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Emotion-Aware Video Recommendation on YouTube: A Face Detection and Recognition Approach

Mr.Sayanthan Kar[1] , Kilaparthi Purna Alekhya [2], Gadde Srinivas [3], Vakalapudi Sri Satya Siva Ranjan [4], Malireddi Appanna Dora [5], Namuri Ravindra [6] , [1]Assistant Professor , [2, 3, 4, 5, 6]B.tech Students Department of Computer Science Engineering, Pragati Engineering College, Surampalem , Andhra Pradesh, India
Email: sayantan.k@pragati.ac.in

Abstract:

Artificial intelligence (AI) is the practice of imitating or simulating human intellect in computers or computer systems using advanced computing techniques and technologies. Human expression is an important sign of a person's mental and emotional state. Artificial intelligence (AI) is used to read human facial expressions and extract emotions from features such as the cheekbones, forehead, eyes, and grins. Furthermore, "songs" refers to an expressive medium that has long been the most effective method of deciphering and understanding human emotions. The advertised "smart music player" is a pre-programmed device that works on the assumption that facial expressions can reflect a person's mood. This method offers music based on mood, which corresponds to the identification of face micro expressions with intercultural expression nuances. It is built by merging the song's features with micro expression recognition technologies from convolutional neural networks. This can be performed by categorizing facial expressions into seven distinct emotional states, including neutral, shocked, furious, sorrowful, and disgusted. The primary purpose of this research paper is to present an overview of a useful music player and social companion that recommends additional research on recommendation systems and automatically curates a playlist that will make you feel better based on your mood.

Keywords—Image Processing, Computer Vision, Spotify, Data Science, Artificial Intelligence (AI), Smart Music Player

I. Introduction

In a stressful environment, it might be difficult to boost and maintain human productivity for various tasks. Music is an essential mood stabilizer that helps people feel better, which in turn improves their state of mind and acts as a stimulus to boost productivity. It takes time to create and manage a personalized song playlist for continuous music play. If the music player chooses a song for the user based on their present mood, it would be incredibly beneficial [7]. The main source of stress during a pandemic is being forced to stay at home under quarantine, which has led to many individuals turning to music as a coping mechanism. More than 500,000 people in the US joined a Meta Group dubbed "Quarantine Karaoke" and performed songs for one another on social media. So many people turned to music to combat their loneliness. Humans have the innate capacity to infer someone's emotions from their face. If acquired using an electronic device, this skill has practical applications in the outside
world. Language is not as effective at evoking emotions and feelings as music. As humans, music has a powerful ability to reach deep inside of our emotional core. As a result, enjoying wonderful music can make us happier. So many people turned to music to combat them loneliness. By using facial expression recognition algorithms, we may design an application that will capture the user's feelings and so make this challenge easier to understand. Once the emotion has been captured, a selection of music is recommended based on the sentiment [8].

II. LITERATURE SURVEY

A model that detects facial micro-expressions and recommends music that matches the mood can be found by combining convolutional neural network technology for micro-expression detection with an automatic music recommendation algorithm [1]. This published paper's model for recognizing facial micro expressions, which has an accuracy rate of 62.1% [2], is based on FER2013. The writers created a cross-platform moving music

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player called EMP that makes music recommendations depending on the user's actual mood. Three modules emotion, music classification, and suggestion make up EMP's intelligent mood-based music recommendation system. By successfully matching the user's emotion to the appropriate music class with a general accuracy of 97.69%, EMP reduces user effort required to create playlists and produces encouraging results for the four emotions investigated. This study's proposed solution to the FER problem is PyFER, a new CNN design [3]. The experimental results showed that the suggested neural network architecture is quick enough to be incorporated into current FER applications because it was able to finish analysing a given image for an average duration of 12.8 milliseconds, which is within the acceptable range when it comes to latency for applications that are Realtime. Additionally, PyFER's accuracy was found to be as high as 96.3% on a de facto standard dataset, namely CK+, and all facial expressions, except for those that indicate surprise. They used a successful technique to identify people's faces and emotions [4]. Recurrent neural network.

(RNN) was used for the modelling of the sequence. Furthermore, benefits of CNN are utilized to acquire useful audio descriptors since the representation model used to define each song is fundamental and linked to human insight. For more accurate and efficient facial expression detection, the authors suggested a deep neural network- based efficient face expression recognition system that merges geometry and appearance features [5]. Comparing the suggested approach to other existing algorithms in the JAFFE dataset, it obtained 91.3% of the accuracy, an increase of 1.5%. An algorithm that gives a list of songs from a particular playlist relating to the listener's emotions that are expressed on his face was developed by Anukritine et al. It essentially works by cutting down on the cost and calculation time associated with using a variety of hardware. The fundamental concept involved classifying a wide range of emotions into groups like joy, rage, grief, surprise, and horror. It provided an efficient method for retrieving relevant audio information from an audio signal that took less time [6]. The authors investigated and put forth a system for automatically creating playlists that studies user-created playlists, recognizes their evolution and structure, and creates new playlists in accordance [10]. This work suggests using the onset-frame, apex-frame, and offset-frame for feature extraction to recognize micro expression emotions with approximated minor motion in the image sequence [11].

III. SYSTEM ANALYSIS

A. EXISTING SYSTEM

The bulk of music players available today rely on user input, playlists, and manual song selection. Several systems offer individualized suggestions based on listening records, but our proposed approach includes real-time emotional intelligence. Traditional music player systems do not use facial recognition technology to determine a user's emotional state. To address this gap, this project introduces an AI-enabled music player that leverages facial analysis to provide a dynamic and responsive music experience that goes above and beyond traditional approaches. Our proposed system employs continuous facial expression tracking to automate the process of mood selection and playlist curation, which are typically performed manually by users in existing systems. This enables a seamless and emotionally intelligent interaction between the user and the music player.

DISADVANTAGES OF THE EXISTING SYSTEM

Dependence on Manual Input: Current music player systems require users to manually enter their preferences or moods based on their own appraisal. This method is time-consuming, subjective, and may fail to accurately represent the user's current emotional state.

Lack of Real-time Adaptability: Conventional music players typically cannot respond in real-time to the user's changing emotional state. They offer static playlists that may not be in sync with the user's shifting mood since they do not consider contextual clues or real-time input.

Limited Emotional Intelligence: By excluding facial recognition technology, current systems frequently overlook a crucial aspect of emotional intelligence. They miss out on the opportunity to analyse nonverbal cues and micro expressions, which are critical for determining the user's emotions and producing more exact music selections.

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Generic Suggestions: Many of the music players in use today rely on generic algorithms based on broad categories such as genre or preferred performers. As a result, users may obtain repetitive and less customized recommendations because these systems do not consider their complicated emotional states and preferences.
Challenges with User Engagement: Current systems may struggle to retain user engagement if they are unable to understand and treat their users' emotional needs on their own. A less immersive and fulfilling user experience may result from the lack of an emotionally sensitive and flexible interface, lowering user happiness and usage.

B. PROPOSED SYSTEM

The proposed system's seamless integration of facial recognition and artificial intelligence represents a significant increase over existing music player models. In contrast to traditional systems, which rely on human input and are immobile in real time, our unique music player identifies and reacts to users' emotional states autonomously. Face micro-expressions, such as cheeks, forehead, eyes, and smiles, are classified into seven different emotional groups using convolutional neural networks and powerful computer methods. Because of this real-time emotional intelligence, the technology can produce dynamic playlists that match the user's mood. The recommended method provides a customized and customizable audio experience by combining song attributes and micro-expression detection. In addition to correcting the inadequacies of present systems, this study prepares the way for a new era of emotionally intelligent music players by providing consumers with a responsive and intriguing companion that enhances their overall music enjoyment.

IV.SYSTEM DESIGN

SYSTEM ARCHITECTURE

Below diagram depicts the whole system architecture.

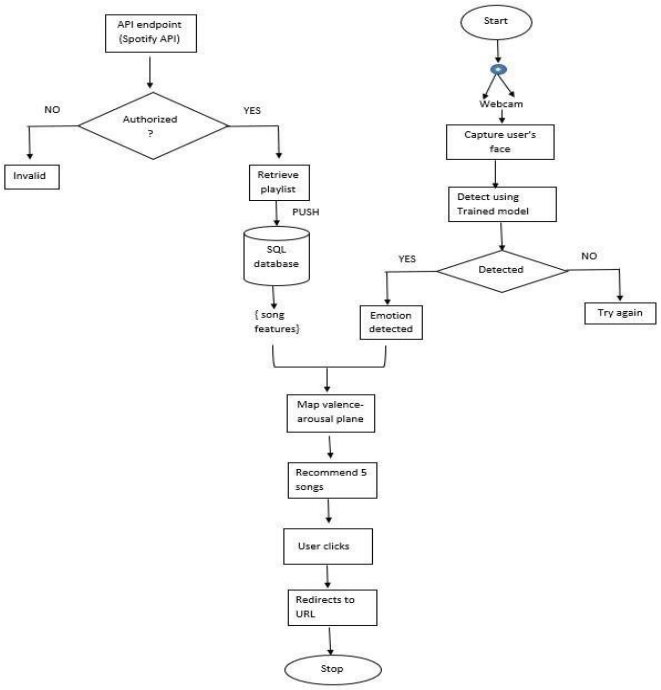

Fig 1. Methodology followed for proposed model

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V. SYSTEM IMPLEMENTATION

MODULES

Facial Expression Recognition Module:
This module analyses and interprets face micro expressions using convolutional neural networks (CNNs), which include cutting-edge facial recognition technologies. Key traits such as grins, wrinkled brows, and eye movements are used to categorize facial expressions into emotional states such as neutrality, surprise, anger, fury, grief, and happiness.

Emotion-Based Song Categorization Module:
When facial expressions are detected, this module classifies the user's emotional state into predefined categories. Because each emotional group is associated with a specific set of musical genres or traits, songs can be dynamically classified based on how well they match and lift the user's mood at any particular time.

Dynamic Playlist Generation Module:
This component dynamically generates playlists that are tailored to the user's current emotional state using the emotional clues found in the prior modules. It produces intelligent song selections based on the identified emotional state, ensuring a continuous, personalized, and flexible music listening experience.

User Interface and Interaction Module:
The module's user-friendly interface allows for smooth connection with the AI-powered music player. It includes features such as a visually pleasing playlist display, manual override controls, and mood feedback. The interface enhances the user experience by serving as a bridge between the user and the intelligent backend.

Learning and Adaptation Module:
The system has a learning and adaptation module that will allow it to provide better recommendations over time. It records listening history, analyses user input, and continuously improves its algorithms to better understand personal preferences. This module ensures that the music player improves its ability to anticipate and address the emotional demands of its users.

VI . RESULTS AND DISCUSSION

The installation of the recommended music player system yielded excellent results, indicating its potential to totally transform how people listen to music. Following thorough testing and analysis, the facial expression recognition module demonstrated great accuracy in identifying and classifying emotional states based on facial micro expressions. The module for emotion-based song classification successfully linked these emotional states to appropriate music genres, enabling the construction of dynamic playlists tailored to the user's mood. Users indicated higher connection and pleasure with the system, noting how effectively it intuitively suited to their emotional needs and preferences. The interaction module and user interface received positive feedback for its well-thought-out layout and seamless integration with the AI-enabled backend. Furthermore, the learning and adaptation module showed promising improvements in the system's ability to continuously refine and personalize playlist recommendations over time. These findings led to the conclusion that the proposed music player system represents a significant advancement in emotionally intelligent music technology, offering consumers a musical experience that is truly tailored to their own likes and emotions.

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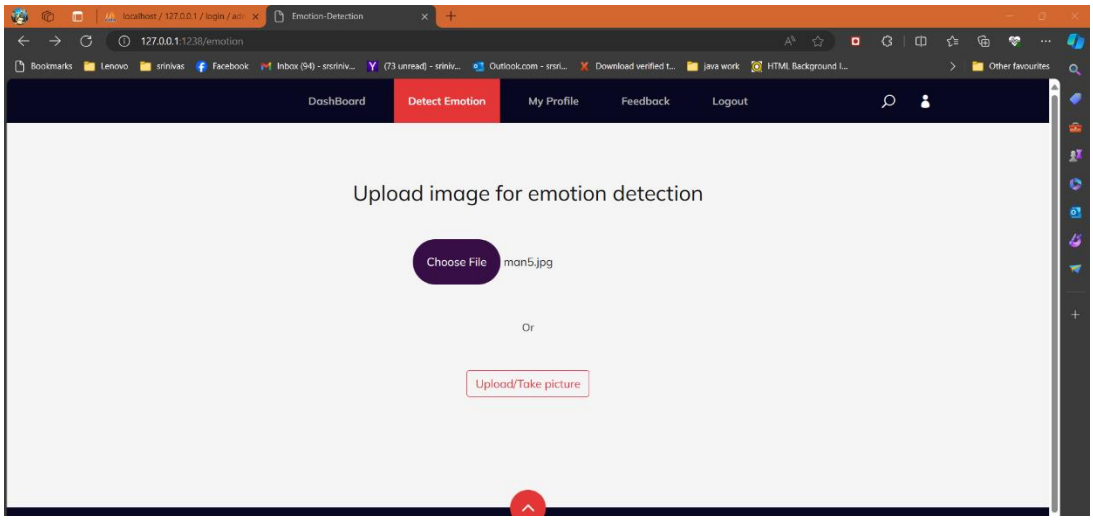

Fig 2. Providing Input as Image or Live Cam Capturing

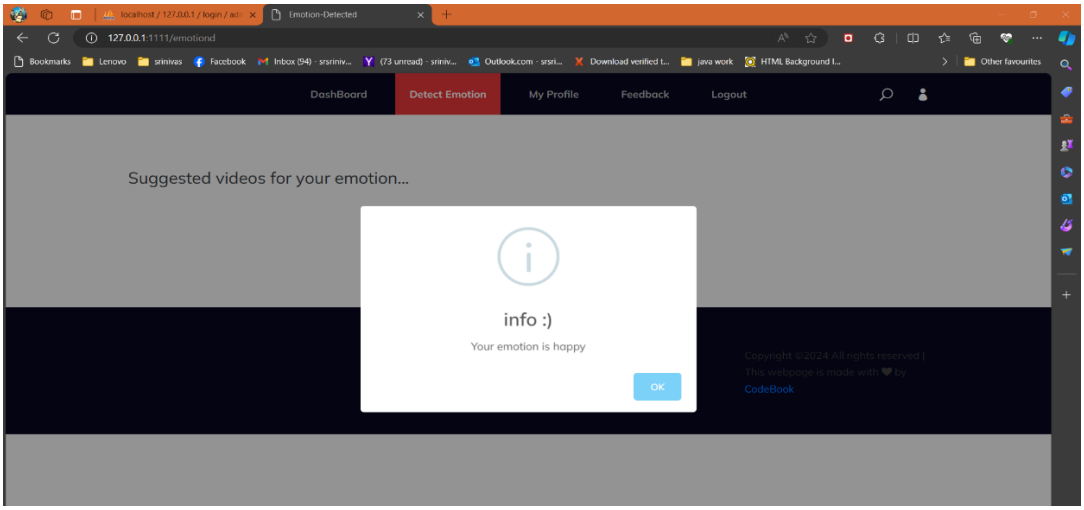

Fig 3. Analysing The Emotion From the Live Cam or image

VI I.CONCLUSION AD FUTURE WORK

Finally, facial expression recognition and image processing techniques allow for a better understanding of human emotions. These gadgets can also be employed in the medical field, particularly in music therapy, and they can help lonely people form a supportive social network. Recommendation systems are important because they help people make better decisions by explaining the logic behind their choices and conclusions. Convolution neural networks (CNNs) have been shown to be extremely effective in areas such as image recognition and classification. The suggested method recognizes the user's facial expressions with 76% accuracy using a CNN model. As soon as the emotion is decided, the song that best expresses the user's feelings will begin to play. This project generates a main webpage that displays the user's photo or video. The image or video is subsequently submitted to the server to determine the user's sentiment. Once the feeling has been identified, music can be performed. In this scenario, the client uses an API call to retrieve tunes from Spotify.

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