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Smart Emotion Based Music Player Using Python Image Processing

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Abstract: Recent studies show that people listen to and react to music, and that music has a significant influence on people's brain activity. The typical person in the globe listens to music for up to four hours every day. People frequently focus on musical genres that support their mood and interests. Text, audio, linguistic, and facial expressions can all be used to interpret emotions. A person's emotional state can be inferred from their facial expression. We are aware that there has been relatively little progress made in the field of real-time emotion recognition using facial photographs.

In this project, we suggest that by incorporating music as per mood application, these feelings can be employed to improve the mood. In this system, facial expressions are used to verify the user's emotions using computer vision components. When a sensation is identified, the algorithm offers a play-list for that emotion, saving the user a ton of time compared to manually selecting and playing music.

Seven emotions—anger, disgust, happiness, fear, sadness, neutral, and surprise—have been identified in our project. There are different levels of melancholy that can be distinguished, with depression being the most severe. Depression is a condition that is linked to poorer social functioning, lower quality of life, and higher mortality rates. Numerous mental illnesses, including depression, personality disorders, anxiety, and bipolar disorder, have been treated with music therapy.

In social settings where emotion recognition is important, the device can dynamically recognize emotions in real time. This gadget can be used to detect a person's unhappiness, detecting their level of despair and responding by playing upbeat music.

1. Introduction

As a major kind of pleasure for music lovers and listeners, music plays a crucial part in improving a person's life. Various music players have been created with capabilities like fast forward, reverse, variable playback speed, general classification, streaming playback with multicast streams, including volume modulation, etc. in the modern world due to the rapid improvements in multimedia and technology. These capabilities might satisfy the user's fundamental needs, but the user still needs to manually browse the song playlist and select songs that suit their present state of mind and behavior.

The easiest method to find and identify people is by their faces. Without faces, no recognition algorithms will function. One of the current topics in several domains that offers solutions to numerous problems is mood recognition based on emotion. In addition to the standard difficulties in capturing facial images in uncontrolled environments, such a varying stances, various lighting conditions, and various facial expressions for face recognition, there are also various sound frequencies for emotion recognition.

The most crucial component in any face and mood detection system is the database, which is used to compare the components of sound frequency and facial traits. Features of the face are determined for database building and are stored in the database. The evaluation of the face and mood is then performed on this database using several algorithms. This system's main objective is to determine a person's mood using a face image as input, and then to play an audio file using the findings of that analysis of emotion. Here, a face recognition method is utilized to compare the input face image to the train face image. The suggested strategy is easy to use, effective, and precise.

Comparing this methodology to the current method, it provides accurate results. Systems are crucial in fields relating to recognition and detection. Because of this, this strategy yields significant results much more quickly than more conventional ones.

2. Motivation and Problem Statement

When they have hundreds of tracks, music listeners find it difficult to manually create and group the play list. Additionally, it might be challenging to keep track of all the songs since occasionally, songs are added but never played, wasting a lot of storage space and necessitating manual song deletion by the user. Every time,

users must manually choose songs based on interest and mood. Users find it challenging to rearrange their playlists and play music when their playing habits change. Currently, playlists and various mood categories are used to categorize music in existing applications.

It's possible that when a user clicks on the play list designed by the developer, they won't like it because the developer is also acting as the user in this case, making it difficult to say what kind of play list the user would like. Everyone is free to make their own decisions.

With the use of this research, we can use human emotions to determine a person's mood and then play music to suit that mood.

3. Problem Discussion

Emotions are one of the most effective ways to convey both global and local speech features, as evidenced by the variety of emotion expression processes that have emerged in recent years. The main goal of the system is to automatically determine the user's mood. Then, through a Linux-based system using a Raspberry Pi, relevant books, videos, and music will be played.

4. Objective

- A unique method called Smart Emotion Based Music Player enables users to play music in accordance with their mood or emotion.
- Identifying human emotion using facial features.
- Utilising training feature data to recognise the face.

5. Existing System

5.1. Spotify

We have developed cutting-edge technology that allows us to create any kind of software. Spotify is now the greatest music player where users can only listen to online music but download songs to their devices. Recently played songs, shows you might enjoy, your 2022 wrapped up, free kicks, popular playlists, best of artists, popular and trending are just a few of the features available on Spotify. After making an online payment, you can get premium here. You can create a playlist based on your favorite musicians. Even you can set up an account and profile. Python is utilized at Spotify's backend in addition to JAVA, C++, and C, which are used to make the software available on OS, macOS, and Linux. Worldwide recognition for Spotify.

5.2. Disadvantage

- Spotify requires that tracks be manually chosen and arranged.
- It takes time for the user to create and refresh a playlist for each mood.
- Users find it challenging to rearrange their playlists and play music when their playing habits change.
- It's possible that the user won't like the developer's play list when they click to their current mood type.

6. System Architecture

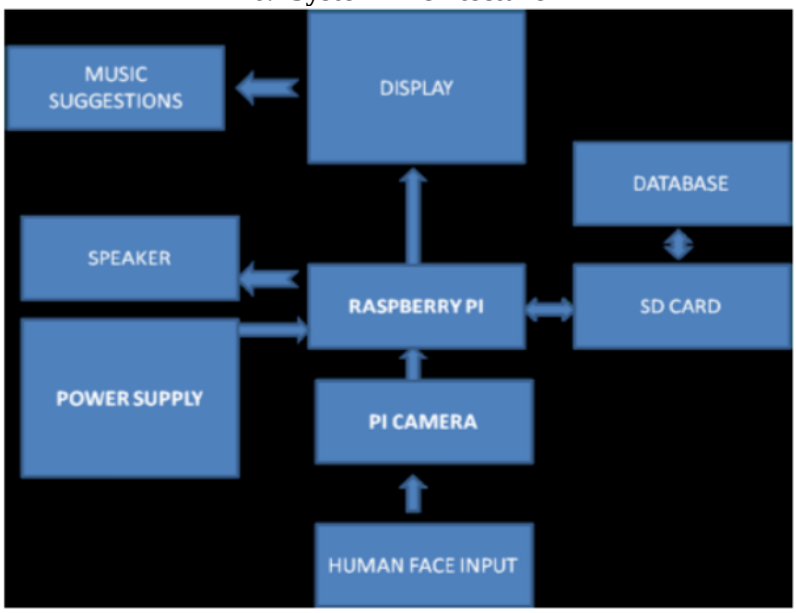

Figure 1 System Architecture

6.1. Description of System Architecture

6.1.1. Raspberry pi

As the primary controller or processing unit, the Raspberry Pi 3 Model B+ is utilized.

Pi is powered here via a 5V DC source. Here, we chose the PI3 board because we needed a small device that could run a Linux-based operating system. The Raspberry Pi3 retrieves data from the camera and plays the desired output song using the CNN technique and logic.

6.1.2. Pi camera

Raspberry Pi 5MP color camera module without a microphone, supports both the Raspberry Pi Model B and cameras that feed live video to the Pi. Full HD video may be captured using it.

6.1.3. HDMI to VGA converter

The 1920x1080@60Hz resolution is supported by the HDMI male to VGA female converter. As some LCD displays have a VGA connector but the Raspberry Pi only has an HDMI connector, we need an interface that can convert HDMI signals to VGA signals and show the images. This converter is used to connect an LCD monitor to the Raspberry Pi.

6.1.4. SD CARD

Here, an SD card is utilised as programme memory. This SD card has transfer speeds of up to 98MB/s, and it houses the OS that we installed.

6.1.5. Display

The HDMI to VGA converter connects the Raspberry Pi to the display, which is a 15-inch LCD monitor used to display the OS's graphical user interface (GUI). Through the display, we may execute, create, and edit the programmes that meet our needs.

6.1.6. Power supply

Cameras, speakers, and Raspberry Pi 3B's require a 5V supply. The system's power supply portion accepts 230VAC as input and provides an isolated output of 5 volts and 2 amp of DC.

6.1.7. Database

After modelling, the database will be made up of numerous face emotion photos that have been categorised and transformed into XML files. The data base XML file contains extracted facial feature information that the raspberry pi will compare to real-time video footage.

6.1.8. Speaker

The music output will be driven by a 3-watt, 8-ohm impendence tiny speaker.

7. Work Fl

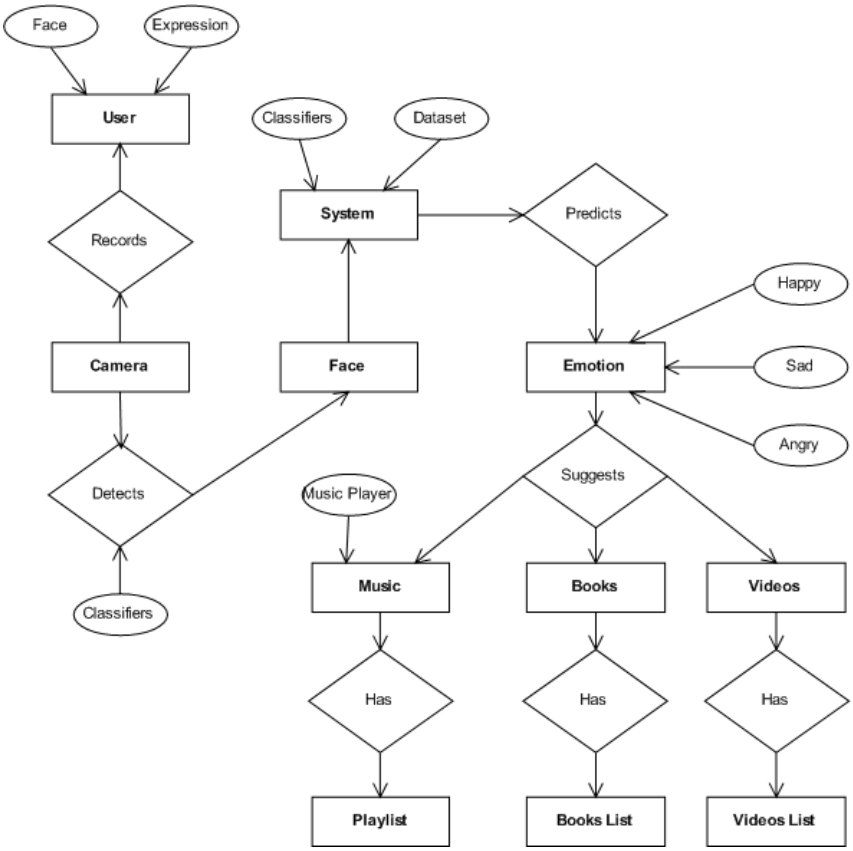

Figure 2 Flow of System

8. Proposed System

The suggested system can recognize the user's facial expressions and, based on those expressions, extract facial landmarks. These landmarks are then categorized to determine the user's specific emotion. Songs that correspond to the user's feelings will be displayed once the emotion has been identified.

8.1. Advantage

- It will assist the user in changing their mood.
- Play music in line with your mood (Emotion).
- time-efficient procedure.

9. Requirements

9.1. Hardware Requirements

- **Raspberry pi board**

1.2GHz 64-bit quad-core ARMv8 CPU, 1 GB RAM.
802.11n wireless LAN, 10/100Mbps lan speed, upgraded switched Micro USB power source up to 2.5A Bluetooth 4.1, Bluetooth low energy.
4 USB ports, 40 GPIO pins, full HDMI port, combined 3.5mm audio jack and composite video Camera interface (CSI), Display interface (DSI), Micro SD card slot (now push-pull rather than push- push), Video Core IV 3D graphics core.

- **Pi Camera**

5MP color camera module without a microphone for Raspberry Pi
Supports both Raspberry Pi Model A and Model B
MIPI Camera serial interface Omni
Vision 5647 Camera Module
Resolution: 2592 * 1944
Supports: 1080p, 720p and 480p Lightweight and portable (3g only)

- HDMI to VGA Converter
- SD Card
- Amplifier LM386

9.2 Software Requirements

- Raspbian OS
- Python
- Open CV library

10. Advantages

- It will assist the user in changing their mood.
- Using a picture of a human face, one may determine their mood.
- It will be possible to identify facial image emotions using picture attributes.
- Time-effective process.
- Cost Effective and Easy to use.
- Identify the eyes in a human facial photograph

11. Conclusion

To sum up, music is a significant tool for controlling mood in a variety of everyday settings. Everyone may easily access the proposed system, and it can be heard practically everywhere. System is highly effective because it is based solely on the user's facial expressions. This project was created to help us make significant progress in the study of human behavior.

Music can be arranged using an emotion-based music player. Our primary goal is to occupy and satisfy users.

12. Future Scope

- It is possible to create an even smaller gadget.
- Can be integrated with a Music player (Global Music players).

13. Application

- Plays music based on the feelings and mood of the user.
- The breadth of the suggested system is heavily utilized at home.
- This mechanism is accustomed to identifying human emotions.

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