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Music Recommendation using Facial Recognition

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ABSTRACT

Face recognition technology has widely attracted attention due to its enormous application value and market potential. It is being implemented in various fields like security systems, digital video processing, and many such technological advances including music recommendation systems. Additionally, music is a form of art, which is known to have a greater connection with a person's emotions. It has got a unique ability to lift up one's mood. Relatively, this project focuses on building an efficient music recommendation system that determines the emotion of the user using facial recognition techniques. This project is based on the principle of detection of human emotions using the image and video processing with a Convolutional Neural Network (CNN), and playing music that is appropriate for enhancing that emotional state. This project will extract the user's facial expression and features to determine the current mood of the person. We have found the Spotify dataset for the project which consists of seven kinds of emotions. Here , we will have to perform some data pre-processing and connect with the Spotify API as we have planned to implement in the web application. Once the emotion is detected, a playlist of the song which is suitable to the mood of the user can be presented to the user.

INTRODUCTION

Music plays an important role in shaping one's emotions in different aspects of life. It is a way to express how he/she is feeling, and traditional music players or digital music service applications in a way help anyone enjoy the music on the go but they do not personalize the playlist according to the user's emotion/mood, instead, there are a series of selections to be made in order to get desired songs automatically in the playlist. This often makes the user experience unpleasant and also is time-consuming. With the increasing usage of artificial intelligence and machine learning in different day-to-day applications. There is a need for music players to be smarter and have a better user experience. The project "Playemos" is to develop an Emotion Based Music recommendation system which is a web-based application meant for users to minimize their efforts in searching large playlists. This application is not targeted for a specific group or audience but for the general users as a whole.

Existing system

Spotify is one of the most popular digital music player application in the world. It is an upgrade over the traditional music player which is completely depend on downloaded music in the system. Spotify being a digital music player provides user access to millions of songs, it lacks the ability to recommend songs to user based on their mood rather it has the same traditional approach to create desired playlists manually. Song recommendations have existed for a long time, but in majority of the scenarios the recommendation is determined after learning the user preferences over a period of time, like looking at his past song preferences, time he listens to the music etc.

Disadvantages of Existing System

- Does not provide personalized playlist to users automatically.
- Does not recommend song based on users emotion.
- User has to manually search for songs/music.
- Not very user friendly.

Proposed System

In the proposed new approach to song recommendation, where in the mood of a person is determined from his picture and based on the mood predicted song recommendations are made that best suit the mood predicted. This approach makes the system user friendly and easier for the user to interact the application.

Advantages

- Provides emotion based music recommendations.
- Makes user experience much easier than traditional approach.
- Playlist is created in real time.
- Better personalized experience for the user.

2) Literature Survey

Deny John Samuvel et. al. [1] proposed a paper that was focused on the study of emotion detection using status image processing and then recommend a Music library according to the mood, the algorithm has analyzed. They have used the technique “Eigenfaces” for

the feature extraction of pictures, which basically tells that not all the parts of the face are important for emotion recognition. Face recognition techniques focus on recognizing the eyes, nose, cheek, and forehead and how they change with respect to each other. Overall, the areas with maximum changes, mathematically, areas with high variations are targeted. And when multiple faces are considered, they are compared by detecting the above-mentioned parts of the faces because these parts are the most useful and important parts of a face. They tend to catch the maximum change among faces, specifically, the change that helps to differentiate one face from the other. They have used OpenCV to detect the face in the image and the Eigenfaces algorithm has been used to recognize the face. They have also used Local Binary Patterns, Direct Cosines Transform, and Gabor Wavelets for local feature extraction. But they have used music based recommendation system which is based on information such as the album and the artist.

S Metilda Florence and M Uma [2] proposed a system that can detect the facial expressions of the user and based on his/ her facial expressions it extracts the facial landmarks, which would then be classified to get a particular emotion of the user. They have classified the emotions into two categories as- Happy, and Sad, Once the emotion, has been classified into categories, the songs matching the user's emotion would be shown to the user. Although they have some limitations in their dataset but on other hand, they are using live webcam images for emotion detection which is opening the improvement work for the system in terms of accuracy and working. Ankita Mahadik et.al. [3] proposed an application based on mood detection implementing real-time mood detection. They have used FaceDetector class available in Java to detect the location of the face of any input images. They have implemented the application in the android app. The dataset they used for classifying the songs was from Kaggle which was further divided into two languages - Hindi and English. They have used Firebase as a backend server. They have used platforms like - OpenCV 3.1, PyCharm IDE, Android Studio, Python3.6, etc. The system detects the mood in real-time and a playlist is displayed for that mood accurately. They have achieved an accuracy of 75% approximately. Madhuri Athavle et. al. [4] proposed a system that benefits us to present interaction between the user and the music player. The purpose of the system is to capture the face properly with the camera. Captured images are fed into the Convolutional Neural Network which

predicts the emotion. Then emotion derived from the captured image is used to get a playlist of songs. The main aim of the system is to provide a music playlist automatically to change the user's moods, which can be happy, sad, natural, or surprised. The proposed system detects emotions, if the topic features a negative emotion, then a selected playlist is going to be presented that contains the foremost suitable sorts of music that will enhance the mood of the person positively. Music recommendation based on facial emotion recognition contains four modules as Real-Time capture, Face recognition, Emotion Detection, and Music Recommendation. They too have used the Kaggle dataset for training the model. OpenCV module has been used to detect the face and to reduce noise. CNN architecture applies features or filter detectors to the input image to get the feature maps or activation maps using the Relu activation function for the model. Ketki R. Kulkarni, [5] has presented a comparative analysis of automatic Facial Expression Recognition by compensating the effect of age on the recognition process by Weighted Least Square filtering. The system uses the Gabor filter and Log Gabor filter to extract facial features. The SVM classifier is first trained using known input images and then classifies unknown input images. From the results obtained, it can be concluded that recognition accuracy improves with the use of a Log Gabor filter whereas the time required for processing. V. R. Ghule et. al. [6] built an “Emotion Based Music Player Using Facial Recognition”, which provides an interactive way for the user to carry out the task of creating a playlist. The working is based on different mechanisms carrying out their function in a predefined order to get the desired output. Here, algorithms such as genetic algorithms for optimization using ellipse, RIO & Histogram equalization to play music according to the emotion.

1) **System Requirements**

I. **Hardware Requirement**

The hardware requirements are the required hardware devices for the web application to run. It gives the clear view of compatibility of webapp to run on various systems.

i. **Laptop or PC**

- Windows 7 or higher
- I3 processor system or higher
- 4 GB RAM or higher
- 100 GB ROM or higher
- Webcam

II. Software Requirement

The software requirements are features and functionalities of the target system. Requirements convey the expectations of users from web applications

Front end :

- HTML
- CSS
- JavaScript

Back end :

- MySQL
- Php
- Python
- Sublime text Editor
- XAMPP Server

Functional requirements:

Functional requirements define the functionality of a system or one of its subsystems. It also depends upon the type of software, expected users and the type of system where the software is used. functional system requirements describe clearly about the system services in detail. The functional requirements contain Login modules. They are the login

module, registered users' module, normal users' module, administrator module and server module.

- Login Module
- User Module
- Admin Module

Non-functional requirements :

Non-functional requirements may exist for the following attributes. Often these requirements must be achieved at a system wide level rather than at a unit level. Below mentioned are the main types of non-functional requirements.

Performance:

The Music Recommendation using facial detection System is built upon the web development technique and put on the web server online. The system and the server is capable of handling the real-time error functionality that occurs by the defined users. In addition, the system must be safety critical. All failures reported by the users must be handled instantaneously.

Reliability:

The system is safety critical. If it moves out of normal operation mode, the requirement is to drop or down the server and fix it as soon as possible and open it again.

Availability:

When in normal operating conditions, requests by a user for an online system are handled within seconds. The requested services from the is to be provided with the required response.

Security:

Maintaining a strong security mechanism should be placed in the server side of the system to keep secure. The application prevents unauthorized access to secure the web application.

Portability:

There is a portability requirement as far as our system is concerned because it is an online as well as offline (local server based) system so we can access it from anywhere through the internet connection.

Interface Design

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