

Music Recommendation System Using Facial Features

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Abstract- One of the most challenging and complex processes ever attempted in the paradigm of image processing is the analysis of facial expressions. Since humans express most of their emotions through facial expressions, other uses for facial expressions include determining a person's mood. The ability to recognize a person's mood is one of the most beneficial implementations since it may be put to use in a variety of ways to enhance a person's quality of life. For many people, listening to music is a crucial part of their existence. Numerous studies and advancements have been made in the field of music organizing and search, which directly relates to the issue of locating or streamlining the process of choosing a certain song to listen to. One option is the song's recommendation, which is becoming more and more popular in modern times as it aids in choosing music for a range of events. Because music is a fantastic form of entertainment for people and may be used to unwind, concentrate, manage stress, and maintain a balance between mental and physical tasks. This paper will discuss the recommendation system which will enable users to receive song recommendations merely by looking at their facial expressions when we combine artificial intelligence technology with a generalized music approach.

Keywords- Convolutional Neural Networks; Deep Learning; Face Recognition, Song Recommendation

I. INTRODUCTION

A general classification of human emotions includes fear, contempt, rage, surprise, sadness, happiness, and neutrality. This category of emotions can include a wide range of additional feelings, including joy and disgust. These feelings are quite understated. Very little facial muscle movement occurs, making it difficult to distinguish between variations because even a minor variation might cause a change in expression.

Additionally, as emotions are highly context-dependent, various people's displays of the same feeling may differ, sometimes even from the same person. Even if the lips and eyes, which show the most emotion, are the only parts of the face that receive attention, how these gestures are extracted and classified is still a crucial issue. For these tasks, neural networks and machine learning have been applied with positive results. Machine learning algorithms have shown to be quite helpful in classifying and recognizing patterns, therefore they can also be used to identify mood. It is crucial to create a personalized music recommendation system that makes music recommendations for users as digital music technology advances. Using the extensive data accessible on the internet to make suggestions is a significant problem. Spotify and Pandora use machine learning and deep learning techniques to provide relevant recommendations. Work has been done on customized music

recommendations that suggest music based on the user's preferences.

Two main methods exist for making individualized music recommendations. One is the content-based filtering strategy, which examines the music that former users have enjoyed and suggests songs with appropriate material. The key disadvantage of this strategy is that the model can only provide recommendations based on the user's current interests. To put it another way, the model has a limited capacity to build upon the consumers' already established interests. The alternative strategy is collaborative filtering, which suggests songs that members of a peer group with similar tastes enjoyed. Both methods of recommendation are founded on the user preferences deduced from listening behavior. In this paper, we will compare the algorithms.

II. LITERATURE SURVEY

1. S. Deepika, K. A. Indira, and Dr. Jesline[1] have focused on the implementation of a Convolutional neural network for emotion detection and thereby playing a song accordingly. Segregating the songs and playing them following one's mood could facilitate the music lover. The multiple actions such as capturing, detecting the emotion, and classifying the same can all be confined as one step through the use of CNN. have developed a model that plays a song based on the user's emotions.
2. Ram Kumar Madupu, Chiranjeevi Kothapalli, Vasanthi,

Yarra, And Sonti Harika[2] have proposed An automatic facial emotion classification system in the paper using the Convolution Neural Network (CNN) with the features extracted from the Speeded Up Robust Features (SURF). 91% accuracy is achieved with the proposed model which supports tracking human emotion with facial expressions.

Ahlam Arihalli, Alaa alsaedi, kholood albalawi, Liyakathunisa syed [3], In their Proposed paper they implemented a system that utilizes the Viola-Jonze algorithm with the help of PCA to detect the emotion that is depicted in the acquired image to suggest depending on that the most suitable playlist will be recommended through which we aim to improve the user's mode.

III. EXISTING SYSTEMS

- EMO Player: Emo player (an emotion-based music player) is a cutting-edge method that enables users to have songs played for them automatically based on their feelings. [2]
- SoundTree: Sound Tree is a music suggestion tool that can be implemented as a web service and incorporated into another web application. Based on the user's prior behavior, such as having listened to or downloaded songs, it employs a people-to-people correlation. [3]
- Lucyd: A music recommendation engine called lucyd was created by four graduate students in the Master of Information and Data Science (MIDS) program at UC Berkeley. The user can use any terms they like to search for music recommendations on lucyd. [4]
- Reel Time. AI: The user must subscribe for this system to function. After that, the user can upload pictures of major gatherings like malls, theaters, and restaurants. The algorithm then distinguishes between joyful and sad moods. By identifying which expressions convey pleasant emotion and which faces conveying sadness, it can infer the situation's outcome from the faces of everyone in the room.
- Music.AI proposes songs based on the user's preferred mood using a collection of moods as its input. It combines content-based and collaborative filtering approaches for filtering information. When recommending music, factors including emotion, timing, atmosphere, and learning history are taken into consideration. [5]

IV. EXISTING ALGORITHMS

- Deep Learning-based Facial Emotion Recognition using Keras:-This system allows for the real-time detection of up to five different facial emotions. It operates on top of a Keras-powered Convolutional Neural Network (CNN) whose Python backend uses TensorFlow. This technique can identify and categorize the following facial emotions: happy, sad, angry, surprised, and neutral.

- The hybrid approach of Music Recommendation: Relying only on collaborative filtering to suggest music has several disadvantages. The Cold Start is the main issue. Only when new songs are being discovered or listened to do music tracks get labeled. In other words, there aren't many or any tags available to characterize recently released music or undiscovered music. Furthermore, listeners are more likely to provide tags for the music they like than for tunes they only like a little or not at all. [3]
- Viola Jones object detection framework: The Viola-Jones algorithm is a popular method for detecting objects. This algorithm's key characteristic is that detection happens quickly while training takes a while. This approach does not employ multiplications because it uses Haar basis feature filters. By creating the integral image first, the Viola-Jones method may function much more effectively.

V. METHODOLOGY

For Facial Emotion recognition: -

- For Emotion recognition through facial features, the webcam will be used to take live input of facial images.
- This image will undergo preprocessing and a CNN approach to detect emotion and recommend songs to the user.
- According to the emotion, the music will be played and recommended from the predefined directories.

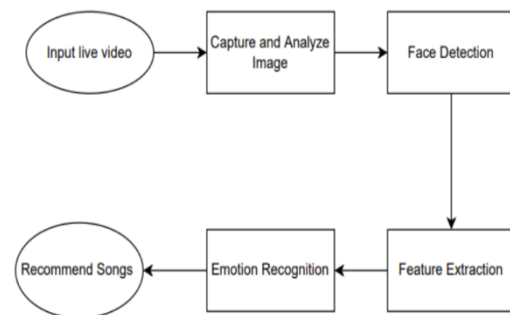


Fig. 1. Overview of Facial Emotion-based Music recommendations.

1. Predicting the mood of songs through lyrics

By using the NLP approach our system will predict the mood of a particular song by analyzing the lyrics and will give the information of same to the user.

2. Predicting the mood of songs through Audio

Our system will analyze the audio of the song and will predict the mood of the song to let the user know about the same.

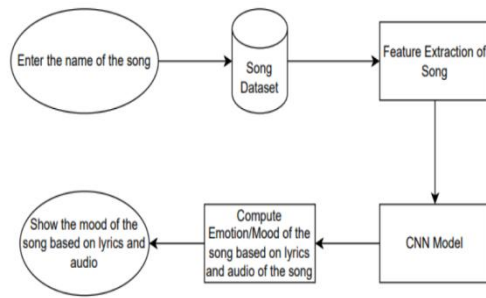


Fig.2. Overview of Music mood prediction

Table 1 Comparison of Existing Systems and Tools

Existing Systems and Tools	Accuracy (%)
Deep learning-based face recognition using Keras	88
A hybrid approach for music recommendation	80.7
Viola-Jones object detection framework	86
Music.AI	78.84
Music recommendation based on Emotion Web app	75.44

VI. CONCLUSION

Even though human emotions are subtle and complicated, it is possible to train a machine learning model to correctly identify a group of emotions that may be distinguished from one another with particular facial expressions. The expression on someone's face can be used to gauge their mood, and after a certain mood has been identified, music that matches that mood can be recommended.

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