



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 6, June 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.512

9940 572 462

6381 907 438

ijirset@gmail.com

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Sentiment Analysis in Songs and Advanced Recommendation System

Akshay Gaikwad, Akash Pawar, Rushikesh Vyas, Prof. Pallavi Gulve

Department of Computer Engineering, JSPM's, BSIOTR Wagholi, Pune, Maharashtra, India

ABSTRACT: The human face is an important organ of an individual's body and it especially plays an important role in extraction of an individual's behavior and emotional state. Manually segregating the list of songs and generating an appropriate playlist based on an individual's emotional features is a very tedious, time consuming, labor intensive and upheld task. Various algorithms have been proposed and developed for automating the playlist generation process. However the proposed existing algorithms in use are computationally slow, less accurate and sometimes even require use of additional hardware like EEG or sensors. This proposed system based on facial expression extracted will generate a playlist automatically thereby reducing the effort and time involved in rendering the process manually. Thus the proposed system tends to reduce the computational time involved in obtaining the results and the overall cost of the designed system, thereby increasing the overall accuracy of the system.. Facial expressions are captured using an inbuilt camera. The accuracy of the emotion detection algorithm used in the system for real time images is calculated.

KEYWORDS: Music Player, Filtering Method, Face Recognition, emotion Detection. CNN.

I. INTRODUCTION

The field of science is as big as the universe itself. Every passing day there are new developments; if not big or groundbreaking, but constructive and leading towards a better tomorrow. Sound and Graphics are two vast fields of Science and Engineering that not only intrigue but also attract learners to study them in detail to explore into their depths. Since then many such inventions have propelled us to this time where thinking of various ideas which might not have been possible a few decades back and more over implementing them is now possible. Now in the present time, where clicking a photo and listening to music „on the go“ is just a part of anyone's daily life, providing any improvements in the working of such technologies that in turn make the user experience better are always appreciated. With the improvements in technology the level of sophistication in software has also increased. Also with the idea of 'keeping it simple developing sophisticated applications is a challenge Facial Expression based Music Player is interactive, sophisticated and innovative mobile (Android) based application to be used as a music player in a different manner. The application works in a different manner from the traditional software as it scans and classifies the audio files present on the device and according to the predefined parameters (Audio Features) present on the application in order to produce a set of mood based playlists. The real-time graphical input provided to the application is classified (Facial expression recognition) to produce a ``mood`` which will then be used to select the required playlist from the earlier set. Listening to music is a key activity that assists to reduce stress. Facial expression helps to determine the mood of individual.

II. LITERATURE SURVEY

1) An K. Chankuptarat, R. Sriwatanaworachai and S. Chotipant, "Emotion-Based Music Player," 2019 .

Listening to music is a key activity that assists to reduce stress. However, it may be unhelpful if the music does not suit the current emotion of the listener. Moreover, there is no music player which is able to select songs based on the user emotion. To solve this problem, this paper proposes an emotion-based music player, which is able to suggest songs based on the user's

emotions; sad, happy, neutral and angry. The application

receives either the user's heart rate or facial image from a smart band or mobile camera. It then uses the classification method to identify the user's emotion. This paper presents 2 kinds of the classification method; the heart rate-based and the facial image-based methods. Then, the application returns songs which have the same mood as the user's emotion.



2) R. Ramanathan, R. Kumaran, R. Ram Rohan, R. Gupta and V. Prabhu, "An Intelligent Music Player Based on Emotion Recognition," 2017

This paper proposes an intelligent agent that sorts

a music collection based on the emotions conveyed by each song, and then suggests an appropriate playlist to the user based on his/her current mood. The user's local music collection is initially clustered based on the emotion the song conveys, i.e. the mood of the song. This is calculated taking into consideration the lyrics of the song, as well as the melody. Every time the user wishes to generate a mood-based playlist, the user takes a picture of themselves at that instant. This image is subjected to facial detection and emotion recognition techniques, recognizing the emotion of the user. The music that best matches this emotion is then recommended to the user as a playlist.

3) Henal Shah, Tejas Magar, Purav Shah and Kailas Devadkar "AN INTELLIGENT MUSIC PLAYER USING SENTIMENTAL ANALYSIS" 2015.

The images are taken using the camera and they are stored by using OpenCV. The Harr Cascade training is a tool used to accurately detect and recognize the hand gestures. In the Harr Cascade algorithm, the data are stored in Xml format. qt is a cross-platform that is widely used for developing application software using graphical user interface (GUI). The motion of the hand

gestures is stored in the OpenCV database. The arm controller recognizes the hand gestures and sends to RS232. The RS232 acts as a interface between arm controller and the PC. The songs are sorted in playlist and played automatically according to the hand gesture. Figure 4. Block Diagram for Gesture Recognition Henal et al. proposed intelligent music player according to the user's mood by using sentimental or emotion analysis.

4) Nikhil Zaware, Tejas Rajgure, Amey Bhadang, D.D. Sakpal "EMOTION BASED MUSIC PLAYER" 2014.

Nikhil et al. determines the mindset of the user by using facial expression . Humans often express their feeling by their expressions, hand gestures, and by raising the voice of tone but mostly humans express their feelings by their face. Emotion based music player reduces the time complexity of the user. Generally people have large number of songs on their playlist.

Playing songs randomly does not satisfy the mood of the user. This system helps user to play songs automatically according to their mood.

5) Anukriti Dureha "AN ACCURATE ALGORITHM FOR GENERATING A MUSIC PLAYLIST BASED ON FACIAL EXPRESSIONS" 2014.

This paper presents an algorithm that automates the process of generating an audio playlist, based on the facial expressions of a user, for rendering salvage of time and labor, invested in performing the process manually. The algorithm proposed in this paper aspires to reduce the overall computational time and the cost of the designed system. It also aims at increasing the accuracy of the designed system. The facial expression recognition module of the proposed algorithm is validated by testing the system against user dependent and user independent dataset. Experimental results indicate that the user dependent results give 100% accuracy, while user independent results for joy and surprise are 100 %, but for sad, anger and fear are 84.3 %, 80 % and is 66% respectively

III. PROPOSED METHODOLOGY

A. System Architecture

The architecture of our proposed system is shown in figure .

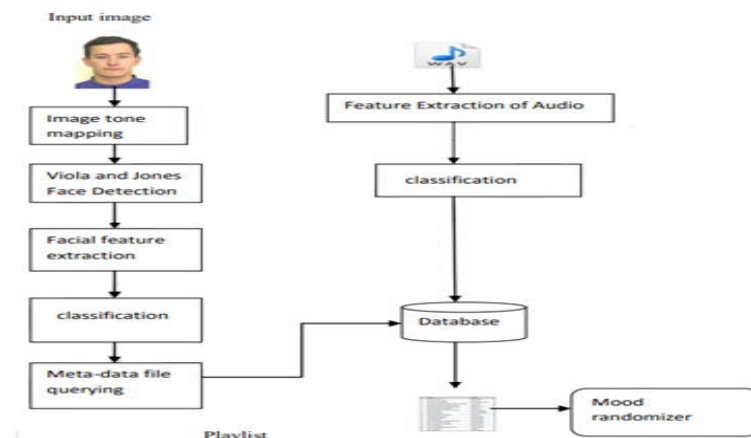


Fig: System Architecture



B. Methodology

User will give input in text or in speech format mostly in speech format that speech will get converted into a text and that text send to server in json format for analyzed and emotions are get calculated for it as well as keyword search is happened for that result return millions of songs that songs will again get filter under collaboration filter this result optimized to hundred and that hundred again sent to mobile and based on the user profile it will be sorted in the 20 to 30 songs. First step the emotions and keyword are consider and based on that most likely data which other users had listened is get extracted that will reduce a cold start problem as we have all data already prepared that data again sorted based on the user contend or profile which consider the most listened genres , musician , song types , music year , duration , listen count , singer and emotions

C. Modules:

1. Facial Expression Recognition The output of Viola and Jones Face detection block forms an input to the facial feature extraction block. The required features are extracted using the Python library that is imported in the Android Studio folder. This helps in classifying that the input real time image has as its expression i.e. the users expression.2. Audio Feature Extraction In this module a list of songs forms the input. As songs are audio files, they require a certain amount of pre-processing Stereo signals that are obtained from the Internet and are converted to 16 bit PCM mono signal around a variable sampling rate of 48.6 kHz. The conversion process is done using Audacity technique. The pre-processed signal obtained undergoes an audio feature extraction, where features like rhythm toning is extracted.

D. Mathematical Model

No Let S be the Whole system which consists:

$$S = \{I, P, O\}.$$

Where,

I is the input of the system.

P is the procedure applied to the system to process the given input.

O is the output of the system.

A. Input:

$$I = \{I1, I2, I3, I4\}$$

Where,

I1 = Face detection.

I2 = Audio List

I3 = Lyrics

I4 = Text

B. Process

$$P = \{p1, p2, p3, p4\}$$

p1 = Face detection

p2 = Emotion detection

p3 = Audio selection

C. Output:

$$O = \{o\}$$

o = Audio played on emotion detected.

E. Algorithm

CNN

A CNN is a type of a neural network that is designed to process an image and represent it with a vector code. The architecture of CNN draws on fully-connected neural networks. Similarly, a convolutional neural network is a compounded structure of several layers processing signals and propagating them forward.

Step 1: Dataset containing image of face captured by camera

Step 2: The convolutional neural network is used a encoder which extracts image feature 'f' pixel by pixel.

Step 3: Matrix factorization is performed on the extracted pixels. The matrix is of m x n.

Step 4: Max pooling is performed on this matrix where maximum value is selected and again fixed into matrix.

Step 5: Normalization is performed where the every negative value is converted to zero.



Step 6: To convert values to zero rectified linear units are used where each value is filtered and negative value is set to zero.

Step 7: The hidden layers take the input values from the visible layers and assign the weights after calculating maximum probability.

KNN

KNN algorithm is a supervised machine learning algorithm which is used for classification and regression problem.

Probability:

$P(Y_i|x) = \frac{N_i + sK + C_s}{N + sK + C_s}$ Where, X is instant,

N_i is instant belong to Y_i in neighbor,

K is total instant, C is classes and

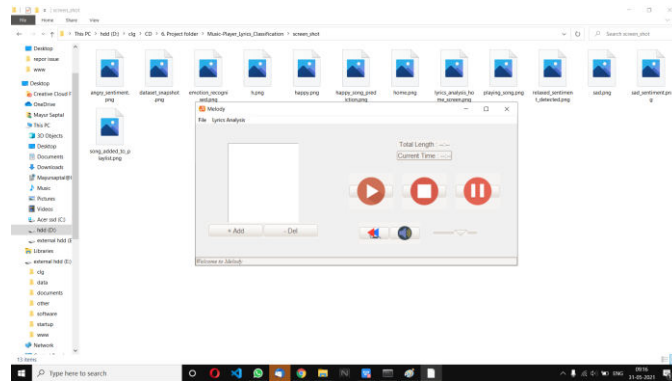
S is smooth parameter font.

Lexicon

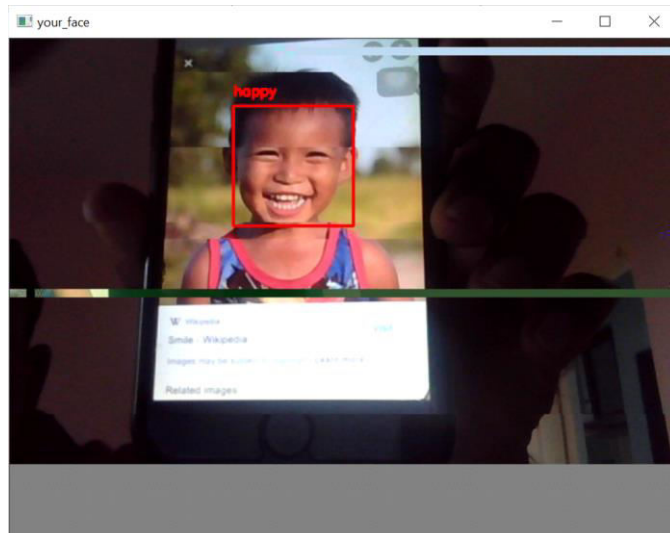
Lexicon algorithm is algorithm where all text converted into tokens and tokens have predefined set of scores that score get assigned to the words and using this score complete result or emotion of the text get calculated

IV. RESULTS

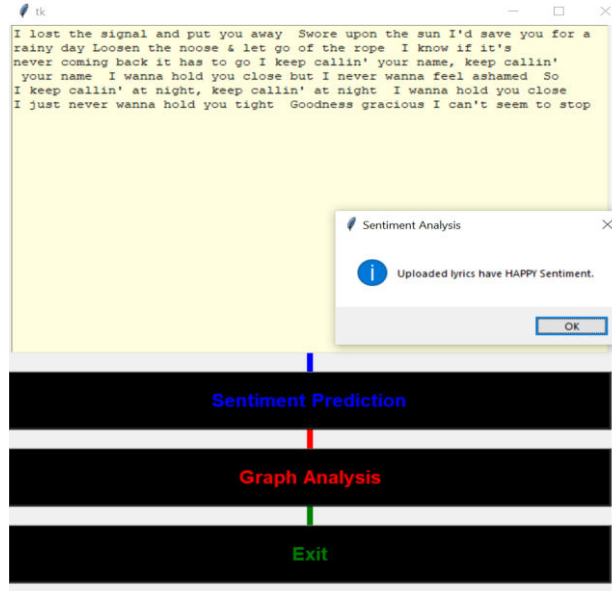
Music Player Dashboard



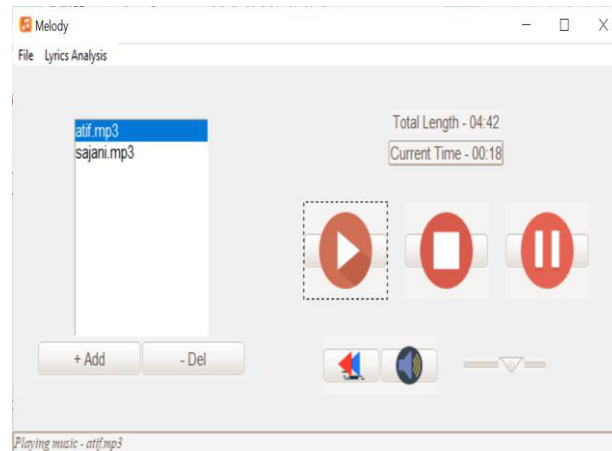
Emotion Capture



Emotion Analysis



Song Added to List



IV. CONCLUSION

The Emotion-Based Music Player is used to automate and give a better music player experience for the end user. The application solves the basic needs of music listeners without troubling them as existing applications do: it uses technology to increase the interaction of the system with the user in many ways. It eases the work of the end-user by capturing the image using a camera, determining their emotion, and suggesting a customized play-list through a more advanced and interactive system. The user will also be notified of songs that are not being played, to help them free up storage space. paper.

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