

MUSIC RECOMMENDATION BASED ON FACIAL EXPRESSION

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ABSTRACT

Music plays a very important role in human's daily life. Everyone wants to listen music of their individual taste, mostly based on their mood. Users always face the task of manually browsing the music and to create a playlist based on their current mood. The proposed project is very efficient which generates a music playlist based on the current mood of users. Facial expressions are the best way of expressing ongoing mood of the person. The objective of this project is to suggest songs for users based on their mood by capturing facial expressions. Facial expressions are captured through webcam and such expressions are fed into learning algorithm which gives most probable emotion. Once the emotion is recognized, the system suggests a play-list for that emotion, thus saves a lot of time for a user.

Once the emotion is detected by CNN then the emotion is used by Spotify API and then the Spotify API generates a playlist according to the emotion of the user.

Keywords: Face detection, Emotion recognition, Webcam, CNN classification, Spotify API, Music Playlist.

1 INTRODUCTION

Music plays an important role in our daily life. Users have to face the task of manually browsing the music. Computer vision is a field of study which encompasses on how computer see and understand digital images and videos. Computer vision involves seeing or sensing a visual stimulus, make sense of what it has seen and also extract complex information that could be used for other machine learning activities.

We will implement our use case using the Haar Cascade classifier. Haar Cascade classifier is an effective object detection approach which was proposed by Paul Viola and Michael Jones in their paper, "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001.

This project recognizes the facial expressions of user and play songs according to emotion. Facial expressions are best way of expressing mood of a person. The facial expressions are captured using a webcam and face detection is done by using Haar cascade classifier.

The captured image is input to CNN which learn features and these features are analyzed to determine the current emotion of user then the music will be played according to the emotion. surprise, neutral. This project consists of 4 modules-face detection, feature extraction, emotion detection, songs classification. Face detection is done by Haar cascade classifier, feature extraction and emotion detection are done by CNN. Finally, the songs are played according to the emotion recognized.

Convolutional Neural Networks (CNN) is a specific type of Artificial Neural Network which are widely used for image classification mathematical operations, such as convolution, a specialized type of linear operation. In digital images, pixel values are stored in a two-dimensional (2D) grid, i.e., an array of numbers and a small grid of parameters called kernel, an optimizable feature extractor, is applied at each image position, which makes CNNs highly efficient for image processing, since a feature may occur anywhere in the image. As one layer feeds its output into the next layer, extracted features can hierarchically and progressively become more complex. The process of optimizing parameters such as kernels is called training, which is performed so as to minimize the difference between outputs and ground truth labels through an optimization algorithm called backpropagation and gradient descent, among others.

2. LITERATURE SURVEY AND RELATED WORK

Literature survey is the most important step in software development process. Before developing the tool, it is necessary to determine the time factor, economy and company strength. Once these things are satisfied, then next step is to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the

programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites. Before building the system, the above consideration is taken into account for developing the proposed system.

2.1 Face Expression Recognition Using CNN & LBP:

Visual interaction is an effective means of communication for human beings as social beings. Even a simple change in facial expression signifies happiness, sorrow, surprise and anxiety. The facial expressions of every person should vary in various contexts such as lighting, posture and even background. All these factors still remain an issue while recognizing facial expressions. This paper hopes to bring out a fair comparison between two of the most commonly used face expression recognition [FER] techniques and to shed some light on their precision. The methods being used here are Local binary patterns [LBP] and Convolution neural networks [CNN]. The LBP is meant as a method only for the purpose of extracting features so the Support vector machine [SVM] classifier is being utilized for classifying the extracted features from LBP. The dataset used for the purpose of testing and training in this paper are CK+, JAFFE and YALE FACE.

2.2 A Machine Learning Based Music Player by Detecting Emotions:

This paper constitutes the implementation of Convolutional neural network for the emotion detection and thereby playing a song accordingly. In order to obtain minimal processing, multilayer perceptron implemented by CNNs. In comparison to various algorithms for image classification, CNNs observed to have little-processing. This implies that the filters used in CNNs are advantageous when compared to traditional algorithm. The visualization of features directly can be less informative.

2.3 Emotion-Based Music Player:

This paper proposed 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. The user and song emotions in this paper are divided into four types namely: neutral, happy, sad and angry. The experimental results present that detecting the happy emotion is the most precise with around 98%, while the accuracy of the sad mood detection is the lowest with 40%.

2.4 Automatic facial expression recognition using features of salient facial patches:

They proposed a system image from database is passed to the facial landmark detection stage to remove noise by applying Gaussian Filter or mask. Here itself they used Viola Jones technique of Haar-like features with learning for face detection. The feature detection stage consists of Eyebrow corners detector, Eye detector, Noise detector, Lip corner detector. After these active facial patches are extracted, the classification of features is done by SVM (Support Vector Machine). While testing it will take the hundreds of images from the database and extract the features and classifies accordingly. They used CK+ (Cohn-Kanade) dataset and JAFEE dataset for training and testing the database. The training database consist of 329 images in total.

3 EXISTING SYSTEM

The features available in the existing Music players present in computer systems are as follows: i. Manual selection of Songs ii. Party Shuffle iii. Playlists iv. Music squares where user has to classify the songs manually according to particular emotions for only four basic emotions. Those are Passionate, Calm, Joyful and Excitement.

Using traditional music players, a user had to manually browse through his playlist and select songs that would soothe his mood and emotional experience .In today's world, with ever increasing advancements in the field of multimedia and technology, various music players have been developed with features like fast forward, reverse, variable playback speed (seek & time compression),local playback, streaming playback with multicast streams and including volume modulation, genre classification etc.

4 PROPOSED WORK AND ALGORITHM

Convolution neural network algorithm is a multilayer perceptron that is the special design for the identification of two-dimensional image information. It has four layers: an input layer, a convolution layer, a sample layer, and an output layer. In a

deep network architecture, the convolution layer and sample layer may have multiple. CNN is not as restricted as the Boltzmann machine, it needs to be before and after the layer of neurons in the adjacent layer for all connections, convolution neural network algorithms, each neuron doesn't need to experience the global image, just feel the local region of the image. In addition, each neuron parameter is set to the same, namely, the sharing of weights, namely each neuron with the same convolution kernels to the deconvolution image. The key era of CNN is the local receptive field, sharing of weights, subsampling by using time or space, with a purpose to extract features and reduce the size of the training parameters. The advantage of CNN algorithm is to avoid the explicit feature extraction, and implicitly to learn from the training data. The same neuron weights on the surface of the feature mapping, thus the network can learn parallel, and reduce the complexity of the network Adopting sub-sampling structure by time robustness, scale, and deformation displacement. Input information and network topology can be a very good match. It has unique advantages in image processing.

5 METHODOLOGIES

MODULES

• PYTHON:

Below are some facts about Python.

Python is currently the most widely used multi-purpose, high-level programming language. Python allows programming in Object-Oriented and Procedural paradigms. Python programs generally are smaller than other programming languages like Java. Programmers have to type relatively less and indentation requirement of the language, make them readable all the time.

Advantages of Python

Let's see how Python dominates over other languages.

1. Extensive Libraries

Python downloads with an extensive library and it contain code for various purposes like regular expressions, documentation-generation, unit-testing, web browsers, threading, databases, CGI, email, image manipulation, and more. So, we don't have to write the complete code for that manually.

6 RESULTS AND DISCUSSION

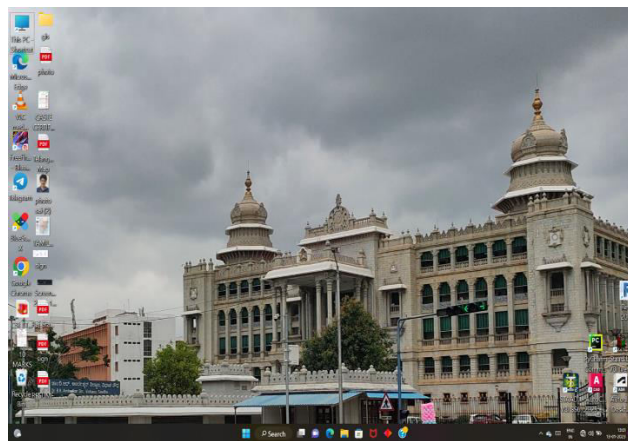


FIG 1 : HOME SCREEN



FIG 2: UPLOAD PHOTO

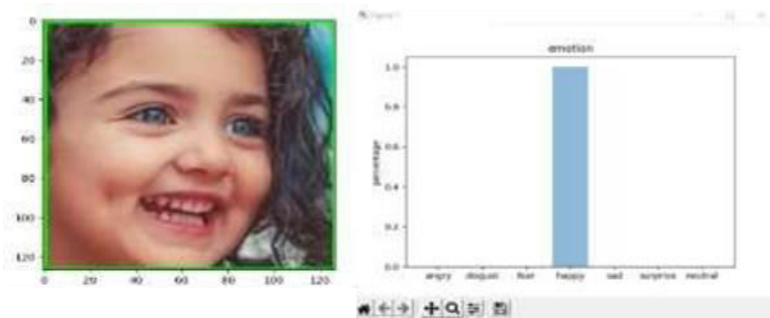


FIG 3 UPLOADED PHOTO

S.no	Songs
1.	The Best Days (feat. Tabitha)
2.	Fly Away
3.	Anyone
4.	Lasting Lover
5.	At Least I Had Fun
6.	Good Vibes
7.	Dancing in the Moonlight (feat. NEMV)
8.	Slow Dance (feat. Ava Max) - Sam Feldt Remix
9.	Holy (feat. Chance The Rapper)
10.	Love You Better
11.	Wonder
12.	Together
13.	Dive
14.	I Don't Know Why
15.	Drown (feat. Clinton Kane)
16.	Watermelon Sugar
17.	Get To Know You
18.	I Found You
19.	Run
20.	Lifestyle (feat. Adam Levine)

FIG 4: EMOTION DETECTED HAPPY

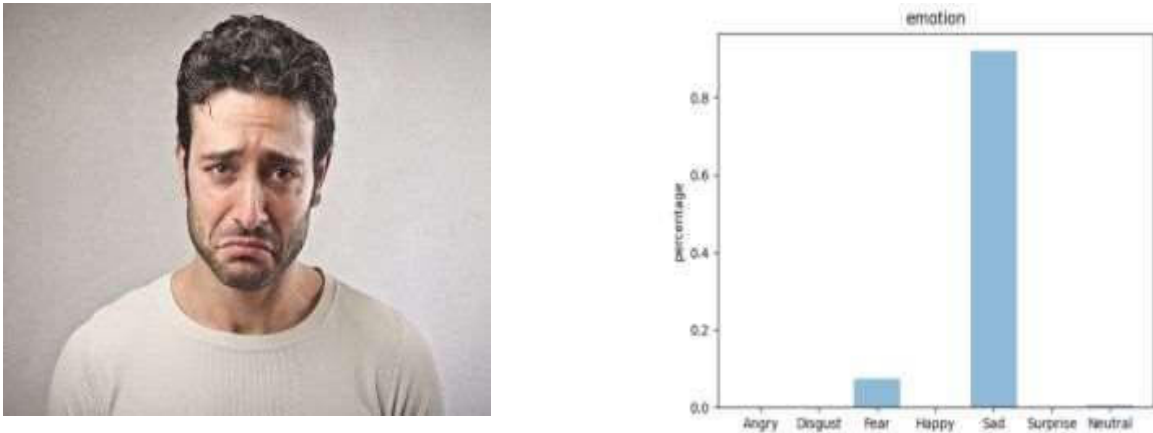


FIG 5: EMOTION DETECTED SAD



FIG 6: EMOTION DETECTED FEAR

7.CONCLUSION AND FUTURE SCOPE

In this project, we are generating the playlist according to the emotion of the user, we developed an application for predicting the emotion of the user using Convolution neural networks and for generating the playlist we have used Spotify API. We have applied it on various images and achieved an accuracy of above 80%.

FUTURE SCOPE

We want to extend our work by creating a real time music player which generates playlist and play songs according to the mood of the user

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