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Advanced Music Application with Music Recommendation system based on Facial Expression Using Machine Learning

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ABSTRACT: Image processing is the process of transubstantiating an image into a digital form and performing certain operations to get some useful information from it. The image processing system generally treats all images as 2D signals when applying certain destined signal processing styles. The images were regularized, resized to 48,48, and converted to grayscale in batches of 64 with help of the Image Data Generator. Facial Expressions convey non-verbal cues, which play an important part in interpersonal relations. The Cognitive Emotion AI system is the process of relating the emotional state of a person. The main end of our study is to develop a robust system that can descry as well as fete mortal emotion from a live feed. Some feelings are universal to all mortal beings like wrathfulness, sadness, happiness, surprise, fear, nausea, and impartiality. The methodology of this system is grounded on two stages- facial discovery is done by the birth of Haar Cascade features of a face using the ViolaJones algorithm and also the emotion is vindicated and honored using Artificial Intelligence ways. The system will take the image or frame as input and by furnishing the image to the model will perform the pre-processing and point selection after that it'll prognosticate the emotional state. Convolutional Neural Network is a deep learning algorithm that is used for recognizing images. CNN uses a unique point of images to identify objects that are placed on the image. This process is veritably analogous to what our brain does to identify objects.

KEYWORDS: Image Processing and Training, Image Data Generator, Convolutional Neural Network, Lossless Audio, Face recognition, Emotion detection.

I. INTRODUCTION

Music is a universal gift and it has the power to connect people. It's an art form with mortal commerce at its center. There were many audiophiles like me starving for a proper musical system with high-fidelity audio. This paper demonstrates a music web application that can be used for streaming high-quality audio output along with multiple functional features. This app is also integrated with a music recommender that senses the user's facial expression through the webcam and, passes it through the model to get a prediction of emotion. Then according to the emotion predicted, the app will fetch a playlist of songs and recommend the songs by displaying them on the screen. This model is trained on FER 2013 dataset. It can detect 7 emotions. After detecting the emotion the model fetches the appropriate playlist for the user. Through this app, the user can stream high-fidelity audio with lossless audio output. Lossless files preserve every detail of the original audio. The music format is in Hi-Res Lossless which is ALAC up to 24-bit/192 kHz.

The paper is organized as follows. Section II describes Real-time expression detection and song recommendations along with the playlist fetching model and the system UI. The flow diagram represents the step of the algorithm given in Section III. Section IV presents experimental results showing the results of the images tested. Section V presents the conclusion. Section VI describes the future scope of the project.



II. PROPOSED SYSTEM

This concept is mainly inspired from famous music applications like apple music and Spotify. The above-mentioned applications do a great job of streaming music but they lack some features that will drastically improve the user experience. So I developed a new system that integrates all the necessary features along with some unique features as well. The proposed application has a unique cluster-free and modern user interface along with multiple functional features that enhance the user experience. It has basic features like play, pause, forward, backward, Popular songs column, popular artists column, and last listened column.

Along with that, it has some unique features like a library with six different playlists of six different moods and a music recommender that detects the facial expression of the user using the webcam. The image is processed and the emotion is detected using an Image data generator. Based on the emotion the model fetches a playlist of songs that are most appropriate and displays it to the user. The UI is designed with multiple columns and colors along with numerous features to satisfy audiophiles like me.

The above-mentioned library feature contains different mood sets that have different music in them. The library has six different modes in it namely happy, sad, sleep, party, romance, and motivation. This file contains several songs that match the mood the user selects. Also, the songs are placed based on the popularity of the song and the composer. Another cool feature is the music recommender. This feature works based on facial recognition through which the system finds the user's emotion and displays a playlist related to the user's expression. First, the system detects the user's face using a webcam. Through CNN the expressions are recorded using a model consisting of Conv2d, Maxpool2d, Dropout, and Dense layers. After that recorded image is normalized using an image data generator and the expression is detected using a dataset called FER 2013 dataset which contains seven different emotions in it. Based on the expression detected the system fetches a playlist of the most appropriate songs and displays it to the user.

III. METHODOLOGY

The above-proposed system is achieved with help of a series of processes. The main system function with the help of numerous modules. The main page is built with HTML and styled with CSS. The functionalities are programmed using JavaScript. This technique is also carried forward in the library system. The Music recommendation is achieved with processes like Image capturing, Facial recognition, CNN, Emotion detection, and Music recommendation. The Image capturing is done using a webcam then the captured facial image is processed and mapped to the correct emotion by matching the image with the image present in the dataset by which the emotion can be detected. After which the system fetches a playlist of songs based on the emotion detected. This model contains seven different emotions namely happy, sad, surprise, anger, neutral, fear, and disgust. The playlist change automatically with the change of expressions.

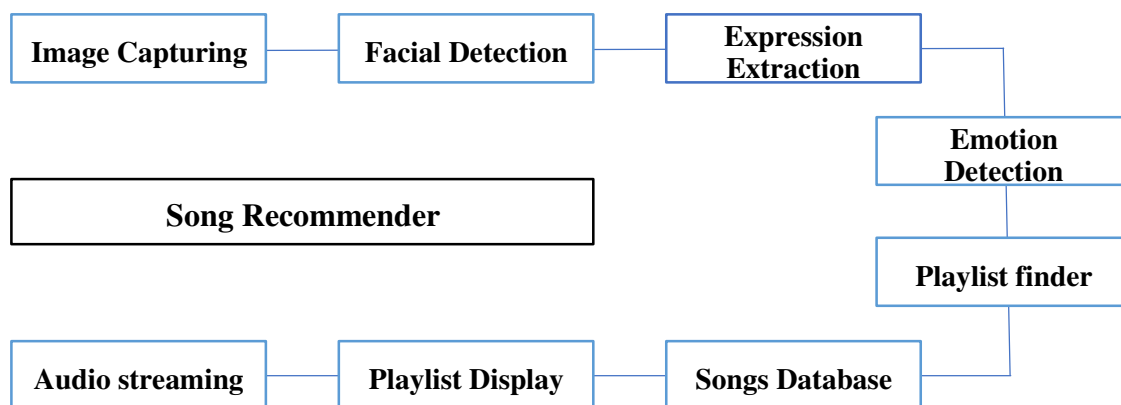
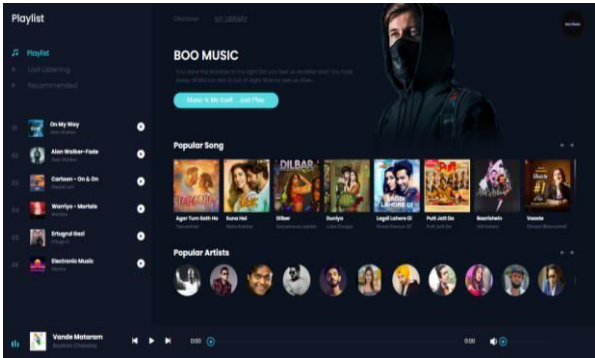


Figure 1. Block diagram of the proposed system

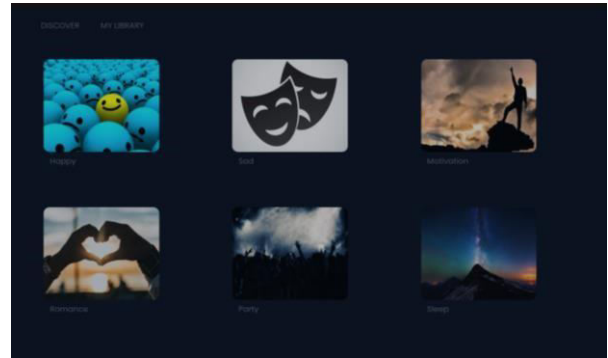


IV. EXPERIMENTAL RESULTS

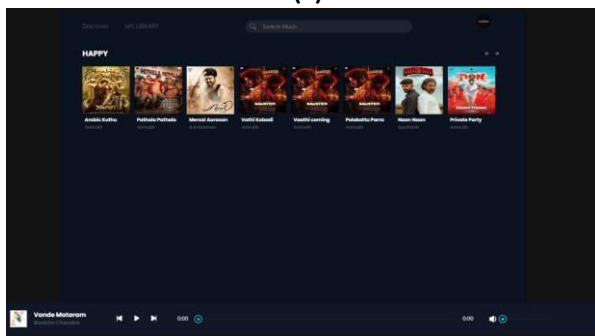
Figure 2(a) shows the main UI, 2(b) shows the library section, 2(c) shows the happy playlist section, 2(d) shows the sad playlist section, 2(e) shows the motivation playlist section, 2(f) shows the romance playlist section, 2(g) shows the party playlist section, 2(h) shows the sleep playlist section.



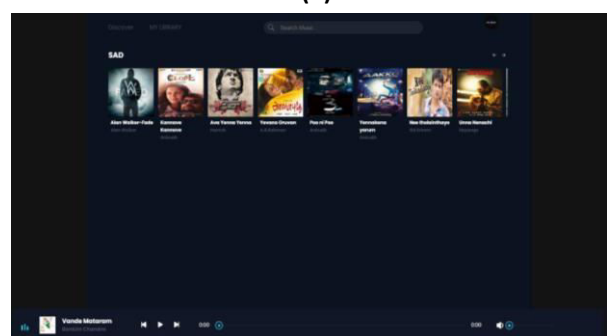
2(a)



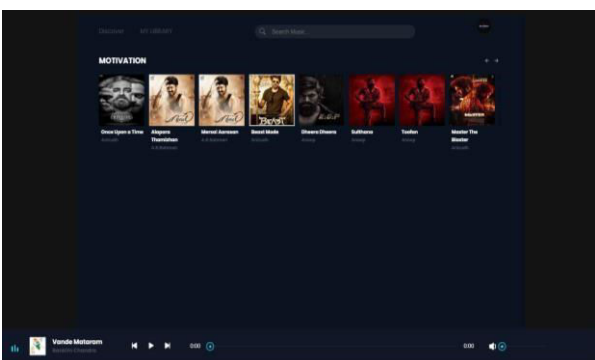
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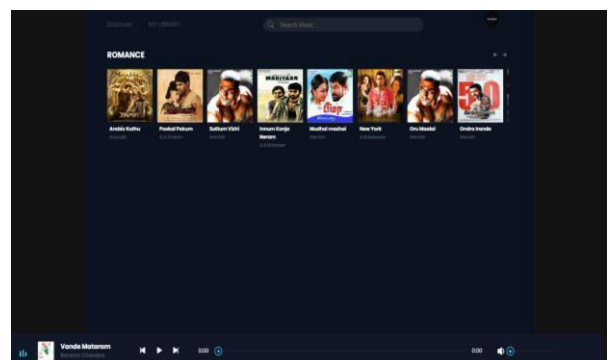
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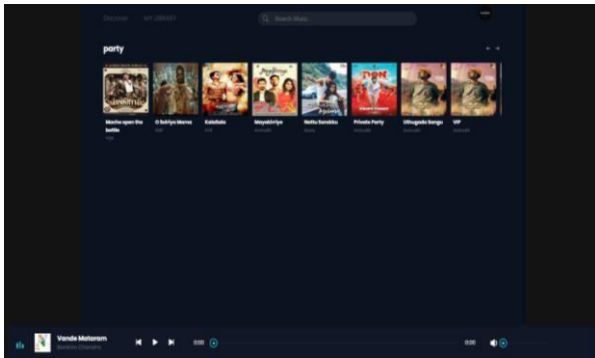
2(d)



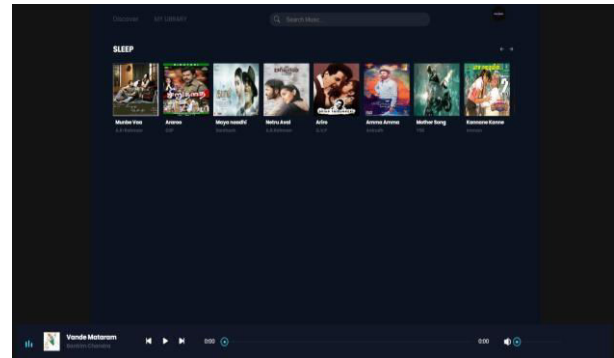
2(e)



2(f)

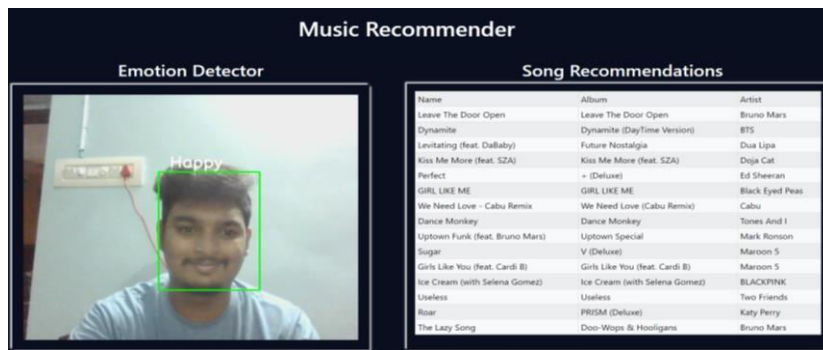


2(g)

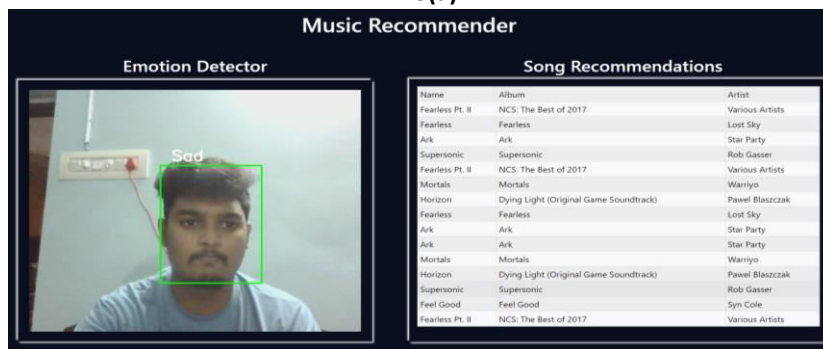


2(h)

Figure 3(a) and 3(b) shows the Music Recommender System



3(a)



3(b)

V. CONCLUSION

In this developed project a music application with advanced features is created to enhance the music-listening experience of audiophiles. The main motto of developing this project is to create a hassle-free music streaming system with a music recommender along with the high-quality audio output for free. As many of the streaming platforms provide high-quality music experience only on a subscription basis along with loads of compromises. This developed system makes listing to music easier and more intriguing. Every individual must incorporate music inside them as “Music is Life Itself”.



VI. FUTURE SCOPE

Although this system work is completely functional, It also has a large room for improvement in the future. There are several aspects present in the system which can be modified to drive better output and a better overall experience. By performing various research and implementing newer concepts this system can be brought up to the next level. For example, instead of using facial impressions as the only measure for recommending songs advanced AI technology can be developed for suggesting music automatically by fully monitoring the user's behavior. Also, more Emotions can be added and also the fluidity of the system and the UI can be improved. As there is no limit to evolution things can always change in the future.

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