*International Journal of Applied Engineering Research*

# Emotion Based Music Recommendation System using CNN

K.C. Kullayappa Naik Ch. Hima Bindu M. Hari Babu J.Sriram Pavan
Associate Professor Professor & HOD Assistant Professor Assistant Professor
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
QIS COLLEGE OF ENGINEERING AND TECHNOLOGY, ONGOLE, A. P, India

***Abstract:*** Music has a crucial role in the human's day -to-day life. Most of the existing music players are based on the manual selection of songs. This kind of method doesn't satisfy the users mood for listening of songs. So, this paper refers about the development of music player system by detection of the facial expression of the user. The face is an important aspect in predicting human emotions and mood. The, proposed method is more accruable method than existing method. By using the Convolutional Neural Network method, the proposed method can be used for emotion detection and music recommendation. Hence this paper projected system concentrates on identifying the human feelings for developing emotion-based music recommendation system using computer vision and machine learning techniques.

***Index Terms:*** Emotion Detection, Emotion Extraction, Music Recommendation, Machine Learning, Computer Vision, Convolutional Neural Network (CNN).

## INTRODUCTION

In this paper, music is recommended to the user by detecting the facial expression of the user. First, the user's expression will convey his or her feelings.
The gadget will then determine the state of the face expression after that and analyze the facial expression, finally extracts the emotion of the user given. After the extraction of the emotion of the user, Songs that the user's current feeling can represent will be played on the music player. The created music system will put i ts main emphasis on analysing the user's facial expression and exclude head or face movement. In this study, we successf ully identify the four fundamental emotions of happiness, sadness, surprise, and normality. This system's performance wil l be judged based on how effectively it can identify the present facial expression and play the appropriate musical genre. The system makes extensive use of facial recognition and image processing technology. The.jpeg format is still used as the input for this suggested model.

## LITREATURE REVIEW

[1] Emotion Based Music Player:

- As a major kind of pleasure for music listeners, music plays a crucial part in improving a person's life.
- A novel method called as "emotion-based music player" enables music fans to have songs played for them automatically based on their feelings and mood.
- The main drawback of this music player is it uses, Affective SDK that has a lot of limitations in creating custom emotion recognition system.

[2] Statistically Based Analysis of Facial Expression and Recognition:

- In this literary technique, Londhe RR and Pawar DV suggested that facial emotion recognition be researched using a number of features of the face.
- Here, we compute changes in expression, the curvatures of the face, and characteristics of the objects, such as brow, lip, nose, and mouth area changes,

using statistical parameters. Similar to this, the intensity of the relevant picture pixels varies, and the computed results (changes) are saved as feature vectors. These characteristics are categorized into six different expressions, which consists of happiness, anger, fear, disgust, surprise and sadness using an artificial neural network.

- One of the major drawback in this literature is here the facial recognition goes with certain properties like changes in eyebrows, lips and nose. Sometimes those properties do not give the accurate result for music playing.

[3] Emotion Based Music Player-X beats:

- This literature model demonstrates the creation of the Android-based music player X Beats, which uses the principles of image processing to record, examine, and deliver music in accordance with the mood or feeling of the user.

- The main drawback of this literature model was it detects only happy, fear and sad expressions it cannot detect the frustrated, amazed, ecstatic expressions given by the user.

[4] Learning Personal Specific Facial Dynamics for Face Recognition from Videos:

- In this paper, the author presents boosting strategy and an extended set of volume LBP (Local Binary Pattern) features, an efficient method of spatiotemporal face recognition from films is presented.

- More importantly in this paper Hadid A, Pietikäinen M And Li SZ considered for face recognition, only the most discriminative spatiotemporal EVLBP characteristics should be used; other features that might interfere with recognition should be ignored.

- The main drawback of this literature model was it delay some facial recognition process.

## RESEARCH ELABORATION

### 1. Algorithm:

The Emotion Based Music Recommendation system algorithm help to understand the system architecture in detail. The step-by-step algorithm is mentioned here:
Step-1: Intialize the face detection by using webcam.
Step-2: Extraction of features of facial expressions given by user.
Step-3: Detection of the facial expressions.
Step-4: Initialization of Music System.
Step-5: Playing of songs based on the emotion detected.

### 2. Working procedure of the Proposed system:

The proposed system has the certain steps for the playing of music based on mood or emotion of the user. The steps perform the operation for the playing of music system based on the emotion given by the user. The steps that follow in the proposed method are

1. Face Detection using webcam,
2. Facial landmark extraction,
3. Facial Expression given by user
4. Initialization of music system,
5. Playing of music as per the facial expression.

Initially, the user gives the face expression through the webcam associated with the system. Once the webcam detects the face of the user, then it extracts features of user like the curvatures of the face, emotion given by the user but the system does not include the certain properties like nose, eyebrows, lips and ears. The system only depends upon the facial landmark given by the user like sad, angry, happy, surprised, fear, neutral. Once the landmarks of the user were extracted from the webcam then it initializes the music system to play songs.

In this work, music player we recommended certain songs to the system based on the emotions performed by the proposed method. In proposed system six different expressions are used in order to analyze emotions like 1. Happy, 2. Sad, 3. Surprised 4. Angry, 5. Neutral, and 6. Fear. This are the certain expressions associated with the proposed system that we are developed. The playing of the songs based on accuracy of emotion given by the user. For example: Let us consider an emotion happy, while the user initializes their face with the webcam then the webcam detects the accurate emotion given by user if the accurate emotion of the user is happy then the system sends the signal to the music system for the playing of the accurate emotion i.e., song related to the happy emotion was played by the system. In this way the proposed system works. Here the below flow chart helps to find out the step-by-step procedure of the proposed method.

**3. Flow Chart:**

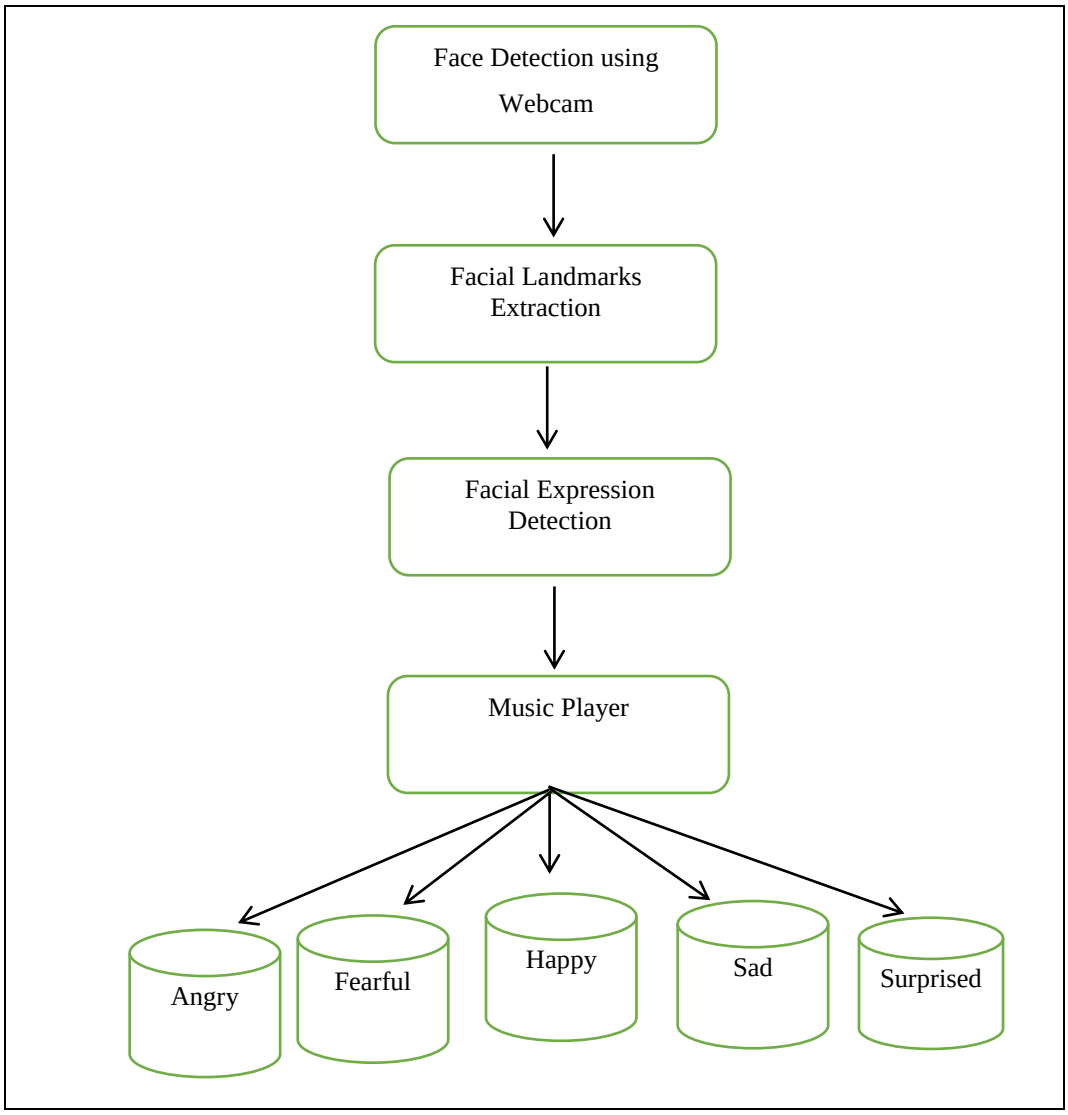



**Fig1: Flow chart of the Proposed System**

## RESULTS DISCUSSION

**1. System Testing Results:**

In order to have the system test results with an accurate emotion performance the system should proceed with the certain components, those components are 1. Browse button, 2. Webcam, 3. Start Butoon, 4. Restart, 5. Setting, 6. Music Library button, 7. Exit.

Browse button: It directs the user facial detection to the local disk and allows the user facial image from local disk.
Webcam Start button: After initiation of face the web cam starts to monitor the facial expression of user.
Start button: Once the webcam detects face expression then start button analysis the facial image of the user.
Restart button: In order to have the error free music playing the system clear the all previously loaded images.
Setting button: It enables the certain facial expressions of the user to store at a file.
Music Library System: It was customized with related to facial emotion of the user to play the music once the emotion of user was detected.
Exit button: Once the music was played for the accurate emotion of user then system goes to the exit mode and again starts the procedure.
The detailed procedure was given below in a tabular form.

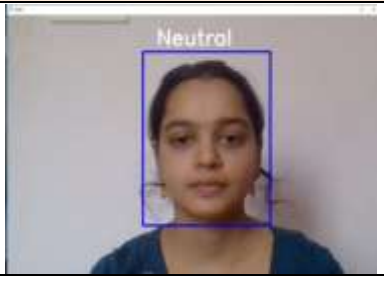
**Table-1 Results of system testing**

| Component | Action | Result | |
|---|---|---|---|
| | | Positive | Negative |
| **"Browse" button** | User directs towards local disk. | | |
| | Give user option for choosing a picture from their local drive. | ✓ | |
| **Webcam "Start" Button** | Start the internal / external webcam | ✓ | |
| **"Start" button** | Once pressed, the picture analysis procedure will begin. | ✓ | |
| **"Restart" button** | Delete the previous picture that was loaded. | ✓ | |
| | The songs that are playing should stop. | ✓ | |
| **"Setting" button** | Give the user the option to save the collection of photographs in database. | ✓ | |
| **"Music Library" button** | Send the user to local disc so they customize the songs. | ✓ | |
| | Allow the user to edit the music selection for each emotion, including the ability to remove undesired songs and add new ones. | ✓ | |
| **"Exit" button** | Close the suggested model's window. | ✓ | |

**2 Emotion Accuracy Testing Results**:

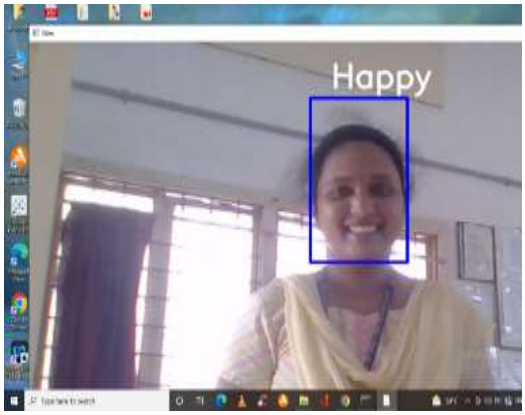
The emotion accuracy of the test results is presented in below mentioned table 2.

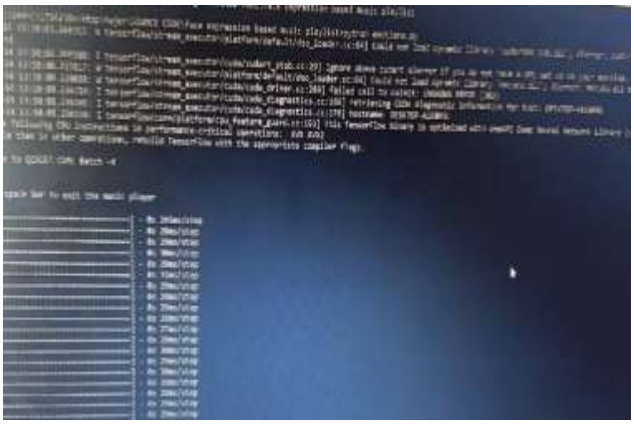
**Table-2: The photos are saved in dataset**

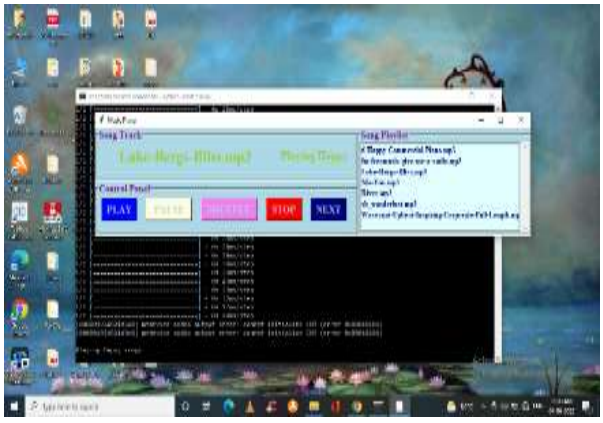
| Photographs | Emotion |
|---|---|
|   | **Neutral** |

| | |
|---|---|
|  | **Surprise** |
|   | **Fear** |
| | **Happy** |

## 3 EXPERIMENT RESULT S ANALYSIS:





**4 Accurate Emotion Reorganization Calculation:**

**Table-3 The summary of tested correct findings**

| Emotion | Input Samples | Recognized Sample | RR |
|---|---|---|---|
| Neutral | 10 | 9 | 90% |
| Happy | 10 | 10 | 100% |
| Fear | 10 | 7 | 80% |
| Surprise | 10 | 8 | 80% |
| **Total** | **40** | **34** | **85%** |

**Fig-2 Experimental results- Emotion Detection**

After the extraction of facial expression, the system recommends to play the song on the accurate expression given by user which was shown in figure-2

Recognition Rate (RR) can be calculated using the formula

**RR=Classified Character/Total number of Characters*100**
**RR = 34/40 * 100**
**RR = 85%**

**CONCLUSION**

The significance of recommended model was informed by the pictures' ability to recognize emotions. The main objective is the functionality of emotion detection. The proposed idea seeks to enhance the user's entertainment through the use of music player and emotion recognition technology. The gadget can distinguish between the four emotions: normal, happy, sad, and disgusted in the photographs that are placed into it. This application can be added as an additional feature to current advanced music players which suggests songs based on previous song history. Adding a facial expression detection system in music player would increase the situations where the system suggests the song what he needed, this would increase user satisfaction.

**REFERENCES**

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