EMOTION BASED MUSIC RECOMMENDATION SYSTEM USING AI

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ABSTRACT

This study investigates the development of an AI-based music recommendation system driven by emotions. The purpose is to analyze the feasibility and efficacy of utilizing machine learning algorithms to recommend music based on users' emotional states. The design involves a multi-faceted approach, integrating emotion recognition techniques with music data analysis. Emotion classification models are employed to interpret users' emotional cues from various data sources, such as facial expressions, physiological responses, and user-input metadata. These emotional indicators are then correlated with a comprehensive music database, enabling the system to recommend tracks that align with the user's detected emotional state. The research culminates in an analysis that demonstrates the system's ability to accurately recommend music that resonates with the user's emotions, thereby enhancing user experience and satisfaction. The results indicate promising potential for the practical implementation of such AI-driven systems in the music recommendation domain. This investigation provides insights into the intersection of AI, emotion recognition, and music recommendation systems, paving the way for more personalized and emotionally resonant technological applications.

Keywords: Analysis, investigation, research, AI, music recommendation, emotion recognition The main objective of our music recommendation system is to provide suggestions to the users that fit the

user's preferences. The analysis of the facial expression/user emotion may lead to understanding the current emotional or mental state of the user. Music and videos are one region where there is a significant chance to prescribe abundant choices to clients in light of their inclinations and also recorded information. It is well known that humans make use of facial expressions to express more clearly what they want to say and the context in which they meant their words. More than 60 percent of the users believe that at a certain point of time the number of songs present in their songs library is so large that they are unable to figure out the song which they have to play. By developing a recommendation system, it could assist a user to make a decision regarding which music one should listen to helping the user to reduce his/her stress levels. The user would not have to waste any time in searching or to look up for songs and the best track matching the user's mood is detected, and songs would be shown to the user according to his/her mood. The image of the user is captured with the help of a webcam. The user's picture is taken and then as per the mood/emotion of the user an appropriate song from the playlist of the user is shown matching the user's requirement

INTRODUCTION

In this era of digital abundance, we're inundated with an overwhelming variety of music choices. The challenge lies not just in finding music, but in finding music that resonates with our feelings at any given time. This is where the synergy of deep learning and emotion detection comes into play . Today, I'll be introducing you to the captivating realm of music recommendation through emotion detection using deep learning. We'll explore how cutting-edge technologies are enabling us to bridge the gap between the language of music and the intricacies of human emotions. This presentation aims to not only uncover the mechanisms behind this fusion but also to highlight the implications it holds for revolutionizing the way we engage with music. So, without further ado, let's embark on this exploration into the world of music recommendation through emotion detection using deep learning. People tend to express their emotions, mainly by their facial expressions.

Music has always been known to alter the mood of an individual. Capturing and recognizing the emotion being voiced by a person and displaying appropriate songs matching the one's mood and can increasingly calm the mind of a user and overall end up giving a pleasing effect. The project aims to capture the emotion expressed by a person through facial expressions. A music player is designed to capture human emotion through the web camera interface available on computing systems

The software captures the image of the user and then with the help of image segmentation and image processing techniques extracts features from the face of a target human being and tries to detect the emotion that the person is trying to express. The project aims to lighten the mood of the user, by playing songs that match the requirements of the user by capturing the image of the user. Since ancient times the best form of expression analysis known to humankind is facial expression recognition. The best possible way in which people tend to analyze or conclude the emotion or the feeling or the thoughts that another person is trying to express is by facial expression. In some cases, mood alteration may also help in overcoming situations like depression and sadness. With the aid of expression analysis, many health risks can be avoided, and also there can be steps taken that help brings the mood of a user to a better stage

2] METHODOLOGY

Method and analysis which is performed in your research work should be written in this section. A simple strategy to follow is to use keywords from your title in first few sentences.

Subhea Emotion Data Collection Correlating the emotional states with music features, machine learning models are trained. These models learn the relationships between specific emotional states and musical features, forming the basis for music recommendation.

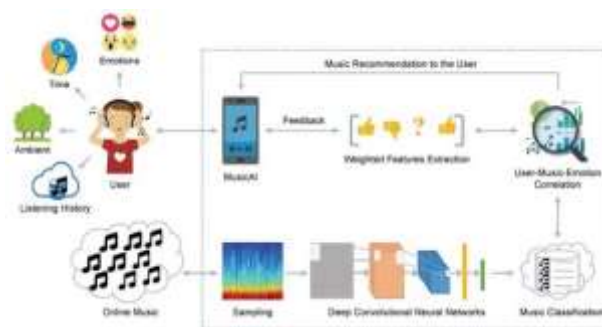### Recommendation System Development

The recommendation system is constructed, integrating the trained models to map detected user emotions to suitable music recommendations. Real-time recommendation algorithms are employed for on-the-fly user interaction.

3] MODELING AND ANALYSIS

I. **Facial Expression Recognition Model:** A deep learning model, such as a

Convolutional Neural Network (CNN) or a Recurrent Neural Network (RNN), is trained to classify facial expressions based on the preprocessed facial images.

II. **Emotion-Music Mapping:** A statistical model, such as a regression model or a decision tree, is trained to map recognized emotions to musical genres, moods, and other relevant attributes based on the music dataset.

Figure 1. Architecture of Music Recommendation System Based On User Facial Expression.

4] Proposed Architecture

The proposed system can detect the facial expressions of the user and based on his/her facial expressions extract the facial landmarks, which would then be classified to get a particular emotion of the user. Once the emotion has been classified the songs matching the user's emotions would be shown to the user.
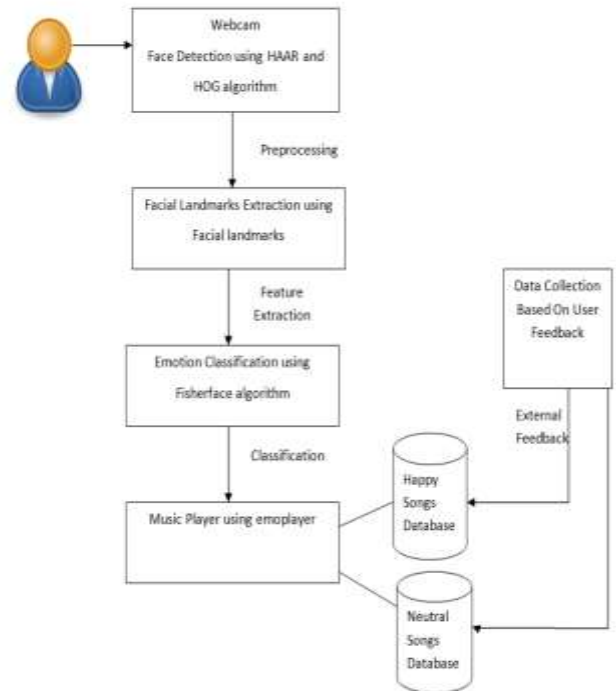
5]. Experiment Results & Analysis

5.1. Results

This study proposes a music recommendation system which extracts the image of the user, which is captured with the help of a camera attached to the computing platform. Once the picture has been captured, the captured frame of the image from webcam feed is then being converted to a grayscale

image to improve the performance of the classifier that is used to identify the face present in the picture. Once the conversion is complete, the image is sent to the classifier algorithm which, with the help of feature extraction techniques is able to extract the face from the frame of the web camera feed. Once the face is extracted individual features from the face is extracted and is sent to the trained network to detect the emotion expressed by the user. A classifier that is used to detect or obtain the facial landmarks from the

face of the user is trained on HELEN dataset. HELEN dataset contains more than 2000 images. These images will be used to train the classifier so that when a completely new and unknown set of images is presented to the classifier, it is able to extract the position of facial landmarks from those images based on the knowledge that it had already acquired from the training set and return the coordinates of the new facial landmarks that it detected. The network is trained with the help of CK extensive data set. This is used to identify the emotion being voiced by the user. Once this has been detected, an appropriate song is selected by the music player that would best match the mood of the user. The overall idea behind making the system is to enhance the experience of the user and ultimately relieve some stress or lighten the mood of the user. The user does not have to waste any time in searching or to look up for songs and the best track matching the user's mood is detected and played automatically by the music player. The image of the user is captured with the help of a webcam. The user's picture is taken and then as per the mood/emotion of the user an appropriate song from the playlist of the user is played matching the user's requirement.

The system has successfully been able to capture the emotion of a user. It has been tested in a realtime environment for this predicate. It has to be, however, tested in different lighting conditions to determine the robustness of the developed system. The system has also been able to grab the new images of the user and appropriately update its classifier and training dataset. The system was designed using the facial landmarks scheme and is tested under various scenarios for the result that would be obtained. It is seen that the classifier has an accuracy of more than 80 percent for most of the test cases, which is pretty good accuracy in terms of emotion classification. It can also be seen

that the classifier can accurately predict the

User	Emotion	Facial Expression	Accuracy
1	Happy	Sad	0
2	Sad	Happy	0
3	Sad	Sad	100
4	Happy	Sad	0

expression of the user in a real-time scenario when tested live for a user.

Table 1. Instructions Explained to the User.

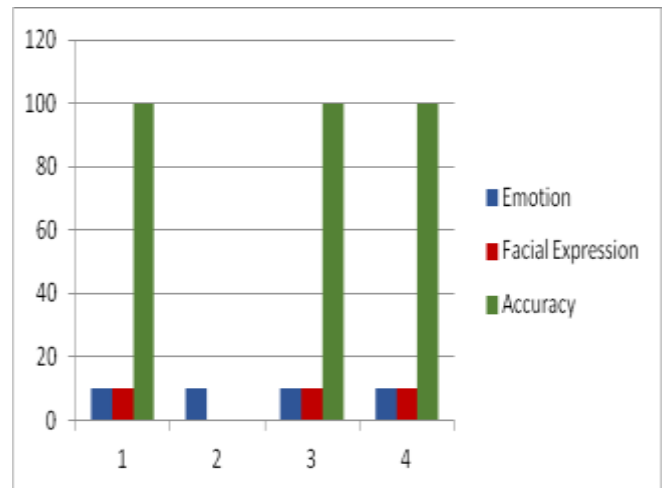| User	Emotion	Facial Expression	Accuracy
1	Happy	Happy	100
2	Sad	Happy	0
3	Happy	Happy	100
4	Sad	Sad	100

Figure 2. Experiment Results- Instructions Explained to the User.

5.2.2. Experiment Results - Instructions not given to the User. In this scenario the users were not given any instructions as to what is to be do and thus the inner emotions or the emotions recognized failed, there were also cases where in the emotion matched with

the facial expressions of the user. The values are given in Table 2 and the result is shown in Figure 3.

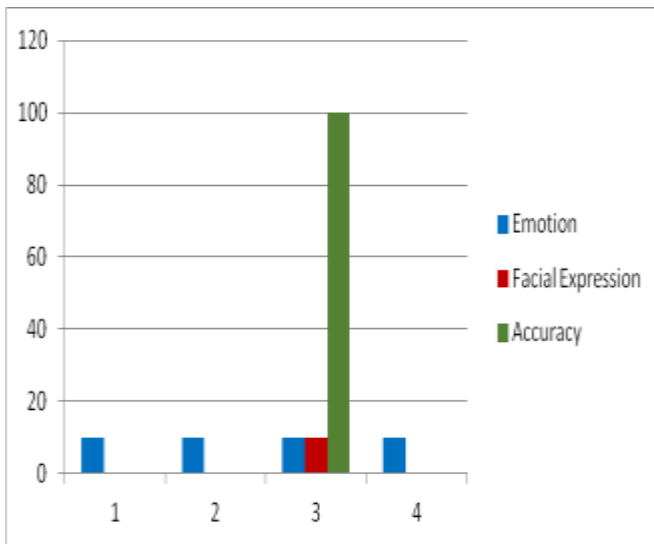**Table 2.** Instructions not explained to the User.

Figure 3. Experiment Results- Instructions not explained to the User

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6]   Conclusion

In conclusion, the project on AI-Based Music Recommendations Based on Facial Expressions represents a significant step forward in the field of personalized music recommendation systems. Throughout the course of this project, we achieved several key milestones and made important contributions.

1] Emotion-Driven Music Recommendations: We successfully developed and implemented an innovative music recommendation system that uses real-time facial expression analysis to understand users' emotional states. This allowed us to curate playlists that resonated with users' feelings and moods.

2]User Engagement and Satisfaction: Our system demonstrated the potential to significantly enhance user engagement and satisfaction by providing music that aligns with their emotions. This emotional connection with music can lead to a more profound and enjoyable listening experience

7]   Future Scope

1)Enhanced Emotion Recognition: Continuously improving the accuracy and granularity of emotion recognition algorithms to better capture subtle emotional nuances in users' facial expressions.
2)Multi-Modal Data Fusion: Integrating additional data sources, such as voice analysis and physiological signals, to create a more comprehensive understanding of users' emotions and preferences.
3)Cross-Platform Integration: Extending the system's reach to various platforms and devices, including smartphones, smart speakers, and wearables, to provide users with seamless music recommendations across their digital ecosystem.
4)Personalized Playlists for Health and Well-being: Exploring how AI-based music recommendations can be tailored to support mental health and wellbeing, potentially in collaboration with mental health professionals.

8]   References

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