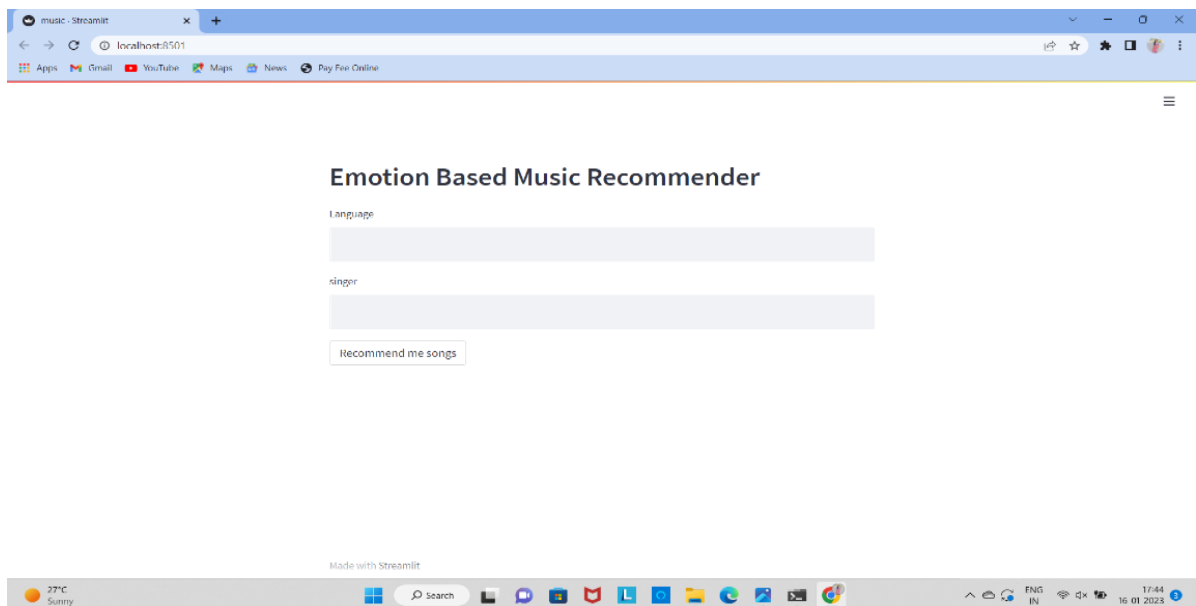

Figure 5: Main Window

4. Capture face

This module is allow user to capture his face through webcam. through the face captured using facial detection algorithm, facial emotion will be displayed and songs with video will be generated based on emotion detected.

5. Train and Test the data

Train:

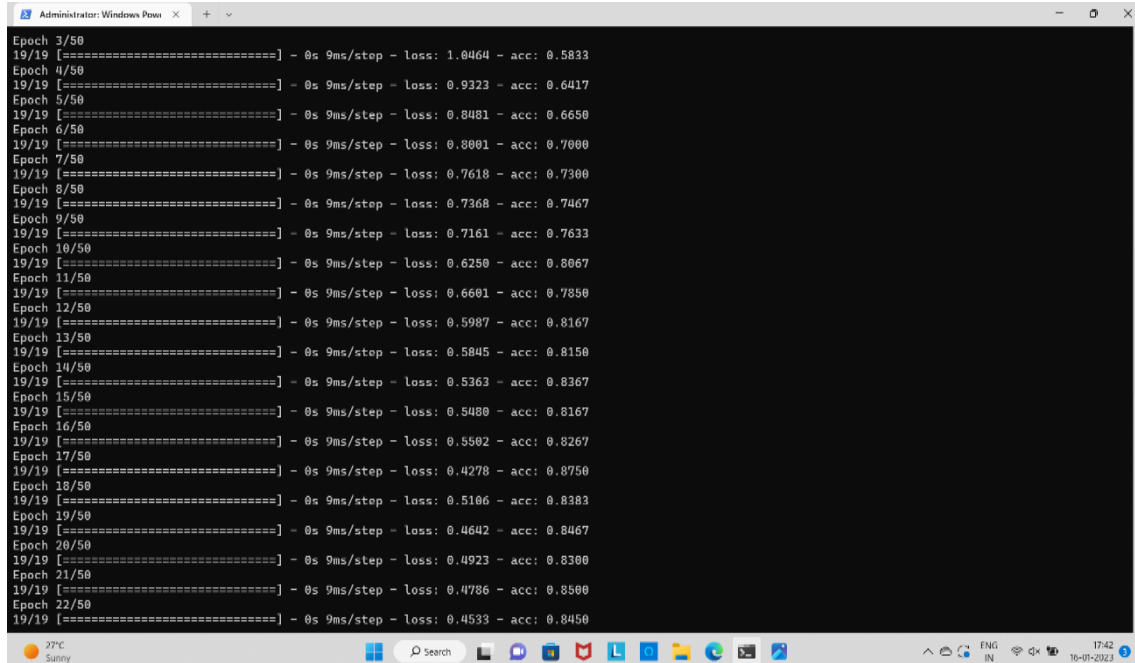In this phase we need to train the machine by using previous input data

Figure 6: Training the data

Test:

Here user need to give expressions, based on live collection and trained data, the predicted output will be show by using users expressions.
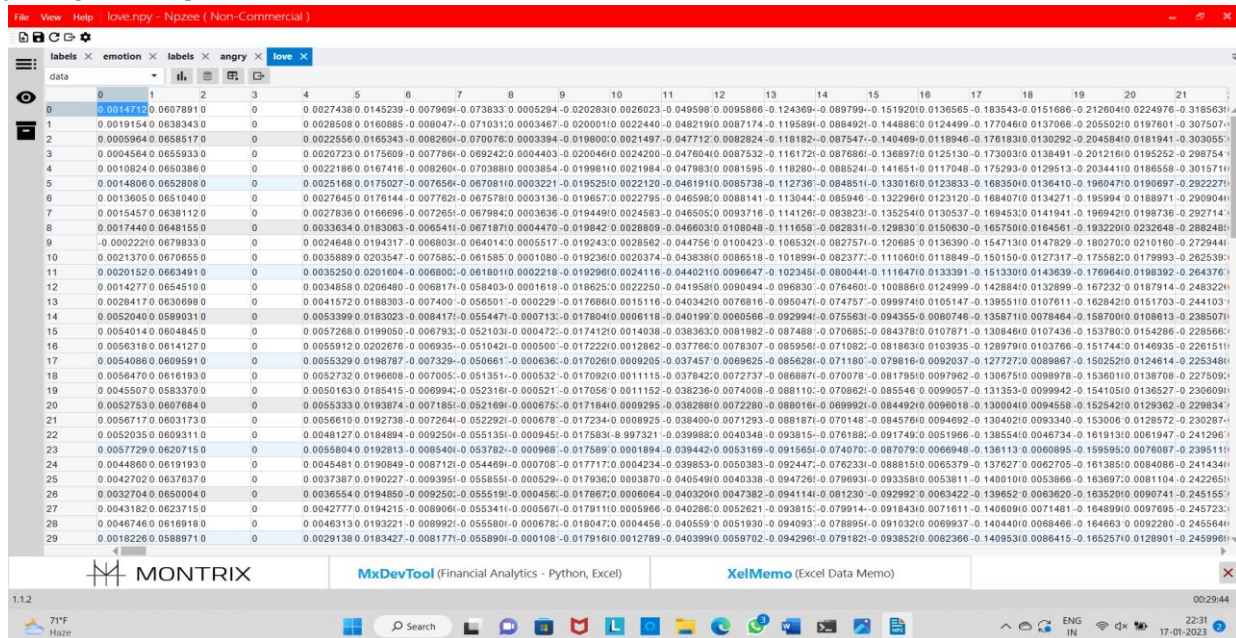

Figure 7: Test the data

6. Play music screen

User will be able to play music that has been generated based on his/her detected emotion.

V.   RESULTS AND DISCUSSION

The outputs of the system we have created is as follows:

Data Collection:

Data Prediction:

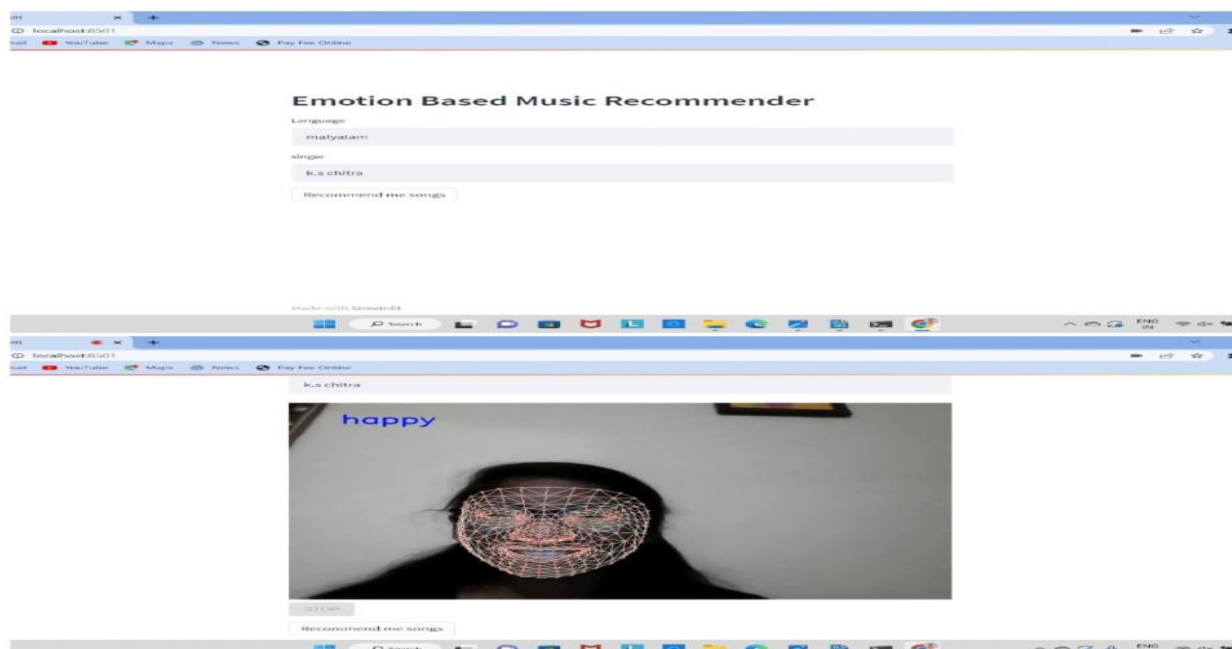**Music Recommendation Based On Facial Expression:**

Figure 8: Input

Figure 9: Output

VI.   CONCLUSION

In this project, we are generating the playlist according the emotion of the user, we developed an application for predicting the emotion of the user using Convolution neural networks and for generating the playlist we have used stremlit-webrtc to Recommend the songs on Web by Opening YouTube.

We integrate computer vision and machine learning techniques for connecting facial emotion for music recommendation. The approach is to use Deep Neural Networks (DNN) to learn the most appropriate feature abstractions. DNNs have been a recent successful approach in visual object recognition, human pose estimation, facial verification and many more. Convolution Neural Networks (CNNs) are proven to be very effective in are as such as image recognition and classification. The proposed system can detect facial expressions of the user using a CNN model. Once the emotion has been classified, the song matching the user's emotions would be played. In this project, a main web page is designed where an image or video of the user is recorded. The image/video is then sent to the server to make the prediction about the emotion of the user. Once the emotion is detected, the next phase is to play songs. This is where the client side requests tracks from Youtube via an Website.

VII.   FUTURE WORK

1. Making this as a real time application so that actual users would be able to use it.
2. Making the project music recommend based on giving voice.
3. Extracting songs from third party API in real time..
4. Deploying this application in any cloud platform such as Azure, Google app engine etc.
5. Making use of containerization with Docker containers or Kubernetes clusters

VIII.   REFERENCES

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