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SMART MUSIC PLAYER USING MOOD DETECTION

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ABSTRACT

Music is a therapy which heals an individual from any situation. Also, music is heard by people along with their various activities. Music unites various generations together and makes us happy and we enjoy each and every moment of listening. In this world of music, now – a – days the number of available songs is too high for a single person to choose and listen to songs accordingly. Due to this, people sometimes feel it is difficult to choose from millions of songs. People find it a tedious job to hear music. For this problem our proposed system Smart music player using mood detection is capable of identifying or verifying a person's mood from image captured. Playing Music according to an individual's mood is a concept where People can hear music according to their current mood. Expressing various expressions/ emotions is something which defines an individual's mood. People also hear music to regulate their current mood. Our application will capture the facial image of a person which is further scanned, followed by the processing of the image to detect the mood of the person to display the songs to be played.

Keywords: Music, Mood Detection, Songs, Current Mood, Processing Of Image.

I. INTRODUCTION

People's emotions and their expressions are visible on their face through which we can easily come to know about their mood. Often people tend to hear music in each and every situation, whether it may be happy, sad, good or bad. Music has been made available with various automatically generated playlists which recommend music to the user according to their previously heard songs. People enjoy listening to them but at the same time choosing music before listening to it is a tough one. Manually selecting songs even from a single playlist is a difficult job.

In this project, we are going to create a smart music player website which will detect the mood of a person and will display the list of songs to that person depending upon their mood. The mood detection will be done through some algorithm / technique with the help of Python language. Open-Source Computer Vision Library is a library of programming functions that focuses on real-time computer vision. The library is a cross-platform. Its main purpose is real-time image processing. If the native Intel performance primitives are installed on the system through self-optimized routines, library performance can be improved. This system will detect the user face and will give the suggestion according to the mood of the user. The face is divided into a smile, not a smile or a neutral one. According to emotion, music will be played. Users can change song details such as category and interest level at any time on the website.

The system will be capable of storing history data of every user in the system's database. This previous choice data of the users will then be used to accurately predict the future preference of songs using collaborative basis filtering and clustering algorithms. The system then generates albums and catalogs based on different sentiments of the user which includes the predicted songs for that particular user. Also, this project will have a simple UI which will be easy for any user.

II. LITERATURE SURVEY

The basic concept behind this project is to automatically play songs based on the user's mood. When listening to music on a standard player, the user had to look beyond his playlists for songs that would give him a soulful and spiritual experience. Many music players with various capacities are being produced in today's world as a result of the ever-increasing progress in the field of multimedia and technology. Despite the fact that these capabilities suit the user's basic needs, the user must still manually navigate the music library and select songs based on his current behavior.

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Face Detection systems such as OpenCV, Neural Networks, Haar-Like Algorithm, Fishing Algorithm and others follow a nearly same procedure. In some projects, they have created an emotion-based music player with Python, OpenCV, Android Studios, and the Fisher-Face Algorithm.

Face recognition is one of the rare biometric technologies that combines high accuracy with little intrusiveness. It offers the precision of a physiological approach while being less obtrusive. Many academics have suggested many face recognition approaches over the last 30 years, spurred by the growing number of real-world applications that need the recognition of human faces. There are various issues that make automated facial recognition extremely challenging. The facial image of a person, on the other hand, is generally captured under different settings and inputted to the database. The importance of automated face identification is in its ability to deal with multiple variations of photographs of the same face caused by changes in factors such as stance, lighting, emotion, motion, facial hair, spectacles, and background. Face recognition technology has advanced to the point where it can be used for a variety of commercial applications such as personal identification, security systems, image-film processing, psychology, computer interaction, entertainment systems, smart cards, law enforcement, and surveillance, among others. The system should detect whether or not there is a face in a given picture, video, or image sequence. This is known as face detection. Once a face is spotted, the face region should be separated from the rest of the scene for face identification.

Face detection is characterized as a method with a wide range of applications, including face tracking, location estimation, and compression. It is a two-class issue in which we must assess whether or not a face exists in a photograph. This approach offers a simplified answer to the problem of face recognition. It can recognise many faces in a picture; with these approaches, we can identify faces more accurately. Face detection algorithms such as OpenCV, Neural Networks, Haar-Like Algorithm, Fishing Algorithm, and others follow a similar method.

- In paper[1,2,3], The Viola-Jones Object Detection Framework, created in 2001 by Paul Viola and Michael Jones, can swiftly and correctly recognize objects in photos and works particularly well with the human face. Despite its antiquity, the framework, like with many of its CNN counterparts, is still a dominant player in face detection. The Viola-Jones Object Recognition Framework integrates Haar-like Features, Integral Images, the AdaBoost Algorithm, and the Cascade Classifier to provide a quick and accurate object detection system.
- In paper[3], A Haar-like feature consists of dark and bright patches. It generates a single value by adding the intensities of the bright regions and subtracting them from the intensities of the dark parts. There are other forms of Haar-like characteristics, however the Viola-Jones Object Detection Framework only employs the ones. The many forms of Haar-like characteristics enable us to extract important information from a picture, such as edges, straight lines, and diagonal lines, which may be used to identify a human face.
- In paper[3], The AdaBoost (Adaptive Boosting) Technique is a machine learning algorithm that selects the optimal subset of available information. The technique produces a classifier known as a "Strong Classifier." A Strong Classifier is constructed from a series of "Weak Classifiers." To identify these weak classifiers, the method iterates for T iterations, where T is the number of weak classifiers to find, which you specify. The method calculates the error rate for all features in each iteration and then selects the feature with the lowest error rate for that iteration.
- In paper[3], A Cascade Classifier is a multi-stage classifier that detects objects rapidly and reliably. Each stage consists of a powerful classifier generated using the AdaBoost Algorithm. From one level to another, the number of weak classifiers in a strong classifier grows. An input is analyzed sequentially (stage by stage). If a classifier for a certain step returns a negative result, the input is immediately rejected. If the result is affirmative, the input is passed on to the next stage. This multi-stage technique, according to Viola and Jones (2001), allows for the building of simpler classifiers, which may then be used to reject most negative (non-face) data fast while spending more time on positive (face) input.
- In paper[4], Fisher face is a well-known facial recognition algorithm that is frequently thought to be better than other methods. The project collects the user's image with a web camera, recognizes the facial emotion as happy, sad, neutral, or irate, and then plays music based on the input image. The Fisher face technique for image identification is based on reducing the face space dimension using the Principal Component Analysis method, followed by the use of the Fisher's Linear Discriminant approach to produce image characteristic

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features. The main advantage of this project is that the user does not have to manually implement and select music.

III. SYSTEM IMPLEMENTATION

A. OVERVIEW

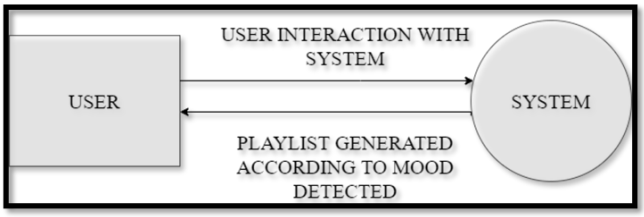

Figure 1: DFD Level 0 Diagram of the system

According to fig. 1, it depicts the abstract view of the system, showing the relationship with the external entities which is the user and the system. The proposed system consists of two modules. The Mood detection module firstly captures the image from the already in-built webcam from the system. After this the mood is then detected from the OpenCV technique.. After the detection of mood next we move on to the next module which is our music module. This module will choose songs according to the user's detected mood. Users can use this Smart music player whenever they equire and in any situation.

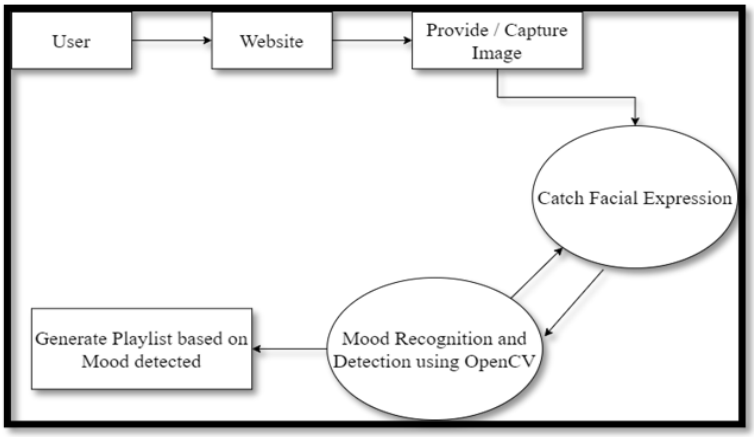

Figure 2: DFD Level 1 Diagram of the system

According to fig. 2, it expresses what are the main functions our system provides.

Use Case Diagram for our system:

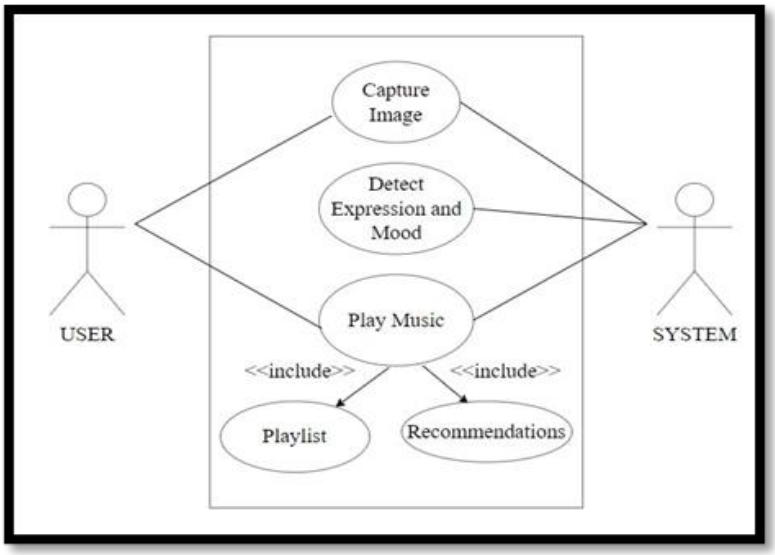

Figure 3: Use Case Diagram of the system

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Fig 3 shows the Use case diagram of the system, which explains how the actor i.e, the user interacts with the system and how the system accepts the request from the user and internally handles all the functions and provides the accurate results to the user. In short it checks the behavior of the system and checks how it responds to the user.

B. METHODOLOGY

In this project, we are using OpenCV to create a music player. It is used for image processing jobs, such as identifying a face from a live webcam stream, which is then processed and put into a trained neural network for emotion recognition. [5],It is an open-source library that may be used to accomplish tasks such as face identification, object tracking, landmark detection, and many more. Some of these routines are quite widespread, appearing in practically every computer vision work. This plays a significant part in real-time operation, which is critical in today's systems. It can process photos and movies to recognise items, faces, and even human handwriting. Python processes the OpenCV array structure for analysis when combined with many other libraries such as NumPy. The Open-Source Computer Vision Library is a programming function library focusing on real-time computer vision. The library is multi-platform. Its primary function is real-time picture processing. Library performance can be increased by installing native Intel performance primitives on the system through self-optimized procedures. This system will identify the user's face and provide suggestions based on the user's mood.

In paper[5], OpenCV (Open Source Computer Vision) is a well-known computer vision library that was founded by Intel in 1999. The cross-platform library focuses on real-time image processing. The collection contains over 2500 optimized algorithms, including a complete mix of traditional and cutting-edge computer vision and machine learning techniques. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track moving objects, produce 3D point clouds from stereo cameras, stitch images together to produce a highly resolution image of an entire scene, find similar images from an image database, follow eye movements, recognize scenery, and establish markers to overlay. OpenCV has a user group of over 47 thousand members and an estimated number of downloads in excess of 18 million. In a nutshell, OpenCV is a Computer Vision library that contains APIs for building a pipeline for your Computer Vision project.

1) MOOD DETECTION

In this module, the system will capture the image of the user from an already in-built camera. Also, while capturing the images the user needs to follow all the requirements such as the user should be close to the camera, etc. After capturing the image of the user, the image is then sent for further processing where it is scaled along with this it's also tested using techniques proposed in the system i.e., OpenCV. OpenCV will be used in our project to detect the user mood. Mood can be of various types such as: happy, sad, fear, excited, joyous etc. Such Moods and their related features are extracted using such techniques.

OpenCV is an open-source library where this library now - a - days plays a major role in real-time operation which is important in technology, UI and other such fields. By using this library/technique an individual can identify objects, faces by processing the images of humans. When this is integrated with other libraries such as NumPy, OpenCV array structure can be analyzed using Python Image Processing in OpenCV:

Performing certain operations on the image provided is called Image Processing. To extract some useful features image processing is used which results in giving required information regarding the image. Bringing back to the basic definition of image processing it says "It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image."

For processing an Image, these three steps are included:

- Import Image
- Analyze and manipulate the image
- Output generated, which is the result based on the image analysis

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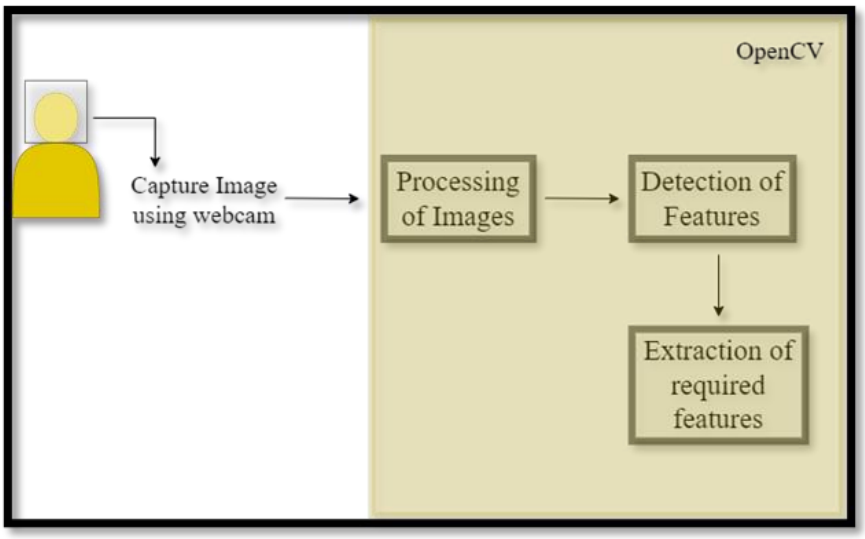

Figure 4: Modular diagram of OpenCV

Fig 4, helps us to understand the modular representation of OpenCV, how it works internally and what actions are performed when the image is captured.

2) MUSIC MODULE

Songs with respect to the user's mood is something to which everyone relates as Music is soothing to every individual in any situation. This module in our system contains various songs classified as per mood detected. Songs are available in various languages. As of now, we are making songs available to users in two different languages - Hindi and English. Users can select songs from the playlist given to them and can enjoy their time in hearing their choice of songs. This will again enhance their mood and will definitely give it a second try for detecting their mood and play the songs again.

So far, we have planned to inculcate this methodology of our project, but there might be certain changes in case of any unavoidable interference.

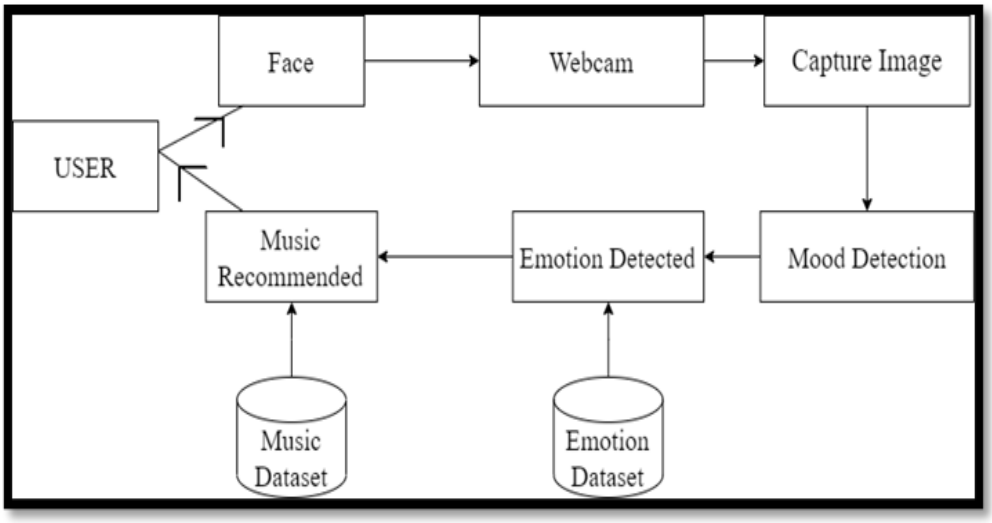

Figure 5: Modular Diagram of Music Module.

Fig 5, explains the Music module of the system. It's also linked with the music data set and emotion dataset which are the core dataset of the system.

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Use Case of our system

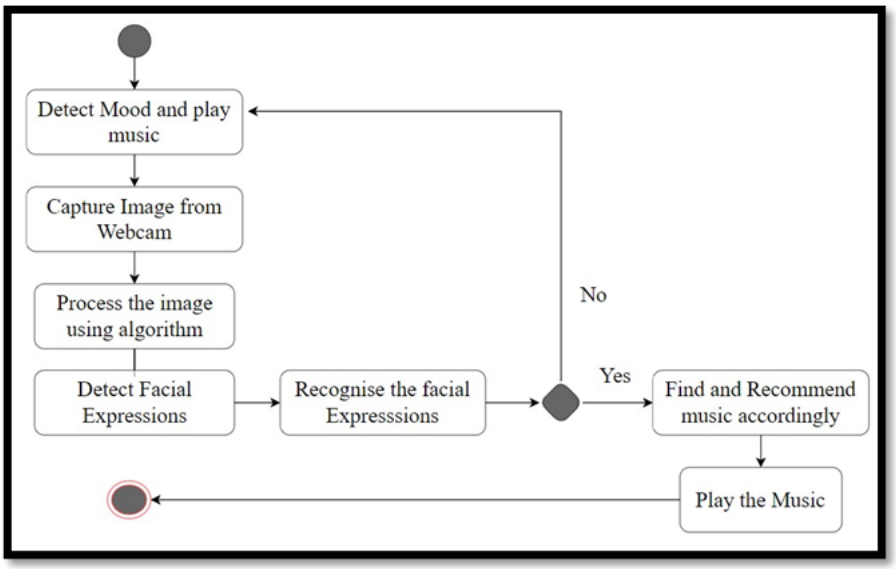

Figure 6: Activity Case of the System

Fig 6, shows the whole activity of our system from start to end including all the features.

IV. CONCLUSION

A Smart music player using Mood detection approach would reduce the tedious job of seeking music from the playlists. Mood detecting and playing songs accordingly is one of the major features of our system. Using this proposed smart music system, we can reduce the likelihood of manually searching for songs. Users can thus get the songs according to the detected mood and can enjoy their time by happily listening to it. Thus, this system saves on the time of the user by directly generating songs according to the mood, cuts the searching part, prevents any confusion of users to choose between songs every time before listening and reliable songs are thus provided to the user. Also, this system assures information accuracy and security.

V. FUTURE SCOPE

Our future plans for this system are to implement this system to scale up to various users and make the entire system and the entire process of detecting mood in a more efficient way also make it smooth. We would like to use this system in a real life problem and accordingly customize it for the needs of the company/user. Also, we've thought of implementing this system wherever there is any need of music therapy in hospitals, as now - a - days music therapy is something new which always proves to be helpful for patients to recover soon and live a healthy life.

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