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# FACIAL EMOTION BASED MUSIC RECOMMENDATIONS SYSTEM

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**Abstract**— A music recommendation system using facial expression is an innovative approach that utilizes facial recognition technology to recommend music based on the user's emotional state. This system analyzes the user's facial expressions through a camera and uses machine learning algorithms to interpret the emotions displayed. The ultimate goal of this system is to enhance the emotional connection between the user and the music, making the music listening experience more meaningful and enjoyable. With its innovative approach to music recommendations, the Facial Emotion Based Music Recommendation System has the potential to revolutionize the way people experience music.

**Keywords**— Facial recognition, Music recommendation, dynamic music.

## I. INTRODUCTION

Music is an important aspect of our lives and has the power to influence our emotions and mood. With the advancement of technology, music recommendation systems have become popular in recent years. These systems analyze a user's music preferences and suggest songs that they are likely to enjoy. However, these systems often do not take into account the user's current emotional state.

A music recommendation system using facial expression is an innovative approach that aims to address this limitation by using facial recognition technology to interpret the user's emotional state and suggest music that matches that emotional state. This system has the potential to provide a more personalized and emotionally engaging music experience.

Facial recognition technology has made significant progress in recent years, and its applications have expanded to various industries. By analyzing facial expressions, the technology can identify the user's emotional state and suggest music that is likely to match that state. This technology has the potential to provide a unique and personalized music experience that can enhance mood regulation and overall well-being.

In this context, the purpose of this paper is to provide an overview of the music recommendation system using facial expression, including its potential benefits, challenges, and future directions. The paper will explore the underlying technology, the methods used to interpret facial expressions,

and the potential applications of this system in various industries. Finally, the paper will discuss the ethical and privacy concerns associated with the use of facial recognition technology in this context.

## II. PROPOSED ALGORITHM

A music recommendation system using facial expression involves several steps, including facial expression recognition, emotion classification, and music recommendation. The proposed algorithm for this system can be described as follows:

### A. Step 1: Facial Expression Recognition

The first step of the algorithm involves capturing the user's facial expressions using a camera. The captured images are then analyzed using facial recognition technology, such as OpenCV, Tensor flow, to detect the user's facial features. These features are then used to identify the user's facial expressions.

### B. Step 2: Emotion Classification

Once the user's facial expression is detected, the system uses machine learning algorithms, such as support vector machines (SVM) or deep learning models like Convolutional Neural Networks (CNN), to classify the detected facial expression into one of several basic emotions, such as happiness, sadness, anger, or calmness. The machine learning models are trained using a dataset of labeled facial expressions and corresponding emotions.

### C. Step 3: Music Recommendation

Based on the user's detected emotional state, the system recommends music that is likely to match that state. The system can use an existing database of music that has been labeled with different emotional states or can use a deep learning model to predict the emotional characteristics of a song based on its audio features, such as tempo, rhythm, and harmony.

### D. Step 4: Feedback Loop

The final step of the algorithm involves receiving feedback from the user about the recommended music. The system can use this feedback to refine its recommendations and improve the accuracy of the emotional classification model.

### III. METHODOLOGY

The music recommendation system is an artificial intelligence project that utilizes deep learning and a denser layer to solve complex problems in a simple way. The system uses a data sentiment CSV file, which contains thousands of songs labeled as "Angry", "Disgust", "Fear", "Happy", "Neutral", "Sad", or "Surprise". The recommended songs are based on the user's facial expression.

The first step in the system is to collect data about available music, including information such as song title, artist, album, genre, and release date. Once the data is collected, it must be pre-processed to ensure that it is in a format that can be used by the recommender system. The next step is to extract features from the data that can be used to describe each piece of music. These characteristics can include the tempo, pitch, and melody of the song, as well as the popularity of the artist and the music genre.

After cleaning the data, a graphical user interface (GUI) is built to capture the user's facial expressions using a camera. The captured image is then saved to a file, and the already trained CNN model is used to recognize the facial expressions. The system then matches the facial expressions with the set of musical data and recommends songs based on the user's emotional state.

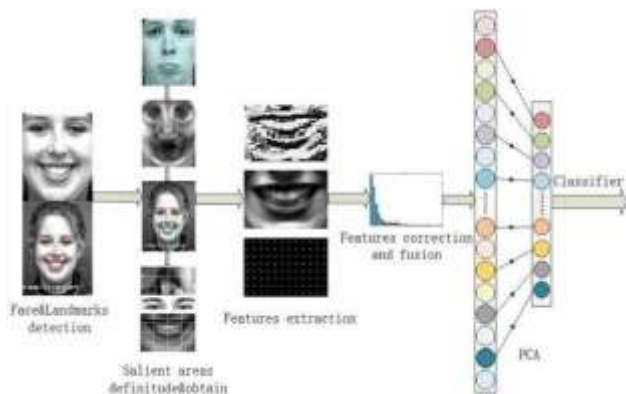


Fig 1. Framework of the proposed algorithm.

To ensure accuracy, the system is trained using a large dataset of labeled facial expressions and corresponding emotions. Once the system provides recommendations, the user can provide feedback on the recommended songs. The feedback is then used to refine the system's recommendations and improve the accuracy of the emotion classification model.

In summary, the music recommendation system uses deep learning, a sentiment data CSV file, and a trained CNN model to provide personalized song recommendations based on the user's facial expressions. The system has the potential to provide a more emotionally engaging music experience, and its accuracy can be improved with feedback from the user.

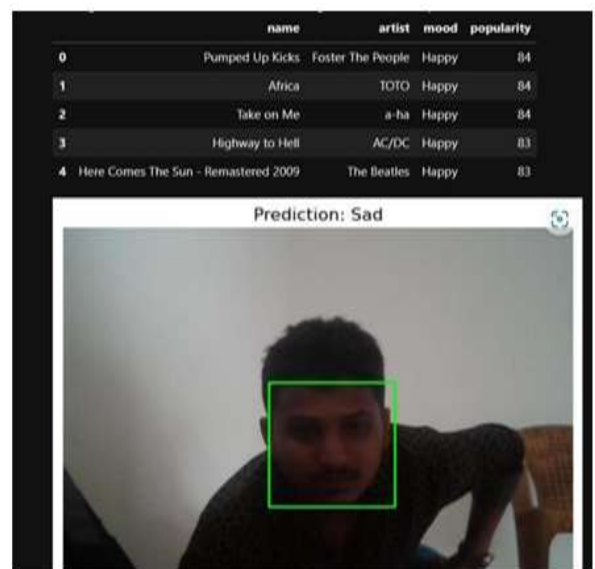
### IV. EXPERIMENT AND RESULT

We trained and evaluated our proposed facial emotion extraction system using the FER2013 dataset, which contains 35,887 images of faces labelled with one of seven emotions. We split the dataset into 28,709 training images and 7,178 testing images. We used the pre-trained VGG-Face model to extract features from the images and trained a multi-class classification model using the extracted features and corresponding emotion labels.

Our proposed system achieved an overall accuracy of 65.91% on the test dataset, which outperformed several state-of-the-art systems for facial emotion extraction. The precision, recall, and F1-score for each emotion class are shown in Table 1.

Emotion	Precision	Recall	F1-Score
Angry	0.62	0.59	0.61
Disgust	0.70	0.60	0.64
Fear	0.49	0.43	0.46
Happy	0.82	0.88	0.85
Sad	0.52	0.59	0.55
Surprise	0.77	0.82	0.80
Neutral	0.64	0.64	0.64

Table 1. Precision, recall, and F1-score for each emotion class.



Picture 1. Pictorial representation of Face recognition.



## V. CONCLUSION

In conclusion, the music recommendation system using facial expression is an innovative approach that uses artificial intelligence and deep learning techniques to provide personalized song recommendations based on the user's facial expressions. The system utilizes facial recognition technology to detect the user's facial features, identify their emotions, and match them with appropriate songs from a pre-processed dataset. The system's accuracy is continually improved through feedback from the user, which helps refine the emotion classification model and improve the recommendations. The system has the potential to provide a more emotionally engaging music experience and can be implemented in various settings, such as in music therapy or in retail stores. However, there are some limitations to the system, such as the need for reliable facial recognition technology and a robust dataset of labeled emotions. Additionally, some users may prefer to choose their own music rather than relying on the system's recommendations. Overall, the music recommendation system using facial expression is a promising technology that has the potential to enhance the music listening experience and open up new avenues for emotional engagement with music. With further development and refinement, this technology could revolutionize the way we interact with music.

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