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Real time emotions recognition and analysis based music player

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ABSTRACT

One of the most essential components of an individual's body is the human face and it acts as the main indicator for the behavioural and the emotional state of the individual face and it's very important for the human to extracting the required input from the human face can be done by using the camera directly. The mean of this examination is making Facial Expression Recognition (FER) conspire by Utilizing the CNN Algorithm and tensor flow to recognize the face by the camera. Facial expression analysis is used in a different way to detect human emotions. There are four types of emotions are recognized: happy, sad, angry, neutral depends on the mood. The playlist itself have the songs in the database, it plays the songs according to the mood detect by the Camera. This research paper is effective because we are using the different algorithm i.e. CNN model which is based on Machine Learning which gives accuracy and reduces the time to recognize the emotions.

Keywords— *Face Recognition, Emotion Detection, CNN, Face Analysis, Tensor flow.*

1. INTRODUCTION

Music has been proven to become an important part of everyone's life. Facial expression is one of them which shows that technology works very differently in today's world. Recognition of facial expression is used to identify the basic human emotions. There are four types of emotions i.e. Happy, Sad, Angry, Neutral. To recognize these emotions, we are using the CNN Algorithm which is based on Machine Learning and we have the different data set of the emotions. The app data consists of 48*48 pixels of grayscale. The face occupies the less amount of space in each image. Every face is based on the Facial expression into one to four categories (0=happy, 1=Sad, 2=Angry, 4=Neutral). This dataset prepared by Pierre-Luc-Carrier and Aaron Courville, as a region of Associate in nursing in-progress research.

Most of the time some music lovers couldn't find the songs corresponding to their mood when they are in a hectic situation. So, we developed an Android-based Music player Application. By creating this app, we match the songs with the human's current mood because sometimes humans' mood not matching with a song so people get disappointed. In our database, we have a song playlist corresponding to the mood of human emotions. With the increasing advancements within the field of the multimedia system in recent times, there is various high-end music player accessible with the most recent options of handling the degree, modulation, pitch, sound, genre, etc.

Though these features are very useful for the users sometimes it becomes quite irritating and time-consuming to manually browse through the playlist for the intended song which user wants to play and supported his/her mood and emotion. It detects the face of the user by capturing the image using the camera and recognises the emotions and play the songs which are best suited to the user's emotional state.

The increasing progress of communication technology and computer science has led us to expect the importance of facial expression in future human-machine interface and advanced communication, such as multi-media and low-bandwidth transmission of facial data In human interaction, the articulation and perception of facial expressions form a communication channel, that is additional to voice and that carries crucial information about the mental, emotional and even physical states of the conversation [1]. The computer vision applications face the issue due to the fact that the real world is three dimensions but the computer works in two dimensions. In our day to day life, we interact with each other directly either by face to face or indirectly by phone calls [2]. For the purpose of providing the users with the best possible and effortless pleasure of music, Facial Expression Recognition (FER) based systems have been adopted as they provide more fast, accurate and efficient results with less effort.

To realize this goal, next-generation computing (a.k.a. pervasive computing close intelligence, and human computing) can develop human-centred user interfaces that respond promptly to present, multimodal, human communication. These interfaces will need the capacity to perceive and understand intentions and emotions as communicated by social and effective signals. [4]

It reduces the time-consuming and it takes less than 1.4 seconds to acknowledge one instance of feeling. The high performance and therefore the less time demand of the system create it appropriate to any emotion-aware mobile applications and the rate accuracy is very high. This system eliminates the time-consuming and the tedious work of manually playing the songs from any playlist accessible on the net or in the other Application.

2. EXISTING SYSTEM

[1] In this paper, they used the PCA (Principal Component Analysis) for implemented the Singular Value Decomposition (SVD) for feature Extraction so that they detect the 100% emotions. The objective of this paper is they made the application highly machine intelligent and they used the 8 emotions in this paper and they use the JAFFE database for the results.

[3] In this paper, they used the Bezier Curve algorithm for detecting the face outlines and the points and they used the only four emotions to detect. This paper shows the real view of the emotions of humans to recognize the face and give the 70% accuracy and they studied the 70 persons of images.

[4] In this paper, they show the automation of the entire process of facial expression and give the solution with high accuracy that would be enormously beneficial for the system as diverse as medicine and communication. This paper shows a lot of progress in past few years and faced a lot of problems to resolved the problem but then also they have reached to that point to showcase our skills in this paper they have used the machine learning technology in this research paper.

Thayer [12] proposed a very useful 2-dimensional (Stress v/s energy) model plotted on two axes with emotions depicted by a 2-dimensional coordinate system, lying on either 2 axes or the 4 quadrants formed by the 2-dimensional plot. The music mood tags and A-V values from a total 20 subjects were tested and analysed in Jung Hyun Kim ‘s [13] work, and based on the results obtained from the analysis, the A-V plane was classified into 8 regions(clusters), depicting mood by data mining efficient k-means clustering algorithm

3. PROPOSED SYSTEM

The Proposed System provides an interactive way to get the high-performance emotion recognition system for the Android-based Mobile Applications. By using the Proposed System, the users will not have to choose the songs by its own, it automatically scans the memory from audio files, when the application is opened and played the songs accordingly. In this paper, we used the different algorithm which gives us the accurate result of capturing the emotions. According to the proposed system, parameters are provided in the database, which is inbuilt since the application is developed. From this application, the features are extracted.

These parameters include a limited set of genre types based on which the audio feature values will be processed. Then the songs are divided into different playlists and it scans the songs based on similar genres types automatically, with the help of feature extraction process. In the next step, the user’s camera takes permission to scan an image in a real-time graphical input. The system first checks for the presence of a face in the input using the face detection process, then classifies the input and generates an output which is an emotion (mood) based on the Face expression Recognition (FER) extracted from the real-time graphical input.

In the end, the classified expression, which is detected from FER acts as an input and is used to select an appropriate playlist from the initially generated playlists and the songs from the playlists are played. The Proposed System does not work manually, it is fully automatic. The rate of accuracy is very high. It takes less than 1.4 sec to recognise facial expression and play the song accordingly.

4. FACIAL EXPRESSION RECOGNITION (FER)

In 1884, William James gives the important physiological theory of emotion that is in a person emotion is rooted in the bodily experience First, we have a tendency to understand the thing then response happens and so emotions seem. For example, when we have a tendency to see a lion or alternative danger we start to run and so we worry. Each emotion has its own characteristics and appearance figures [11]. Feature extraction is one of the most important parts of this android application, there are different ways to detect the face and emotions. In the beginning, the image is contrasted and skin colour segmentation (Son Lam Phung, Abdesselam Bouzerdoum, and Douglas Chai, 2003) is executed [3].

Then we find the possibility to find the proper and largest face to detect the skin colour or image of the person and connected to the region so, it detects the face clearly. In this, every emotion has a different feeling or positive feeling. In this paper, we use only four emotions happy, sad and neutral.

Every emotion plays a very important role in the application because when we are very happy the feeling is very positive and very sad and the person wants to listen the soft music depend on the mood and when the mood is neutral then we usually listen to mix songs and in a sad mood the feeling is a little bit too low or negative then we use to listen some romantic or low music. Recently a real-time emotion recognition system deployed on a Microsoft’s Windows desktop is purposed that work on still images of the face as well as in real time environment for feature extraction and emotion recognition [5]. The face expression is only recognized by the static image. Testing of the algorithm is performed on a database of the people, which is obtained from the FEI face database. Experimental result reveals that the success ratio is better for a smile, because the control points and curves for smile are given more appreciable changes from a neutral expression.

4.1 Image processing

In image processing, we usually take the picture and converted the image into grey scale so that the colour of the image will remain same and it captures the only main area of the face and resize the image into 48*48-bit map. To normalize the pixels, we use the classifier and that classifier normalized the pixels and give the final result and figure 1 is given below

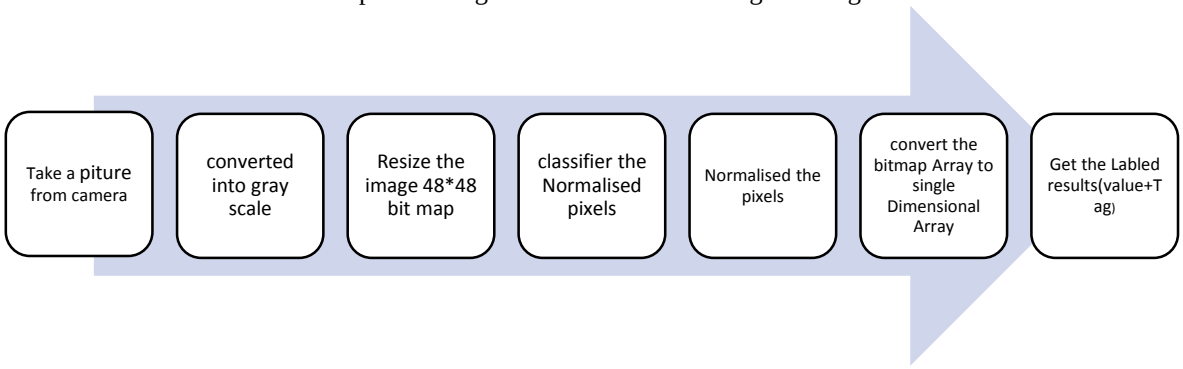

Fig. 1: Flow chart of image processing

4.2 Emotion detection

In case of face detection (M. Bichsel and A. P. Pentland, 1994), at first RGB image is converted into a binary image. By calculating the average RGB value for each pixel, the image is converted into the binary image [3]. It scans the only three parts of the face like eyebrows, lips, and nose. The pixels size is 48*48 bitmap image. Among the 53 false dismissals cases, some of the faces are grey-scale images from the JAFFE database, which leads hard to detect the skin colour pattern of facial region in the image [6]. Many detection methods have been employed to detect faces some of the previous [7] [8] [9] face detection methods summarized here.

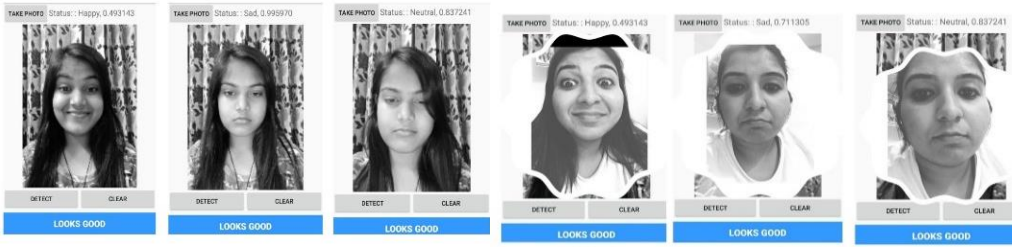

Fig 2. Showing facial expression with accuracy

4.3 Expression recognition using template

Expression recognition is the process of extracting eventful attribute which is a help to a segment of the image into other classes. Templates matching is state support by making use of roll and intercourse coefficient for the higher and faultless matching. The wanted eyebrow, eye, mouth are stage transcript from the image and extracted output which is selected rectangle.

4.4 Extracting the facial characteristic points

The cropping rectangle forms the matched template used to conjecture the value of top left angle pixel from the rectangle in table 1 specified by using height and width of template we enumerate all 30 fcp. These values of a pixel are used to detect the facial enlivenment attribute described the opening of the eye(or), the height of eyebrow(he), the opening of the mouth(om), the width of the eye(we), the width of mouth(wm), task explain the calculation of fcp.

4.5 Open CV

The open CV stands for open source computer vision library. Open CV library programming function is mainly used on real-time computer vision. It was used in languages DBMS, PHP, android interfaces. It was mainly supported operating system like windows, Linux, Mac operating system, iOS and Android. An open CV can be used in our project because it was mainly aimed at real-time image processing. In this open CV can be accelerated if Intel's integrated performance primitives are installed on our program. The open CV supply complex number of functions for face recognition and face detection. Open cv can be used in trainer and detector, if we want to train our own classifier for any object like mobile, pen, we can use cv to create one.

5. CNN ALGORITHM

In this section, we study the usage of Convolutional Neural Networks (CNN) to emotion recognition. CNN's are known to simulate the human brain when analysing visuals; however, given the computational requirements and complexity of a CNN, optimizing a network for efficient computation is necessary. Thus, CNN is implemented to construct a computational model which successfully classifies emotion in 4 moods, namely, happy, sad, angry and neutral, with an accuracy of 70.23%.

6. CONCLUSION

This paper concludes that our Application is more accurate than previous applications because we have used the different algorithm CNN this algorithm is taken from the Machine Learning. In this paper, we have used the four emotions i.e. happy, sad, angry and neutral. The application takes 1.4sec to capture another emotion it gives the accurate result and it reduces the time also and it easily cleans the memory which is never done in previous systems. The technology we have used is java and android studio.

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