MACHINE LEARNING-BASED FACE EMOTION DETECTION

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ABSTRACT

This research constructs a face emotion framework that can examine fundamental human facial expressions. The approach suggested was used by humans to classify the humans' mood and eventually to play the audio file that links to human emotion using this result. First of all, the device takes the face of the human being as a part of the process. It is carried out facial recognition. After this, the human face can be recognized using attribute extraction techniques. This way the emotion of humans can be identified using the picture element. Those signature points are located by the extraction of tongue, mouth and eyebrows, eyebrows. If the input face precisely matches the emotion dataset face, we will detect individual feelings to play the emotional audio file. Training with a small range of characteristics faces can gain recognition in varying environmental conditions. An easy, effective and reliable solution is proposed. In the field of identification and detection, system plays a very important part.

Keywords— Machine Learning, Music Player, face detection, feature extraction, and face emotion

INTRODUCTION

Find a human feeling using the face of man can be the most testing activity in your career. A face is the best means of recognizing and perceiving an individual. Without face recognition stage no acknowledgment calculations will work. The recognition phase is influenced by the identifying process. This is an incredibly exciting command with all of these disturbances to locate and contain a darker picture.

The temperament position based on sensation is one of the topics that addresses various problems in the different fields. In addition to traditional facial challenges in unregulated environments, such as fluctuating positions, distinguishing illumination and facial recognition appearances, and various acoustic frequencies to recognize feelings. The key aspect of the correlation of the face highlights and sound Mel recurrence fragments is with each face and mind recognition frame basis. Highlights are calculated for the construction of the knowledge base and these highlights are stored in the information basis. This database is then used in various calculations to test the face and sensation.

Face sensing systems for identification are also a challenging task because face images can be affected by changes in the scene, such as current variation, face shape or illumination. The main aim of this system is to locate the human state of mind with the aid of face picture as information and then to play the sound document using these sensational results. A recognition of the face technique was used to compare the face of the train to the first image of the information.

The method proposed is fundamental, constructive and accurate. In comparison to the current approach, this system provides accurate results. The structure is important in the field of identification and exploration. In comparison to conventional methods, this produces substantial results quickly.

LITERATURE SURVEY

The thesis explores many well-known and special methods used for the extraction of facial expressions and emotional grading. Several algorithms are contrasted with the output parameters such as precision in identification, emotional quantity, experimentation databases, classification used, etc. [1] in research on facial expressions.

In this work the facial expressions from the face picture are identified and feelings are classified for final judgement. The machine uses a simpler technique for face position known as 'Viola Jones Face Detection.' The club uses a subset sorting strategy to increase the accuracy of identification and classification processes for the various characteristic vectors. The combined characteristic is finally qualified and graded using the classification technique of SVM, Random Forest and KNN[2].

The suggested technique uses three stages face identification using hair cascade and features the extraction of five emotional wrath, disgust, satisfaction, neutrality and surprise by the Active Form Model (ASM) and Adabost classifiers technique [3].

In this work an effective methodology is used to build a database of facial and emotional features which is then used to identify the face and emotions. We use Viola-Jones face recognition methods to recognize face from the input image, and we use KNN classifier technique to analyses the face and emotion detection[4].

This paper aims to demonstrate facial expression recognition needs and applications. The exchange of facial expression between verbal and non-verbial means is type of non-verbal connection, but it plays a key role. It reflects a relationship between people or their mental status [5].

The human face is attentioned to acknowledge speech in this proposed scheme. Many methods for recognizing the face picture are available. It is possible to apply this approach very quickly to the actual method. The machine briefly presents images from the webcam, senses the face and analyses the image in such a manner that few findings are recognized [6].

The latest SIFT flow technique is adopted in this work for the registration of each frame for a character Avatar reference face. An iterative technique will be used to superresolve not only the EAI representation for every video and Avatar, but also the recognition performance of each video. Additionally, use both Local Binary Patters (LBP) and Local Phase Quantization (LPQ) techniques to derive features from EAI's[7].

In this study a method for recognizing emotions is developed, including facial identification, extraction of features and classification of facial expression. A method of skin detection helps the facial region first of all from a challenging context in part of face detection. This function points are initiated with the identification of the lip, mouth and eyes [8].

A new technique for the identification of face emotions is found in this work. This suggestion includes the use, along with minimal gap for facial recognition, of hair transforming technique and AdaBoost adaptive technique to identity the face and main component analysis (PCA) technique. For facial expression recognition, two techniques were tested. The first relates to the use of the grouping techniques of PCA and K-nearest neighbour (KNN), while the latter supports the use of the techniques Negative Matrix Factorisation (NMF) and KNN[9].

PROPOSED SYSTEM

The audience used the proposed approach to distinguish between this individual's mood and the end use of this finding for performing music synonymous with human feelings. At first, it seems to be purely for human faces, and then expands both skills are exercised afterwards to interpret the location of the human face some of these approaches aim to convey the emotions of the human face. Focuses are situated in the tongue, the mouth, and the eyes. If the information's presentation corresponds exactly with the customers' sensory perceptions, people will correctly identify it based on their inclinations with the API. Recognition can be done in varying conditions with natural faces.

PROPOSED SYSTEM ARCHITECTURE

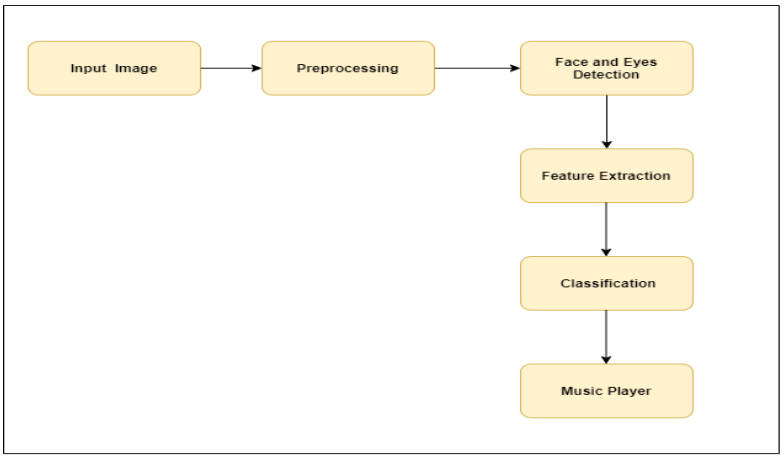

Fig1. Proposed System Architecture

METHODOLOGY

Feature Extraction for Face Identification:

Color feature:As most of the color distribution information can be captured by the low-order moments, using only the first three moments: mean, variance and skewness, it is found that these moments give a good approximation and have been proven to be efficient and effective in representing the color distribution of images (Stricker and Orengo 1995).

Edge Detection: Most of the shape information of an image is enclosed in edges. So first we detect these edges in an image and by using these filters and then by enhancing those areas of image which contains edges, sharpness of the image will increase and image will become clearer.

Texture feature: Describes the structure arrangement of surfaces and their relationship to the environment, such as fruit skin, clouds, trees, and fabric. The texture feature in our method is described by hierarchical wavelet packet descriptor (HWVP). A 170- D HWVP descriptor is utilized by setting the decomposition level to be 3 and the wavelet packet basis to be DB2.

MATHEMATICAL MODEL

Face Image Feature Extraction using Global Features

1. Mathematical Equations of Color Feature Extraction Method

The color distribution information can be captured by the low-order moments, using only the first three moments: mean, variance and skewness, it is found that these moments give a good approximation and have been proven to be efficient and effective in representing the color distribution of. These first three moments are defined as:

$\mu_i = \frac{1}{N}\sum_{j=1}^{N} P_{ij}$

$\sigma_i = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(P_{ij} - \mu_i)^2}$

$S_i = \left[\frac{1}{N}\sum_{j=1}^{N}\left(P_{ij} - \mu_i\right)^3\right]^{\frac{1}{3}}$

Where, Pij is the value of the ith color channel of the jth image pixel. Only 3 x 3(three moments for each color component) matrices to represent the colorcontent of each image are needed which is a compact representation compared to other color features.

2. Mathematical Equations of Canny Edge Detector Method

Step1: Smooth the image with a Gaussian filter to reduce noise and unwanted details and textures.

g (m,n) =G_σ (m, n) * f (m, n)

Where

$G_\sigma = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(\frac{m^2+n^2}{2\sigma^2}\right)$

Step2: Compute gradient of g (m, n) using any of the gradient operations (Roberts, Sobel, Prewitt, etc) to get:

M (n, n) = $\sqrt{g_m^2(m,n) + g_n^2(m,n)}$

And

$\boldsymbol{\theta}$ (m, n) = tan^{-1}[g_n (m, n) / g_m (m, n) /]

Step3: Threshold M:

M_T (m, n) = $\begin{cases} M\ (m,n)\ if\ M\ (m,n) > T \\ 0 \qquad\qquad Otherwise \end{cases}$

3. Mathematical Equations of Texture Feature Extraction Method

According to co-occurrence matrix, there are several textural features measured from the probability matrix to extract the characteristics of texture statistics of remote sensing images. Correlation measures the linear dependency of grey levels of neighboring pixels.

Correlation = $\frac{\sum_{i=0}^{Ng-1}\sum_{j=0}^{Ng-1}(i,j)p\ (i,j) - \mu_x\,\mu_y}{\sigma_x\sigma_y}$

DATASET DESIGN

1. We will use the Japanese Female Face Expression dataset.
2. This data set consistsof several facial expression images of Japanese female models.
3. The JAFFE database is available free of charge for use in non-commercial research.
4. We will divide this data set as testing and training.

RESULT

Let us consider the face image in figure 1. Gray scale conversion is completed which is shown in figure 2 and Median filtering is implemented on the acquired images to get rid of the unwanted noises. The outcomes are displayed in the figure 3 respectively.

Fig. 1 Input Face Image

Fig. 2 Gray Image

Fig. 3 Noise Removed Image

After noise remove, next step to detect the actual face. So using cascade classifier, the face detection is done. The outcomes are displayed in the figure 4.

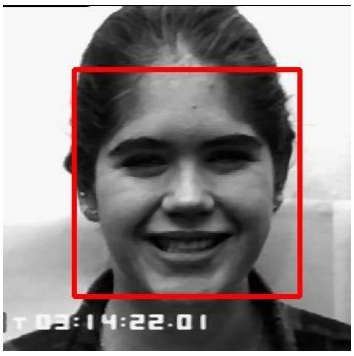

Fig. 4 Face Detected Image

After face detection, next step is to crop the detected face from image for feature extraction process. The outcomes are displayed in the figure 5.

Fig. 5 Face Crop Image

Next, image feature extraction process, all features are extracted from image and using that feature and also training data features to recognized the mood of person.

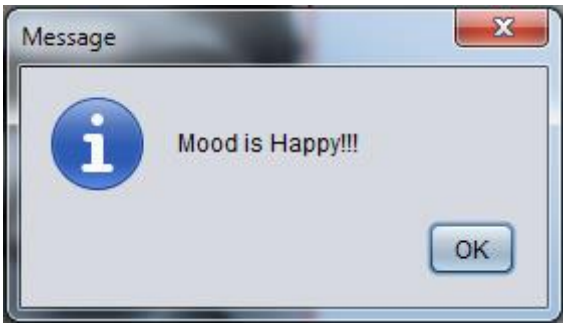

Fig. 6 Mood Detection

The following graph and table shows the mean, variance and skewness values of each face image which is sad and happy.

CONCLUSION

The proposed work, which is based on human emotion detection and implements a feature extraction algorithm, is described below. The extraction of feature information from a face image and the matching of the feature information to the training emotion-based human face dataset are required for the detection of human emotion using the face image. After that, the system played the audio file, which was the additional work, based on the results obtained. In addition, we recommend music based on the mood that has been detected. The work can be further developed in order to improve the recognition accuracy as well as the processing time for large face databases. As a result, our system can play a critical role in the detection of human emotions based on facial expressions.

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