

# MUSIC RECOMMENDATION SYSTEM BASED ON FACIAL EMOTION RECOGNITION

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## ABSTRACT

Face recognition technology has widely attracted attention due to its enormous application value and market potential. It is being implemented in various fields like security system, digital video processing, and many such technological advances. Additionally, music is the form of art, which is known to have a greater connection with a person's emotion. It has got a unique ability to lift up one's mood. Relatively, this paper focuses on building an efficient music recommendation system which determines the emotion of user using Facial Recognition techniques. The algorithm implemented would prove to be more proficient than the existing systems. Moreover, on a larger dimension, this would render salvage of time and labor invested in performing the process manually. The overall concept of the system is to recognize facial emotion and recommend songs efficiently. The proposed system will be both time and cost efficient.

## KEYWORDS

Recognition, Artificial intelligence, OpenCV Application.

## 1. INTRODUCTION

Artificial intelligence, an extensive, prominent and imperative domain that has attracted a lot of researchers and programs in recent times. This particular domain has taken over the world in very short notice. It is incorporated in our daily life in the form of chatbots, digital assistants like Siri and several other technology-based systems. One of the most prominent powers up of artificial intelligence is face recognition techniques. The basic example of its usage is the grouping of Google Photos of a particular person.

There are many existing systems that could recognize facial emotions. On the other hand, there are systems that recommend music. Bringing together, a system which will recommend music by recognizing the mood of the user from facial emotions is the overall concept described in the paper. Emotion recognition would have larger scope in the near future in fields like robotics for efficient sentiment analysis without the involvement of another human.

## 2. RELATED WORK

A few methodologies have been proposed and embraced to group human feelings successfully. Most of the methodologies laid their emphasis on seven essential feelings which are steady over age culture or different characters.

Describes the advantages of using OpenCV, especially the Adaboost algorithm, in the process of face recognition. Detecting and recognition of face in complicated color images can be achieved using a combination of a particular algorithm with AdaBoost algorithm. It also talks about the disadvantages of using a timer in face detection.

Proposes on utilizing Support Vector Machines (SVM) as the primary characterization technique to order eight facial feelings. The faces distinguished utilizing channels in OpenCV and changed over to Greyscale. The paper likewise explains on robotized constant coding of outward appearances in nonstop video gushing, which is feasible for applications in which frontal perspectives can be accepted utilizing webcam.

The creator proposed a calculation to produce a subset of a unique playlist or a custom playlist related to the feeling perceived. The picture to be prepared was acquired from

aweb camera or the hard circle itself. The picture is expose to improvements, where a few mapping and upgrade procedures are connected to reestablish required differentiation of the picture. Preparing and arrangement are maintained by “one versus all” approach of SVM to encourage multi-class characterization.

Proposes on the utilization of profound convolutional neural networks. It depends on solid face acknowledgment convolutional systems, which can be effectively tweaked to play out the feeling acknowledgment task. Visual models are supplemented with sound highlights for better face acknowledgment.

Aids in the music suggestion framework which is additionally a significant module of the proposed framework. It discusses highlights to be removed from the music to characterize its mind-set.

The paper depicts utilizing Thayer’s model of mind-sets to perceive the state of mind of the music piece. The edge level of a music piece is resolved and the feeling it brings is perceived via prepared neural systems.

### 3. METHODOLOGY

Compared to other algorithms used in previous systems, the proposed algorithm is proficient enough to battle large pose variations. Large pose variations tend to disrupt the efficiency of pre-existing algorithms. To reduce this Standard image input format is taken. Few systems detect the faces first and then locate them. On the other hand, rarely, some other algorithms detect and locate the faces at the same time. Every face detection algorithm usually has common steps. First, to achieve a response time, then to perform data dimension. Focusing on data dimension a few algorithms extract facial measurements and the next react certain relevant facial region. Advantages of the proposed algorithm Using the static image gives a great advantage on the defect of pose variations. The three most faced problems are the presence of unidentified elements like glasses or beard, quality of static images and unidentifiable facial gesture. Face Feature Extraction Pictures are spoken to as weight eidgein vectors that are consolidated and known as “Eigenfaces”. One of the focal points taken by Eigen faces is the comparability between the pixels among pictures by methods for their covariance network.

Following are the means required to perceive the outward appearances utilizing this Eigenfaces approach:

Let  $X = \{x_1, x_2, \dots, x_n\} x_i \in R^d$

Here  $X$  be a random vector with observations.

1. Calculate the mean  $\mu$ :

$$\mu = \frac{n}{1} \sum_{i=1}^n x_i$$

2. Calculate the covariance matrix  $S$ :

$$S = \frac{n}{1} \sum_{i=1}^n (x_i - \mu)(x_i - \mu)^T$$

3. Compute the eigenvectors  $v_i$  and eigenvalues  $\lambda_i$  of  $S$ :

$$Sv_i = \lambda_i v_i, \quad i = 1, 2, \dots, n$$

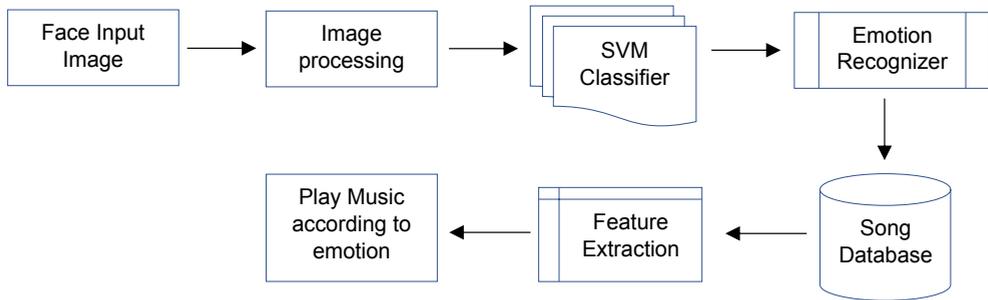
4. The eigenvectors are arranged by their eigenvalue in descending order:

$$y = W^T(x - \mu)$$

5. Calculate eigenfaces.

Eigen Faces: Not all the parts of the face are important for emotion recognition. This key fact is considered to be important and useful. Face recognition techniques focus on recognizing eyes, nose, cheek and forehead and how the change with respect to each other. Overall, the areas with maximum changes, mathematically, areas with high variations are targeted. When multiple faces are considered, they are compared by detecting these parts of the faces because these parts are the most useful and important parts of a face. They tend to catch the maximum change among faces, specifically, the change that helps to differentiate one face from the other. This is how Eigen Faces face recognizer works.

## 4. SYSTEM ARCHITECHURE



**Graphic 1.** Block Diagram.

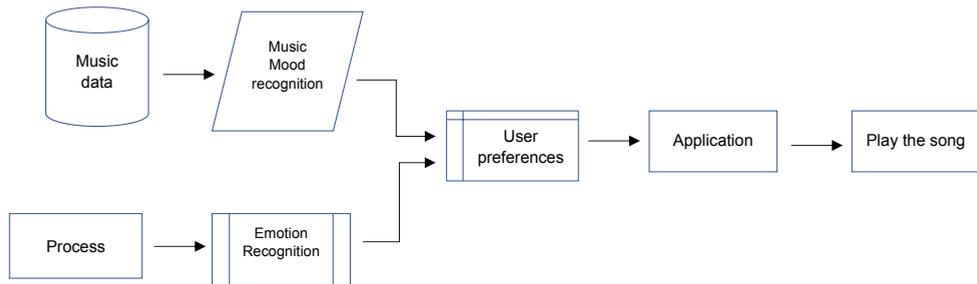
The proposed framework is first prepared to distinguish a face from a static picture. When the information picture is perceived, the picture is handled. The picture is exposed to SVM classifiers for subtleties to perceive the feeling displayed by the face. The subtleties recuperated from the image are utilized by the feeling classifier to discover feeling.

The song database and feature extraction module function simultaneously. The songs are disintegrated into several music pieces and the mood of the song is recognized. The songs are stored based on the mood detected. Once the emotion recognizer reports the mood, the songs pertaining to the mood are played by the music player.

## 5. MODULE IDENTIFICATION

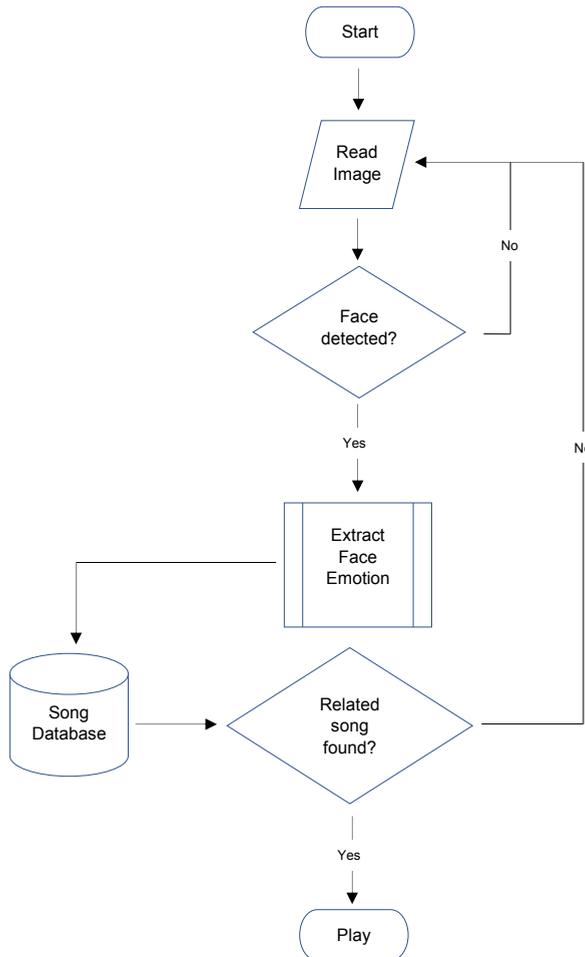
**Face Detection and Recognition:** Facial expressions are powerful reflections of the emotional state of a person. In this section, we will discuss how images with human faces can be processed in order to detect the emotions presented in them. Various algorithms are used for face recognition. Here we are using the OpenCV to detect the face in the image. Eigenfaces algorithm is used to recognize the face. The algorithms used for local feature extraction are Local Binary Patterns, Direct Cosines Transform, and Gabor Wavelets.

To depict progressively trademark highlights of the specific chose face most noteworthy Eigenvalues of the Eigenvector will be picked as the ideal eigenface. Most noteworthy Eigenfaces with low Eigenvalues could be discarded since they coordinated just a little piece of trademark highlights of the countenances.



**Graphic 2.** Module Explanation.

**Music Feature:** Music can be recommended based on available information such as the album and artist. Another way of classifying the mood based on pitch and rhythm. Unfortunately, this will lead to predictable recommendations. For example, recommending songs based on the artists that the user is known to enjoy is not particularly useful. With developing procedures, the utilization of Neural Networks has turned out to be progressively famous. We utilize an Artificial Neural Network (ANN) to arrange the melodies in individual classes. The dataset we utilized for preparing the model is Million Song Dataset given by Kaggle. The information comprises of two records: metadata document and triplet document. The metadata\_file contains the title, song\_id, artist\_name, and release\_by. The triplet\_file contains user\_id, song\_id and listen time.



**Graphic 3.** Flow diagram of the proposed system.

## 6. CONCLUSION AND FUTURE ENHANCEMENT

A simple system is proposed here for the music recommendation using face emotion recognition. It suggests music by extracting different facial emotion of a person: Happy, anger, surprise, neutral. There is a degree for further upgrades and enhancements. Progressively effective approaches to incorporate different highlights and functionalities should, in any case, be investigated due to the lopsided nature of each element set. It is additionally seen that to improve the exactness of the arrangement framework the informational collection used to construct the grouping model could be expanded further.

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