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EMOTIFY–Emotion Based Music Player

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ABSTRACT

Emotify is a computer program targeted towards music lovers in particular. Most individuals choose to play the playlist's songs at random because choosing music might be difficult. Some of the songs chosen as a result didn't reflect the users' present mood. A popular music player that can play songs based on the user's emotions doesn't exist, either. The suggested model can identify the user's emotion by extracting the user's facial expression. The songs in the suggested model will then be played by the music player based on the type of emotion identified. It aims to provide music enthusiasts more ways to enjoy music. The proposed model covers a range of emotions, including normal, sad, surprised, and happy. The system uses advanced facial recognition and picture processing technology. The music player will automatically create a playlist based on one facial expression that is then extracted, reducing the need for human intervention. the time and energy required to do the task manually. As a result, our suggested method will tend to shorten the time required for processing in order to determine the total cost and outcome of our created system, while also improving the system's general accuracy. Datasets that are user dependent and are used to test this system. The system's built-in camera is used to record our facial expressions. Since only one emotion-based music playlist needs to be created or generated, the suggested algorithm will do it quickly.

I. INTRODUCTION

Music has a big impact on a person's life. In addition to being a substantial kind of entertainment, it is frequently employed as therapy. Complex music players that are packed with features like volume modulation, genre tagging, and others have been made possible by technological developments and continual multimedia innovations. Users still need to search their playlists for music that convey their emotions even though this tool effectively meets their needs. A user of a traditional music player must autonomously browse through his playlist and select songs that will improve his mood and emotional experience. The user may have trouble finding the right music using this method of song selection because it is time-consuming and complicated.

Three modules make up our music player: the queue-based module, the random music player module, and the emotion module. The CNN method is used by the Emotion Module to accurately determine the user's mood from an image of their face. While classifying songs into 4 different mood classes, the Music Classification Module achieves an impressive result by utilizing auditory features. By matching the user's emotions to the song's mood type while taking into account their preferences, the recommendation module proposes music to the user.

II. PROBLEM STATEMENT

In our daily lives, music is really vital. Emotions and music have a close relationship. We have access to a variety of music players and technologies that let us listen to music while we go about our everyday business. The challenge comes up when we have to make a playlist. Here, we can get over the laborious task of creating a sizable playlist based on our present state of mind.

III. LITERATURE SURVEY

This paper by Immanuel James, J. James Anto Arnold, J. Maria Masilla Ruban, M. Tamilarasan and R. Saranya proposes an intelligent agent that sorts a music collection supported the emotions conveyed by each song then suggests an appropriate playlist to the user supported his/her current mood. The user's local music collection is initially clustered supported the emotion the song conveys, i.e. the mood of the song. [1]

"Emotion-based music recommendation and classification using machine learning with IoT Framework."by Quasim, Mohammad Tabrez, et al. By observing how people interact with one another and emotionally charged songs, the researchers suggest an emotion-based music recommendation and classification framework for accurately categorizing songs. [2]

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Mood Based Music Player Using Real Time Facial Expression by Prof.Sumeet Pate, Miss.Shreya Zunjarrao, Miss.Poonam Harane and Mr. Akshay Choudhary summarizes us that the face is an important aspect of a person's body and is particularly important in revealing a person's conduct and emotions. Technology makes it possible for a computer programme to instantly analyse human moods from face film. Manually classifying a song list and creating a system that is appropriate for each person based on their emotional characteristics is a laborious, time-consuming, and upheld endeavour. A camera is used to capture facial expressions. The proposed system will analyse facial expression images, identify activities indicative of basic emotions, and then play music indicative of those feelings.[3]

Emotions based music player submitted By Charu Agrawal, Meghna Varma1, Anish Varshaney, Khushboo Singh, Chirag Advani and Dr. Diwakar Yagyasen summarizes us of the poor economy, high living costs, etc., individuals nowadays tend to experience stress on an increasing basis. Listening to music may be a crucial activity that helps reduce stress. However, it won't be of any use if the music doesn't match the listener's current state of mood. Additionally, there isn't a music player that can choose songs based on the user's mood. This study suggests an emotion-based music player that may recommend songs that support the user's emotions—sad, joyful, neutral, and angry—to solve this problem.[4]

A Comparative Study of Music Recommendation Systems by Ashish Patel and Dr. Rajesh Wadhvani informs us of music player technology is advancing quickly particularly with smartphones.Users now have access to millions of songs that are accessible online. One of the main issues is choosing favourite songs from these vast libraries. Each user has a unique musical preference. The environment and the user's mood both affect the music choice. Every day, new people and goods appear, and the system needs to respond quickly to them.The primary objective of the recommendation system is to make recommendations for music that are close to the user's preferences. A user must be online to receive recommendations in the majority of the solutions that have been presented, which mainly rely on client-server architecture. This model might contribute to better recommendations regardless of a user's network connection.[5]

Ke Chen, Beici Liang, Xiaoshuan Ma, Minwei Gu learning audio embeddings with user listening data for content-based music recommendation explains to us about the personalizing recommendations for recently released tracks has always been a difficult issue in the music business. To address this issue, we look into user listening history and demographics first before building a user embedding that reflects the user's musical preferences. Metric learning using Siamese networks can be used to obtain an audio embedding for each track utilizing the user embedding and audio data from the user's preferred and disliked tracks. We can make extensive use of offline metrics to iteratively improve our model. For the final determination of the effectiveness of the proposed audio embedding, online A/B. The personalization of new track release recommendations will be tested.[6]

Chih-Fang Huang, Cheng-Yuan Huang Emotion-based AI Music Generation System with CVAE-GAN informs us of the variety of music has expanded and spread more quickly because to the quick development of technology. Nevertheless, the price of making music is still very high. To address the issue, in recent years, the field of AI music composition has slowly acquired popularity. Establishing an automated composing system that incorporates music, emotions, and machine learning is the aim of this work. Deep learning is used to train the CVAE-GAN model as the framework to produce the music segments matching to the required emotions. The system contains the music database with emotional tags as input. The participants assess if the music matches the initial emotion by listening to the system's output. The process of this article is mainly divided into three parts: music library creation, system model establishment, and system output results. There are four categories of emotion: A (content, thrilled, startled), B (displeased, angry), C (sorrowful, gloomy), and D (calm, relax, comfortable). [7]

Phisetphong Suthaphan, Vich Boonrod, Nattapon Kumyaito, Kreangsak Tamee Music Generator for Elderly Using Deep Learning explains to us that this study suggests us a brand-new, straightforward song generator for outdated musical instruments. This music maker is capable of producing original music in ABC notation. Utilizing LSTM to rearrange the music bars from the original tune, it creates a new melody. Note patterns in specific music bars that are converted and encoded as hash tables using WTA approach serve as the input for LSTM features. We set the opening music bars and allow the closing music bars to be set automatically during the music producing process. The trained model is then fed the first few music bars to find the remaining bars of the song. As a result, the music's beginning, middle, and end were clearly separated in the outcome. This research, however, is unable to demonstrate at this time whether the reconstructed music is lovely or not. Therefore, more research on evaluating the quality of music's melody and pitch is needed. [8]

Genki Yamaguchi, Makoto Fukumoto A Music Recommendation System based on Melody Creation by Interactive GA explains us about how we have access to large music databases. Finding preferred musical compositions from such databases that the user is unfamiliar with is difficult, though. As a result, there is a growing need for music recommendation systems. The goal of this study is to develop a system

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for suggesting music from a user's unknown music collection that matches their interests. The outcomes of the music recommendation, however, showed no discernible variation. These experimental findings demonstrated that the system's performance in terms of its capacity for recommendations was insufficient. It will likely focus on growing the music database in the future. As a result, closer musical pieces can be retrieved from the database of musical pieces based on the distance between the key melody and the main melody's note number, and an improvement in the accuracy of the music recommendation system can be anticipated. Additionally, if the precision seems to be significantly improved, it will be feasible to produce music pieces that reflect user desire by lengthening the IGA melody compared to the current method. [9]

IV. METHODOLOGY

Tool: PyCharm

A Python-specific Integrated Development Environment (IDE), PyCharm offers a wide range of essential tools for Python developers. The tools are tightly integrated to produce a practical environment for effective Python, web, and data science development.

Tool: VSCode

Visual Studio Code, or VS Code, is a versatile and lightweight IDE developed by Microsoft that supports numerous programming languages, including Python. With a wide range of extensions and plugins available, VS Code offers features such as syntax highlighting, code completion, debugging capabilities, version control integration, and much more. This makes it an ideal choice for developers working on projects like the emotion-based music player, as it helps to expedite the development process and ensure a high-quality, efficient, and maintainable codebase.

Flask

Flask is a lightweight web framework written in Python that allows developers to quickly build and deploy web applications. It is designed to be easy to use, modular, and scalable, providing a simple and minimalistic approach to web development without imposing any specific tools or libraries on the developer. This flexibility wide range of projects, from simple web applications to more complex, feature-rich applications. Flask uses the WSGI (Web Server Gateway Interface) library for handling server-side requests and the Jinja2 templating engine for rendering HTML templates. It also provides built-in support for handling URL routing, error handling, and various other essential web application components.

SQLite

SQLite is a lightweight, serverless, self-contained relational database management system (RDBMS) used for embedding into applications. SQLite 3.7.15 is a specific version of SQLite that includes several features, improvements, and bug fixes over previous versions. As a popular choice for mobile and desktop applications, SQLite offers various advantages due to its small footprint, cross-platform compatibility, and ease of use. SQLite provides a simple and efficient way to manage data storage without requiring the overhead of a full-fledged database server. Developers can utilize SQLite to create, read, update, and delete records in a relational database using SQL syntax. SQLite's serverless architecture makes it ideal for applications that require an embedded database without the need for a separate server or complex setup.

Language: Python

Python will be utilized as the primary programming tool for this project since software engineers, analysts, data scientists, and machine learning engineers prefer using it. It also provides several powerful libraries for building neural networks and processing images.

Library: Tensor Flow, keras

In simple terms, Python library is a collection of scripts or modules of codes that we may use in a program to perform particular activities.

TensorFlow

An open-source software library for high performance numerical computation is called Tensor Flow. Its adaptable design enables easy deployment of compute across a variety of systems. The tensor flow was created and developed by Google researchers and engineers. It offers strong support for deep learning and machine learning, and its adaptable numerical processing core is utilized in a variety of other scientific fields.

Keras

Keras is a high-level API. With its consistent & straightforward APIs, fewer user interactions needed for typical applications, and clear & actionable error messages, Keras adheres to the best practises for lowering cognitive load.

ImageNet

A sizable visual database created for use in research on visual object recognition software is called the ImageNet project. The project has significantly advanced the fields of deep learning and computer vision. Machines are trained on a big dataset of different image types in machine learning and deep neural networks. These training images are needed to teach machines essential

features. Once mastered, they can utilize these features to classify images and carry out a variety of other computer vision-related tasks. The shared set of images provided by ImageNet allows academics to compare their models and algorithms.

Convolutional Neural Network

Similar to conventional ANNs, convolutional neural networks (CNNs) are made up of neurons that train to optimize their own performance. Each neuron will continue to take in information and carry out a function that forms the basis for countless ANNs. Convolutional neural networks have evolved recently, making object detection more accurate and quicker. Tens or even hundreds of layers can be present in a convolutional neural network, and each layer can be trained to recognize various features of an image. Each training image is subjected to filters at various resolutions, and the output of each convolved image is used as the input to the following layer. Beginning with very basic features like brightness and edges, the filters can get more complex until they reach characteristics that specifically identify the object. The comparison of computation speeds is also included.

V. OBJECTIVES

- To suggest a facial expression recognition model for identifying and analyzing a person's emotions.
- To correctly identify the seven fundamental emotions anger, disgust, fear, happiness, sadness, surprise, and neutral.
- To include a music player in the suggested model so that it can play music based on the emotions picked up.

VI. SYSTEM DESIGN

6.1 SYSTEM ARCHITECTURE

There are numerous programs that use emotion detection to play music based on the user's mood. All of these features are not offered by the majority of programs though. This system has taken into account each of these traits. When you launch the app's main screen, the webcam on your device will automatically identify your face. When a user is photographed, the system first recognizes their face and, based on their facial expression, determines their mood. It then retrieves that information and plays the song that best expresses that mood.

The suggested model will concentrate on two key features: first, identification of facial expressions, and second, the list of songs played for each emotion category. In terms of expression recognition, the system is primarily built to identify the seven key expressions. They include anger, disgust, fear, happiness, sorrow, surprise, and neutral. On the other hand, each category will have music that are easily accessible. The system will play the songs through the music player after identifying the person's emotion.

6.2 ARCHITECTURAL DESIGN

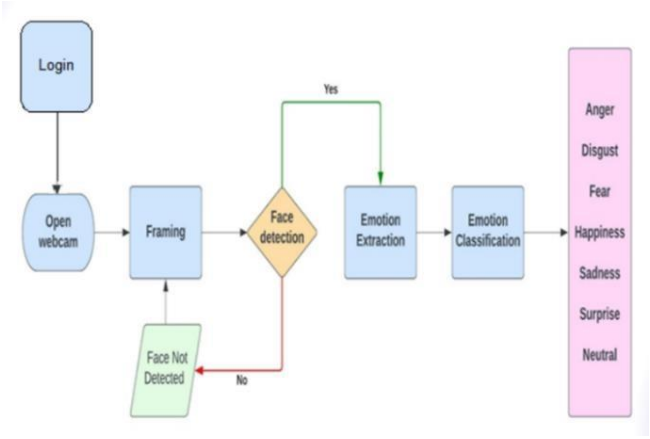

Figure 6.1: Architecture of Emotify

6.3 FLOW DIAGRAM

The system's overall flow is depicted in the flow diagram below, which starts with user face detection and ends with music selection based on the user's emotional state.

•The program will request the user's consent before accessing the photos and media. The webcam will be enabled to capture the user's facial expressions when the user gives permission.

•The program sends the image to the SDK after it has been captured. There, the image is processed, and the software receives the image response.

•The program receives the visual data and, using the specified threshold, determines the emotion.

•To retrieve the emotion playlist, this emotion is given to the database.

•The songs are arranged using the CNN algorithm and a playlist dependent on the user's mood.

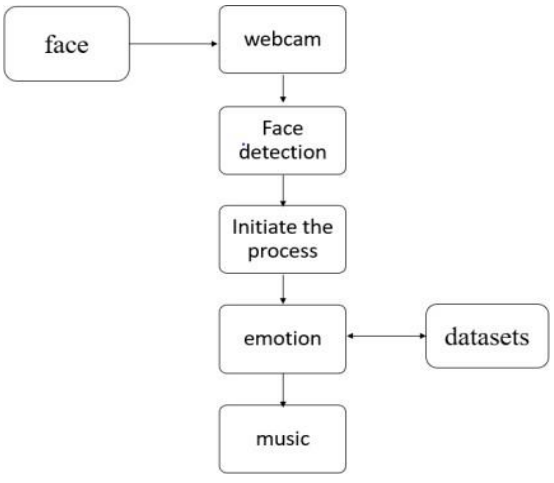

Figure 6.2: Flow Diagram of Emotify

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VII. RESULT & ANALYSIS

Figure 7.1: Home page of emotion-based music player

Figure 7.1 shows the home page of the emotion-based music player name Emotify.

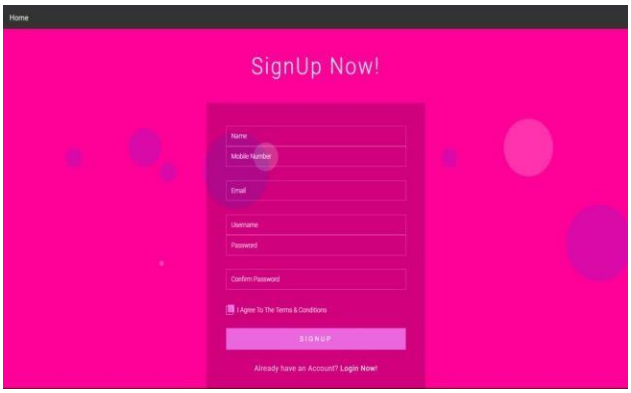

Figure 7.2: Sign Up page of Emotion based music player

Figure 7.2 represents the sign-up page where the user creates the account by entering the necessary information so he can login to the emotion-based music player.

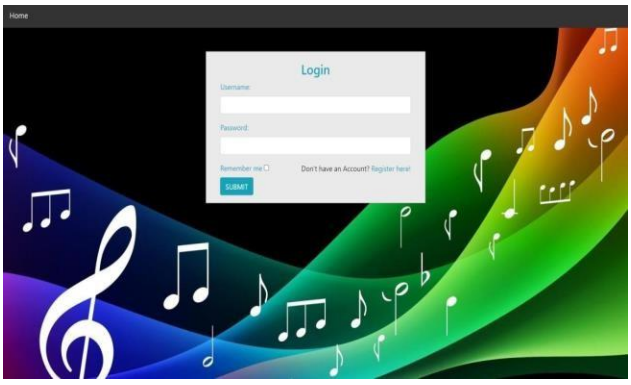

Figure 7.3: Login page of Emotion based music player

After Signing up the user has to enter their username and password and gain access to the emotion-based music player which is shown in figure 7.3.

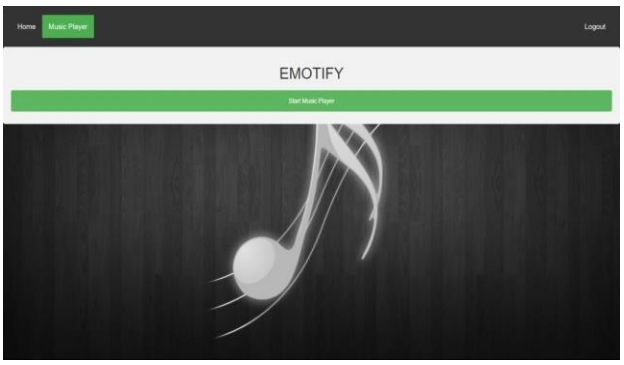

Figure 7.4: Starting of the Emotion based music player

After completing the login, the user can start the music player by clicking on 'Start Music Player' button shown in figure 7.4.

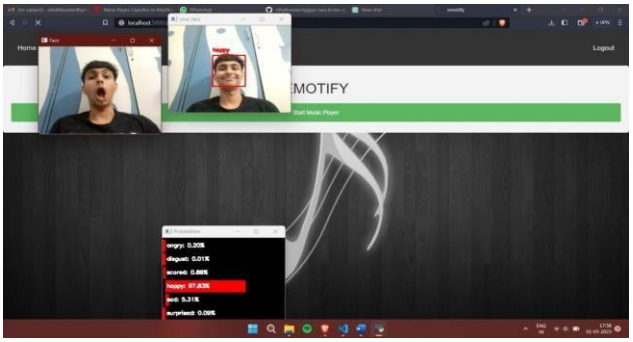

Figure 7.5: Identifying the emotion and playing the song

A happy song is played in accordance with the happy emotion that was detected, as seen in figure 7.5.

Figure 7.6: Identifying the emotion and playing the song

In figure 7.6, the music player identifies the sad emotion and plays the sad song accordingly.

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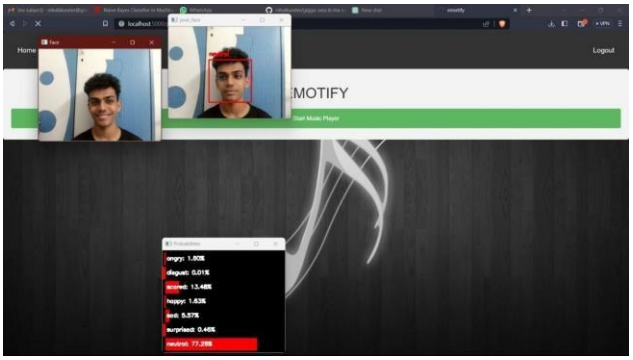

Figure 7.7: Identifying the emotion and playing the song

In figure 7.7, the music player identifies the neutral emotion label form the user and plays the neutral songs accordingly.

VIII. CONCLUSION

The emotion-based music player using real-time emotion detection represents a significant step forward in the development of personalized music experiences and affective computing. By leveraging advanced computer vision techniques and machine learning algorithms, this system can accurately detect a user's emotional state in real time and recommend music tailored to their current emotions. The integration of such a system has the potential to enhance the listening experience, providing not only entertainment but also emotional support and well-being.

Throughout this, we have explored various aspects of emotion detection, face recognition, and music recommendation systems. We have demonstrated the feasibility and effectiveness of the proposed emotion-based music player using a real-time implementation. However, there is still room for improvement in areas such as emotion detection accuracy, music recommendation algorithms, and personalization.

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