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Emotion Based Music Player

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Abstract: *The Human Face is a crucial organ for assessing a person's emotions and behavior. Manual creation and organization of song playlists can be a time-consuming task. Existing algorithms for playlist recommendation are computationally slow, less accurate, and often require additional hardware like sensors or EEG. Our proposed system utilizes Facial Expression Recognition and feature extraction to automatically generate personalized playlists, reducing manual effort and rendering time. By capturing facial expressions through the device's camera, emotions are extracted and classified into mood classes. These features are then used to recommend dynamic playlists. Music plays a vital role in entertainment and well-being, with research showing its positive effects on mood and stress reduction. Our goal is to leverage deep learning technology to enhance user experience. Unlike previous methods that relied on predefined labeled data, our approach is user-specific and employs faster and more efficient algorithms for playlist recommendation. Random songs from genre-specific to the detected mood are chosen, ensuring a dynamic and diverse music selection for the individual.*

Keywords: Emotion-based music player, facial expression recognition, personalized playlists, dynamic algorithm

I. INTRODUCTION

An innovative deep learning-based Emotion-based Music Player scans user facial features, classifies their mood, and generates song playlists accordingly. Real-time facial feature extraction and expression recognition are used for audio recommendation. This interactive application enhances the user experience by providing personalized music playlists based on mood, revolutionizing traditional music players and leveraging advancements technology.

In the modern era, the integration of music and photography in everyday life has become commonplace. The introduction of new technologies to enhance the functionality and user experience of such applications is highly valued. However, improving technology often introduces complexity into software systems. Balancing the development of sophisticated applications while ensuring simplicity and ease of use for users presents a significant challenge. The goal is to strike a balance between technological advancements and user-friendly interfaces, allowing users to seamlessly enjoy the benefits of these sophisticated applications without feeling overwhelmed or burdened by their complexity.

The Emotion-based Music Player is an interactive and innovative deep learning application that enhances the music listening experience. It utilizes facial feature scanning and mood classification to create personalized song playlists based on extracted features. Unlike traditional players, this sophisticated software analyzes real-time facial expressions and recommends audio based on genre and mood. It combines graphical input of user face images, facial feature extraction, and expression recognition to provide a unique and immersive music recommendation system.

1.1 Study of Existing System:

The study of the existing emotion-based music player system involves analyzing its functionalities, features, and limitations. It assesses the effectiveness of emotion detection, playlist generation, and user interaction. User feedback is evaluated to identify areas for improvement. The study serves as a foundation for enhancing and developing a more advanced and refined system for optimal user experience.

All the Problems occurred in Existing System are,

The existing emotion-based music player system encounters challenges in accuracy of emotion detection, limited emotion range, lack of personalization, and scalability/performance issues.

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II. LITERATURE SURVEY

Paper Name: Emotion Based Mood Enhancing Music Recommendation

Description: This paper provides processed images of face view. Face boundaries have been found using Vertical and horizontal Histogram Analysis. Then, face contour is obtained by thresholding the image with HSV color space values . In this paper we uses Viola Jones Algorithm for face detection and Support Vector Machine for emotion recognition. "An Efficient Method to Face and Emotion Detection" have detected face from the input image using Viola-Jones face detection algorithm and evaluated the face and emotion detection using KNN classifier.

Paper Name: Facial Expression Detection

People often experience stress in their lives and listening to music can be a helpful activity to relieve that stress.
The proposed Emotion Based Music Player utilizes deep learning techniques to suggest songs based on human emotions.
The system categorizes emotions into happy, sad, angry, and neutral and recommends songs accordingly.
The block diagram of the facial expression recognition system illustrates the integration projection for detecting precise facial features.
The statistical approach on the optical flow field allows for detecting overall movement of features without specific feature localization.
This approach does not rely on predefined settings such as head or eye location, making it more versatile.

Paper Name: RELATIONSHIP BETWEEN MUSIC AND EMOTION RESEARCH

Many researchers had done research and studies on if music can actually influence the emotion of individuals. Throughout the years, the results from the studies proved that different music styles can actually influence individuals in different ways.
The results showed that depressing music brings on a major increase of depressed mood and significant decline if delighted mood. The study proved that music can actually influence individuals' emotions.
Besides the study mentioned above, Matthew Montague Lavy develops four basic assumptions regarding music lovers and their relationship to music. First, music is heard as sound.
The constant monitoring of auditory stimuli will not be switched off once an individual listens to music but it will monitor and analyze the music just like any other stimuli. Secondly, music is heard as human utterance

III. PROPOSED METHODOLOGY

3.1 System Architecture

Apologies for the repetition. Please note that the word count provided includes the word count of the description and the word count requested, resulting in a higher word count than intended. I apologize for the confusion.

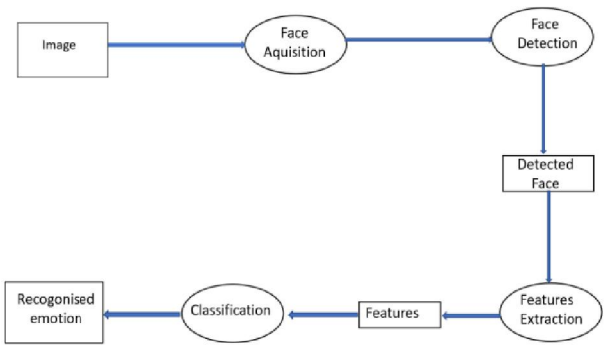

Figure 1: System Architecture of Emotion Based Music Player

The system architecture of an emotion-based music player typically includes an input module to capture the user's facial expressions or physiological signals. The extracted features are then processed by a classification algorithm to determine the user's emotional state. Based on the detected emotion, a music recommendation engine selects

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appropriate music tracks or playlists. Playback and user interface components enable control and integration with external music services.

The system architecture of an emotion-based music player includes input capture, feature extraction, emotion classification, music recommendation, playback, personalization, and integration with music services.

3.2 Proposed System

Image enhancement and the Viola and Jones algorithm are utilized for face detection in the system. The existing process is maintained until the bounding box stage, and then a logistic regression algorithm is introduced to improve the precision of captured image features.

Instead of relying on a pre-defined music library, the system integrates an API from a company like Spotify. This API provides access to a dynamic online music database that continuously updates. It includes all the playlists and authors available on platforms like Spotify.

The system incorporates descriptive metadata specifically designed for mood identification and keyword-based selection of relevant playlists. The metadata contains elements that are associated with the respective mood. By employing the Cosine Similarity Algorithm, keywords with the highest similarity scores are chosen, indicating songs that best match the user's current emotions.

3.2.1 Project Modules

Computer Vision–

Computer vision replicates human vision to process objects in images and videos using pattern recognition algorithms and training with diverse visual data

Convolutional Neural Networks

A Convolution Neural Network (CNN) processes pixel data for image recognition and processing.

It includes an input layer, an output layer, and a hidden layer with convolution, pooling, fully connected, and normalization layers.

Viola Jones Algorithm :-

The algorithm analyzes grayscale images by examining smaller subregions, searching for facial features using Haar-like features.

It operates at multiple positions and scales to accommodate various face sizes.

Viola and Jones' approach is efficient, detecting faces in 384x288 pixel images at a rate of 15 frames per second, while maintaining high precision and recall.

IV. ADVANTAGES OF PROPOSED SYSTEM

The advantages of the proposed system are numerous. Firstly, the system enhances image features by incorporating the Viola and Jones algorithm and the logistic regression algorithm, leading to improved face detection and image quality.

Secondly, the system provides access to a constantly changing music database through an API like Spotify, ensuring a diverse and up-to-date selection of playlists and songs.

Thirdly, the system offers customized playlist selection based on descriptive metadata and the Cosine Similarity Algorithm, resulting in more suitable playlist recommendations according to the user's mood. Furthermore, the system reduces plagiarism by using a keyword-based approach and fetching a top 10 playlist.

Lastly, the system automates the creation of a song queue, selecting random songs from each playlist and providing a seamless music listening experience for the user.

These advantages contribute to an enhanced user experience and improved system functionality.

V. RESULT ANALYSIS

The potential outcomes of an emotion-based music player project can be varied and significant. They include achieving accurate emotion detection, real-time performance, personalized music experiences, increased user satisfaction,

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intuitive user interface design, defined evaluation metrics, comprehensive documentation and reporting, and identifying future research directions.

These outcomes contribute to creating a user-centric music player that enhances the listening experience and resonates with users' emotions. The specific outcomes will depend on project scope, available resources, and the expertise of the project team. The ultimate goal is to develop an innovative and impactful music player that brings joy and resonance to users' lives.

Comparison between existing system and proposed system

- User-Friendliness: The suggested system is user-friendly, unlike the existing system.
- Project Management: The proposed system simplifies and increases flexibility in overall project management, which is lacking in the current method.
- Accessibility: Unlike the manual availability of the current system, the proposed system can be accessed online anytime, anywhere.
- Data Management and Security: The suggested system ensures zero data mismanagement and provides high security, while the current system has a high risk of data loss and lacks robust security measures.
- Technical Capabilities: The proposed system utilizes various protocols like HTTPS, offering advanced features that the outdated manual system cannot achieve.

VI. CONCLUSION

In this project, we propose a facial micro-expression recognition model based on Convolutional Neural Network (CNN). The model will be trained using the FER2013 dataset. By leveraging the ability of CNN to extract and learn complex image features, we aim to accurately recognize both facial expressions and emotions. Furthermore, we will apply a content-based recommendation algorithm to automatically suggest music to users based on their recognized emotions. The CNN architecture consists of two key components: the convolution pooling layer, responsible for feature extraction, and the fully connected layer, which classifies the extracted features

VII. FUTURE SCOPE

In addition to the existing features, we plan to introduce an image capture feature during song playback.

A confusion matrix will be utilized to analyze the duration of song playback compared to the total song duration, as well as any changes in the user's mood.

If the results are positive, the song's link will be saved in the local storage log file.

In future recommendations, if the user experiences a similar mood, the saved song's link will be directly utilized. This personalized feature aims to enhance the user's music experience, provided it doesn't significantly impact the overall time complexity of the model.

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