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Music Melodies Based on Facial Expressions

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Abstract: In recent years, with the development and application of big data, deep learning has received more and more attention. As a deep learning neural network, convolutional neural network plays an extremely important role in face image recognition. In this paper, a combination of micro-expression recognition technology of convolutional neural network and automatic music recommendation algorithm is developed to identify a model that recognizes facial micro- expressions and recommends music according to corresponding mood. This research helps to improve the practicality of the music recommendation system, and the related results will also serve as a reference for the application of the music recommendation system in areas such as emotion regulation.

Keywords: Face Detection, Face Embedding, Face Extraction, Mood Predictions, Music Recommendation

I. INTRODUCTION

Background

Human beings have a tendency of judging a person's mood based on the facial expressions. Applications having great utility can be developed if this ability of humans is mastered by computers or other electronic devices using deep learning. People have always enjoyed music. It can make us expressive and aids in analysing our feelings and emotions in a better way. Music does wonders for our mood. In case of an unfortunate event, listening to sad songs may help. According to science, listening to sad songs can actually elevate the mood. This paper proposes a similar application which is a music recommendation system using emotion detection.

Problem Statement

This study addresses the need for an intelligent and real-time music recommendation system that can automatically detect a user's emotion through facial expressions and generate personalized music playlists accordingly. The aim is to reduce user effort in manually selecting music, enhance the listening experience, and bridge the gap between emotional context and musical content using a deep learning-based approach, specifically Convolutional Neural Networks (CNNs), to classify emotions and map them to an appropriate music database.

Objectives

The objectives of this research are:

- To develop a real-time emotion recognition system.
- To map user emotions to appropriate music.
- To automate and personalize the music selection process

II. LITERATURE REVIEW

In the paper the authors proposed a system which uses the algorithm of point detection for the extraction of features from the input images and the classification algorithm OpenCV for the purpose of training the input images for facial emotion detection. Image is taken from webcam and the extracted image is subjected to pre-processing. Edge detection technique is applied using canny edge detection. Segmentation is applied to the edge detected image. After this face detection takes place followed by feature extraction. This is then deployed on web services.

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A VGG-16 CNN based facial expression recognition is also developed. Once the emotion was detected, the song matching the user's emotions would be played from the user's personalised playlist.

The authors in the paper design a system which can detect the facial expressions of the user. They used clustering techniques after facial recognition and detection. It uses deep convolution networks along with triplet loss to achieve state of the art accuracy.

III. SYSTEM DESIGN

1. System Architecture

Music Melodies Block (Frontend & Recommendation Display) Start/Stop Buttons: These control the system—initiating or halting the video stream for facial emotion detection.

2. Emotion Display (Suggested Songs):

This component receives emotional data and displays a list of songs tailored to the detected emotion. It acts as the core UI where users see the results.

3. YouTube / Spotify / SoundCloud:

These are music platforms integrated into the system to fetch and stream the recommended songs based on the detected mood.

4. Label:

The output of the model—an emotion label such as "Happy," "Sad," "Angry," etc., which is then sent to the Emotion Display to suggest appropriate songs.

5. Data Flow Summary

User clicks Start → starts webcam via webrtc_streamer. Video frames are processed by Emotion Processor.

Facial data is sent to the ML Model, which uses load _model to get predictions. Detected Label (emotion) is passed to Emotion Display.

Suggested songs are pulled from YouTube, Spotify, or SoundCloud based on the emotion.

User can Stop the process any time via the Stop button



Figure 1: System Architecture Diagram

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Technologies Used

Programming Languages: Python

Facial Emotion Recognition Algorithm: CNN for detecting and extracting facial emotions along with streamlit library. Music Database: A database containing a wide range of music tracks, along with Spotify API, youtube API & Sound cloud API.

Front-End Development: HTML, CSS, Bootstrap, and JavaScript for creating the user interface.

Database Management System: MySQL for storing user preferences, and listening history.

IV. IMPLEMENTATION

Frontend Development

- User-Friendly UI Web Application.
- Facial Emotion Detection using CNN Algorithm and Streamlit library.
- Music Player Using HTML5, CSS, Javascript & Bootstrap.
- User Profile Management -Design user profiles where users can manage their account details and preferences.
- Search and Filter Create search and filter options for users to explore music and manage their preferences.

Backend Development

- Emotion Analysis Algorithm- Facial Data as input and maps it to emotional states using deepflask.
- Music Recommendation Algorithm Collaborative Filtering, Content-based filtering, or a hybrid approach.
- Music Streaming APIs: Integrate with Spotify, YouTube, and SoundCloud



Figure 2 : ER Diagram

V. RELATED WORK

It Extract musical properties such as pace, beats, and RMSE. They clustered music into four distinct emotional categories. However, the reliance solely on audio features posed limitations due to subjective perception and cultural variability.

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Facial Action Coding System (FACS) laid the foundation for facial emotion recognition, later enhanced by deep learning. Recent advancements with Convolutional Neural Networks (CNNs) have significantly improved the accuracy of facial expression analysis, making them a natural choice for emotion-aware systems.

VI. CONCLUSION & FUTURE SCOPE

Music trends are changing all the time, making it difficult to choose the perfect song for one's current mood. This system solves the problem by recommending several songs based on their real-time camera interactions. It has improved their accuracy and is more robust, scalable, and flexible enough to recommend songs in multiple languages. Using CNN an accuracy of 94 percent has been achieved, ensuring proper recognition of users' moods and classification, as well as suggesting appropriate songs for them to listen to. The outcomes are encouraging. As a result, it lowers user effort in manually selecting a music by accurately mapping the user's emotion to the appropriate tune.

REFERENCES

- Liu Jianwei, Liu Yuan, Luo Xionglin. Progress in Deep Learning Research [J]. Application Research of Computers, 2014, 31 (7): 1921-1942.
- [2]. Shen Huijun. Research and implementation of face recognition image preprocessing method [J]. Science and Technology and Innovation, 2014 (18): 119-120.
- [3]. Zhang Chen. Research on some key technologies of facial micro-expression recognition [D]. 2019.
- [4]. Liu Mingqi, Ni Guoqiang, Chen Xiaomei. Research on Pretreatment Algorithm of Dorsal Vein Image [J]. Optics Technology, 2007, 33: 255-256.
- [5]. Li Siquan, Zhang Xuanxiong. Research on Facial Expression Recognition Based on Convolutional Neural Networks [J].Journal of Software, 2018, v.17; No.183 (01): 32-35.



