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Music Recommendations Using Facial Expression

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Abstract— When considering Artificial Intelligent applications in music, most people will think of smart speakers, wearables, and smart home devices used for streaming songs. However, while these advancements are undoubtedly significant, the music industry is embracing Artificial Intelligence based Machine Learning technologies to a much greater degree. In this era, new technologies that integrate emotional intelligence into existing machine learning applications are being studied. Of these technologies, emotional analysis research for providing different music services has received tremendous attention in the last few years. The growth of emotional intelligence technology is going to produce a number of focus areas that will sense emotions; so the proposed project is an Artificial Intelligence based Machine Learning application which will recommend music according to facial expression.

Keywords— Emotion Recognition, Facial Recognition, Convolutional Neural Network (CNN)

I. INTRODUCTION

Music Recommendation System Using Facial Expression Recognition deals with everything related to "data". This is the reason why data mining, classification, prediction all such things took place in the history of our computer science. Right now, Data Mining, Machine Learning, Deep Learning are the most researched and interesting topics of data science in recent days. So why not use such techniques for ease in our lifestyle.

Music has become an integral part our routine life. Everybody listens to music of their own type, their own taste. While driving, everyone loves to listen to music. But, in this case, there's a problem of changing the songs according to your mood, emotion or choice. There have been many advancements in technology related to music recommendation also or we can say music information retrieval but still we do not have this problem solved here. Music information retrieval is still a big research topic As there is variety or we can say there is a great range of music available. It becomes difficult for computers to sort them. As the variety of music, variety of tempo, variety of amplitudes of the music are available and a lot of various emotions attached to it. In this application ,the image of a person is captured using a real time machine,which has access to to local machinery and based on the captured image,it compares the database data sets that already saved in the local device through processing it defines the present facial expression of the user in numerical form based on this music will be played other than that also we have personalized playlist and the last one it is random features it uses python Eel library so that it can pick a random song without any order. for this we've used libraries like OpenCV, EEL, numpy etc. this system is mainly proposed because music plays a vital role in recent times that is to reduce stress.

II. RELATED WORK

In this paper, Ketki R. Kulkarni, [1] has presented relative analysis of automatic Facial Expression Recognition by compensating the effect of age on the recognition process by Weighted Least Square filtering. The system uses Gabor filter and Log Gabor filter to extract facial features. The SVM classifier is first trained using input images and also classifies unknown input images. From results obtained, it can be concluded that recognition accuracy improves with use of Log Gabor filter whereas time required for processing is more when Log Gabor filter is used as compared to Gabor filter.

In this paper, H. Immanuel James,[2] presents "Emotion Based Music Recommendation System". They have proposed a system focusing on detecting human emotions for developing emotion based music player, which are the approaches used by available music players to detect emotions, which approach our music player follows to descry mortal feelings and how it's better to use our system for emotion discovery. The face of the person is recorded in the webcam & converted into frames. Using preprocessing the facial expression is converted into a sequence of Action Units. The Facial Action Coding System is a system that describes all the facial expressions using combinations of the 64 AUs. After

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Feature Extraction, Emotions are classified whether it is Happy, Angry, Sad and Surprise faces. The web services are integrated with them. They may be of SAAS, IAAS, PAAS. The emotions are transferred and the music is played from the emotions detected.

In this paper. V. R. Ghule, [3] 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. Then, algorithms such as inheritable algorithms for optimization using ellipse, RIO & Histogram equalization to play music according to the emotion.

In this paper [4], Gokul Krishnan K, has built an "Emotion detection and music recommendation system using machine learning", which provides an automated playlist with the user's emotion as an attribute. This project is implemented as an Android Application, where the front camera of the smartphone is used to detect the user's emotion and use it as a parameter in music request to popular services. In addition the application will also keep track of the songs played, so that the such learning can improve future recommendations. This is the innovation of the project where everything is automated, and all the user needs to do is to enjoy the music. When the user starts enjoying the music the detector will stop using power.

In the research [5] done by Shlok Gilda, Husain Zafar, Chintan Soni, Kshitija Waghurdekar, they represented a music recommendation system which analyses the emotional state of the user using their facial expression & creates the playlist based on that. This system makes use of CNN to analyse facial expressions and creates a playlist by mapping the songs to users mood. Similar songs are grouped together by using cosine distance functions which determine similarity between audio files. The high accuracy & quick response time of the application makes it suitable for most practical purposes. The music classification achieves high accuracy in the anger category, while also performing well in the happy and calm categories. Thus, EMP minimizes the user's efforts for create playlists. By efficiently mapping user sentiments to the correct song category with an overall accuracy of 97.69%

In the research done by Mahesh Babu[6], they represented a context based multimedia content recommendation system for mobiles & desktops. This system extracts frames from captured video from which faces are detected & using Pro ASM features from the face are extracted. These feature points are normalized & feature selection algorithm is applied to obtain higher level feature sets which are used to train SVM classifiers, which was used during testing for facial expression recognition in real time. Content is then recommended to the user based on his preferences. The ProASM feature is more accurate, faster & robust to illumination changes than ASM.

In the paper[7], proposed by Ziyang & team, a model of facial micro-expression recognition based on convolutional neural network (CNN). After training the model on a data set, they got a recognition rate of 62.1%. Based on the state that both facial expression and emotion were recognized, a content-based recommendation algorithm was implemented to automatically recommend music to users. Compared to the existing algorithms that only recommend music according to the user's previous listening preferences, the algorithm proposed in this paper enhances the user's emotion recognition, so that the recommended music can better meet the users' listening needs. Therefore this algorithm has a contextually promising application market.

The proposed work [8] uses the power of a simple android phone and tries to attach it with good software structure using CNN combined with tensor flow lite to do the work being done on a larger scale. The system tries to detect the emotion of the user by capturing its image on the runtime and based on that recommend and play music to the user from the two modes available online and offline. The research was increased in scope and compared with Retro neural networks on android but the model only gave accuracy of about 45% in comparison to the CNN which gave an accuracy of about 67%. The product leads the way for many innovative and useful products. The system uses a trained model using CNN to detect the mood of the user through taking the picture from the camera of the device and music playlist is recommended using the detected mood of the user. The CNN is constructed using the library of google, Tensorflow which further simplified using Keras Library. This method can also be used in cars where a camera can be placed in the rear view mirror and that can scan the emotion of the people in the car and play music automatically. Other Future applications of this system can also be used for safety of users, thus detecting whether the drivers are asleep. More Dynamic application can be selection of news, music suggestions and in some cases food suggestions.

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III. EMOTION MODULE

In this section, we study the usage of convolutional neural networks (CNNs) in the context of emotion recognition. CNNs are known to simulate the human brain when analyzing visuals; however, given the computational requirements and complexity of a CNN, optimizing a network for efficient computation is necessary. Therefore, a CNN has been applied to construct a computational model that successfully classifies emotion into 4 moods,videlicet, happy, sad, angry and neutral, with an delicacy of 90.23%. In the application "Music Recommendation using facial expression" we are using few of the Python modules eg. Keras, numpy, requests, opencv-python, tensorflow whitenoise==3.3.1 Pillow.

A. KERAS

Keras **is** that the most used deep learning framework among top-5 winning teams on Kaggle. Because Keras makes it easier to run new experiments, it empowers you to undertake more ideas than your competition, faster. And this is how you win.

B. NUMPY

NumPy may be a library for the Python programing language, adding support for giant, multi-dimensional arrays and matrices, alongside an outsized collection of high-level mathematical functions to work on these arrays.

C.REQUESTS

Requests may be a HTTP library for the Python programing language. The goal of the project is to form HTTP requests simpler and more human-friendly. the present version is 2.26.0. Requests is issued under the Apache License 2.0. Requests is one among the foremost popular Python libraries that's not included with Python.

D. OPENCV

OpenCV may be a library of programming functions mainly aimed toward real-time computer vision.firstly developed by Intel, it had been latterly supported by Willow Garage also Itseez. The library is cross-platform and free to be used under the open-source Apache 2 License.

E. TENSORFLOW

TensorFlow may be a free and open-source software library for machine learning and AI. It is often used across a variety of tasks but features a particular specialise in training and inference of deep neural networks.

IV. SYSTEM PERFORMANCE DESCRIPTION

The impact of music on human welfare could also be applied during a sort of contexts; the utilization cases described within the preceding section indicate the feasibility of doing so.

he impact of music on people. To affect these and other issues, conceivable scenarios there's a requirement for a standardised system that reflects the unique characteristics of every individual user. This section focuses on designing an answer that's intended to be recognised. Personal experiences with the physical and emotional effects of music-related characteristics during a sort of scenarios and mixing them utilising well-recognized broad methods no matter whether or not there's a necessity to try to to so, modify a user's psychological state or sustain and retain it Similarly, the system's primary duty is to seem for the music songs that are the foremost similar (closest) to the abstract etalon one, which is characterised by a group of music-related characteristics.he impact of music on people. To affect these and other issues, conceivable scenarios there's a requirement for a standardised system that reflects the unique characteristics of every individual user. This section focuses on designing an answer that's intended to be recognised. Personal experiences with the physical and emotional effects of music-related characteristics during a sort of scenarios and mixing them utilising well-recognized broad methods no matter whether or not there's a necessity to try to to so, modify a user's psychological state or sustain and retain it Similarly, the system's primary duty is to seem for the music songs that are the foremost similar (closest) to the abstract etalon one, which is characterised by a group of music-related characteristics.

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V. FACE RECOGNITION SYSTEM

A face recognition system may be a technology capable of matching a person's face from a digital image or a video frame against a database of faces, typically employed to authenticate users through ID verification services, works by pinpointing and measuring countenance from a given image.

Development began on similar systems within the 1960s, beginning as a sort of computer application. Since their inception, face recognition systems have seen wider uses in recent times on smartphones and in other sorts of technology, like robotics. Because computerized face recognition involves the measurement of a human's physiological characteristics, face recognition systems are categorized as biometrics. Although the accuracy of face recognition systems as a biometric technology is less than iris recognition and fingerprint recognition, it's widely adopted thanks to its contactless process. face recognition systems are deployed in advanced human-computer interaction, video surveillance and automatic indexing of images.

face recognition systems are employed throughout the planet today by governments and personal companies. Their effectiveness varies, and a few systems have previously been scrapped due to their ineffectiveness. the utilization of face recognition systems has also raised controversy, with claims that the systems violate citizens' privacy, commonly make incorrect identifications, encourage gender norms and racism , and don't protect important biometric data. These claims have led to the ban of face recognition systems in several cities within the us . As a results of growing societal concerns, Meta announced that it plans to pack up Facebook face recognition system, deleting the face scan data of quite one billion users. this alteration will represent one among the most important shifts in face recognition usage within the technology's history.face recognition systems are employed throughout the planet today by governments and personal companies. Their effectiveness varies, and a few systems have previously been scrapped due to their ineffectiveness. The utilization of face ognition systems has also raised controversy, with claims that the systems violate citizens' privacy, commonly make incorrect identifications, encourage gender norms and racism , and don't protect important biometric data. These claims have led to the ban of face recognition systems in several cities within the us . As a results of growing societal concerns, Meta announced that it plans to pack up Facebook face recognition system, deleting the face scan data of quite one billion users. this alteration will represent one among the most important shifts in face recognition usage within the technology's history.

VI. CONCLUSION AND FUTURE SCOPE

This was the project of system design about "Music Recommendation System using Countenance Recognition" supported python. Development of this technique takes tons of effort as different technologies are needed to be integrated with the software. this technique can provide a lot of satisfaction to the music lovers and therefore the users. However, not every task is claimed to be perfect during this development field. Even more improvements could also be possible during this system, but the most motto of this project is to play songs consistent with the emotion of the person and it's somehow satisfying as of now. we've learned tons of"> numerous things and gained a lot of data about the event field. We hope this may prove fruitful to us.

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