

Music Recommendation System based on Machine learning Technique

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Abstract:

AI has a sub-field which has made a huge impact in today's world, known as machine learning. Structuring of the data is what the goal of it is. For being understandable and for the purpose of utilization by the user, machine learning fits the data-set into a model, which predict the output for unseen data. In today's time, with a great improvements in the field of technological aspects as well as streaming medias, various development has been done, like in music player the features like local playback , fast forward, reverse have been done. In this paper, a machine learning based technique is used to identify the emotion of the user and then recommend a song to the user.

INTRODUCTION

As machine learning is a field of computer science, but it is way different from the conventional computing which we are used to perform till now. Earlier in conventional computation problems, algorithms were designed by programmers and were used to calculate or for problem solving. Instead machine learning has now made it possible for algorithms to train on some data-sets and use some analysis (such as statistical, genetic, etc.) for predicting the output values.

Some eg. of machine learning are :

1. Facial Recognition - Tagging and Sharing photos in social media platforms like facebook, Instagram, etc., facial recognition technology is used. Which is a part of ML[1-2].
2. Optical character recognition - Conversion of photos of text-data type to movable types is performed from OCR.
3. Recommendation system - For suggesting which music to listen or which web shows to watch (as seen in Youtube, Netflix, Amazon Prime, etc) based on our preferences, is carried out by recommendation engines which is in turn ML powered.
4. Machine learning also gives a base for the idea of self-driving cars. It will really be seen in a few more years in the market.

Machine learning provides facility for computers for building models from sample data-sets in order to get automated decision-making process based on that data sets. After successful training of the model, it is used to predict output for unseen data. Machine learning is a field which is continuously being developed by many developers, scientists, etc. So this field has a lot of scope be it be Emotion recognition, Face detection, Recommendation system, etc. Deep Learning [3] is a area of machine learning technique which replicas the data that are intended to do a particular task. Deep learning in neural networks has wide applications in the area of image recognition, classification, decision making, pattern recognition etc. [4].

Literature Review

As we all know music is an important part of entertainment for people in today's time. It has played a very crucial part in changing an individual's life (Studies have shown that people suffering from depression were cured by making them listen to good music). Also we have seen the growth of streaming medias like gaana.com, JioSaavan.com, Wynk Music, etc. Though these things meet up with the user's basic needs, but still the user faces the work of manual traversal (This is really slow in this current world scenario where everything is now automated) on the playlist of songs and select songs based on his current mood and behavior.

A detailed study on the facial emotion recognition is discussed in [9] which exposes the properties of dataset, facial emotion recognition study classifier. Visual features of image is examined and some of the classifier techniques are discussed in [10] which is helpful in the further inspection of the methods of emotion recognition.

Machine Learning trends are growing rapidly. Yesterday the face recognition looked very different, but today ML is used at each and every department.

Some of the existing websites regarding the purpose include[5-7]:

- EMOSIC

Real-time mining of facial emotion as well as mining of lyrics from songs to categorize into a specific expression is the main task of this system. It will create a list of songs automatically and it would be played.

- Heart Player

Heart Player according to the definition is a smart music player that can recognize the music. There is an animated figure which shows the expression of the song by some facial emotions whenever a song is been played. Also, this player analyses the historical data of the song played by the user and predicts which song to be played today.

- Real Time Emotion Based Music Player for Android

This is a android based music player which is made a little bit complex. It captures the real-time images of the client.

Proposed Technique

Proposed technique Emo-Beat is an approach for helping the user to get the song played without manual searching of songs. This automatic selection is based on the emotions of the user. A machine learning model is trained for a face dataset. Whenever a user wants to play music based on his mood, he is advised to capture his face image. The algorithm predicts the facial expression of him and plays a song in accordance to their emotion. Fisher Face is the method which is used to make the model get trained and help in recognizing the emotion of the user. It has been seen in many forums that the human facial structure plays an important part in mining of one's behaviors and emotion. The objective of this proposed technique is to take an image of the user using a webcam of the device. Then getting the facial characteristics of the user from the image. Facial characteristics is classified into 4 emotions, happy, sad, angry and neutral. In accordance to the facial emotion predicted, a song is played.

The basic requirements for the proposed technique are :

- Identify user's emotion
- Playing songs according to user's emotion
- Attractive eye-catching Front-end

Emo-Beats can be the base for many such ideas. People can help grow this idea to really great extent. Also it is supported by one of the hottest technologies in the market currently, Machine Learning.

Apart from randomly choosing songs from a set of songs, users can now select songs based on their current mood. Also the proposed system provides functionalities where user can select song randomly or can add them to queue for multiple songs playing. It differs from the traditional streaming system as the later is not providing any feature currently for facial emotion based music playing. The reason of this could be the that the field of machine

learning is quite new and researches are going on it everyday. This proposed system is a novel approach and can grow if work is carried on it regularly.

The proposed technique has a very little complex system consisting of different modules with various specific functionalities. The operating environment of the proposed technique is over the webpage deployed over the local host. The proposed technique system has two kinds of interacting entities over the webpage that are the user and the administrators of the system. The administrators of the system can manage the modules and modify the functions of the application and have the full control over the access to the system and also can analyze the activities of the users over the webpage.

The administrator roles will be given to the group member of the proposed technique team, the administrators have different primary roles divided between them such data analysis, security and recovery, maintenance, modifications and adjustments and other specific administrative roles including the retraining of the model from time to time, but all the users have the same secondary role of having the responsibility of using the contents of the application over a specific span of time. The services provided to the users include all the module features of the application which provide different ways for playing of songs, be it playlist mode, or emotion mode, or be it the random mode. The user complaint requests will be treated with full concern as the user can give the feedback to different modules of the application which cover different features of the webpage.

The users are the general public who need to listen to some good music according to their mood, not according to a predefined playlist. The users are also the group of people who are looking for a new way of listening to songs, rather than that conventional method where every time they have to select a random song, which may/may not match their mental status

This is the stage where the design is polished and plans, specifications and estimations are made. Detailed design comprises of yields like 2D and 3D models, cost build up approximations, procurement plans etc. This phase is where the full price of the proposed technique is recognized.

Design and analysis of the Proposed technique includes all the programming and scripting languages like HTML, JavaScript, styling like CSS. For the back end scripting and machine learning part python is used. The front end of the website is developed on the core of html with the styling of CSS. The user interface is developed with the help of javascript.

The back end of the website is supported by python. In Python there are dependencies used such as eel (which is used to connect the python part of the code to the front end part), opencv (which is used for deep learning algorithms, this is very important). The webpage has all the features of HTML5 and CSS3 which make your website responsive. JavaScript is used to make the website more user interactive, as it provides functionality to the basic features of the HTML web pages and helps to support the static websites into more dynamic ones.

The User Interface of both the users (customers) and the administrators needs to be different in appearance as well as in functionalities. The users will have the basic webpage appearance with all the useful basic modules for their support and assistance whereas the administrators require more complex interface for management of website, analysis of data and user statistics, maintenance of website, modification of modules, updating contents and information over the website. These are however a big goal towards the entire proposed technique. Capstone plans are refined and fixed. Above mentioned plans are to be implemented in future after successful hosting of the website.

Pseudo Code

Open website by typing “python app.py” in the cmd prompt.

1. Go to any of the three modes for playing the songs :

- Playlist Mode
- Emo-Mode
- Random Mode

2. If clicked on playlist mode, go to the song cards and :

- Play any song
- Add any song in the playlist
- Remove any song from the playlist

3. If clicked on emo - mode, then the camera would get open and would capture your face.

4. If clicked on random mode, any random song would get played every time.

5. For retraining the model :

- Type “python app.py -retrain” in the cmd prompt
- It would ask for 4 different emotions, each for 5 seconds, keep it that way and it would capture your face.
- Model would then be trained automatically.

IMPLEMENTATION

This part of paper attempts to document the current status of proposed technique. As the proposed technique has been taken a fixed and determined period of time to complete it. Now it is uploaded on the local host so that the user can access it. The application consists of different modules for music playing. The main page consists of different navigation buttons for different module .The first module is “Queue-Mode” which acts as a playlist. If the user wants to play the songs according to his choice without songs being played randomly, he can use this module. The Second module is “Emo-Mode” it is the main idea/heart of the proposed technique. User can use this module to get the songs played according to his/her facial emotion. The Second module is “Random”, it is used when the user wants to play songs randomly. This application is made in such a way that more modules can be added as per requirement by the admin. It is highly integral. It is very fast and responsive on desktop.

System Snapshots

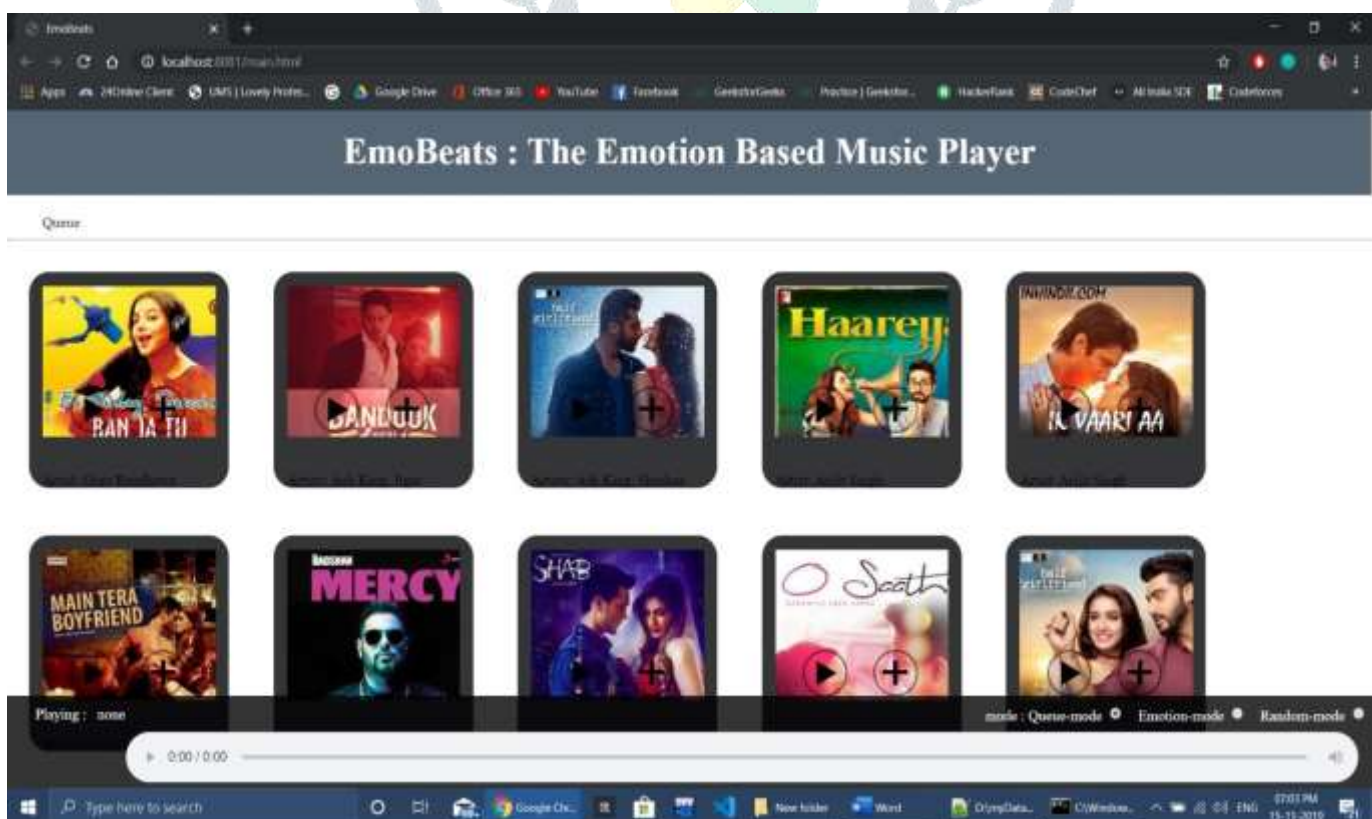


Figure 1 system snapshot 1

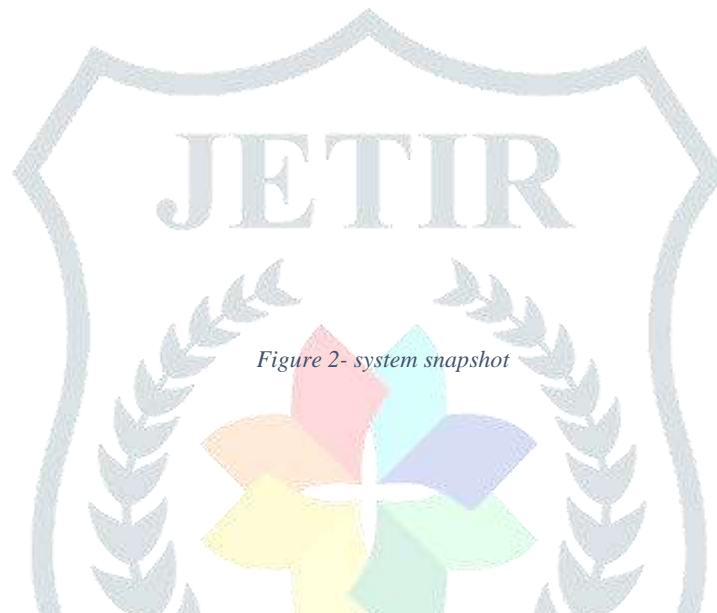
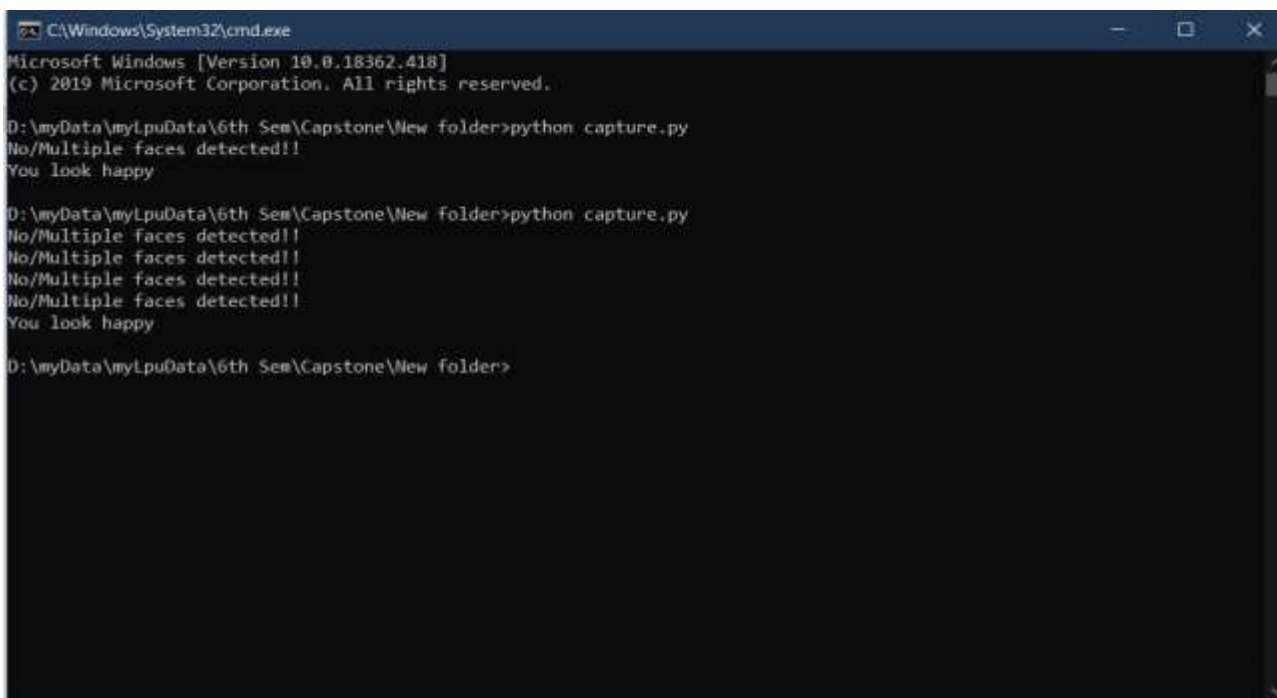


Figure 2- system snapshot





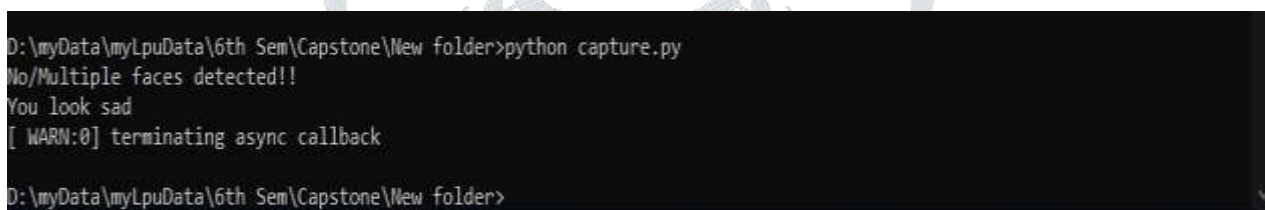
```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.18362.418]
(c) 2019 Microsoft Corporation. All rights reserved.

D:\myData\myLpuData\6th Sem\Capstone\New folder>python capture.py
No/Multiple faces detected!!
You look happy

D:\myData\myLpuData\6th Sem\Capstone\New folder>python capture.py
No/Multiple faces detected!!
No/Multiple faces detected!!
No/Multiple faces detected!!
No/Multiple faces detected!!
You look happy

D:\myData\myLpuData\6th Sem\Capstone\New folder>
```

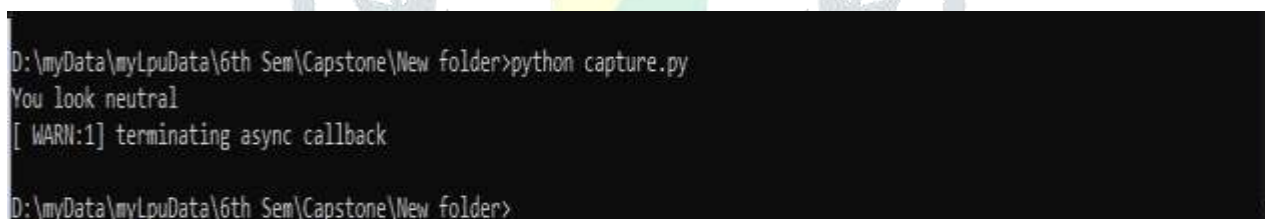
Figure 3 system snapshot 3



```
D:\myData\myLpuData\6th Sem\Capstone\New folder>python capture.py
No/Multiple faces detected!!
You look sad
[ WARN:0] terminating async callback

D:\myData\myLpuData\6th Sem\Capstone\New folder>
```

Figure 4 system snapshot 4



```
D:\myData\myLpuData\6th Sem\Capstone\New folder>python capture.py
You look neutral
[ WARN:1] terminating async callback

D:\myData\myLpuData\6th Sem\Capstone\New folder>
```

Figure 5 system snapshot 5

Conclusion:

The proposed system provides functionalities where user can select song randomly or can add them to queue for multiple songs playing. It differs from the traditional streaming system as the later is not providing any feature currently for facial emotion based music playing. The reason of this could be the that the field of machine learning is quite new and researches are going on it everyday. This proposed system is a novel approach and can grow if work is carried on it regularly. Remaining areas of concern includes :Functionalities for genre of songs recognition by its lyrics, Dynamic change of song every time user enters the application, Addition of a module through which “sad” or “angry” user may become “happy” after listening to some specific songs.

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