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EMOTION RECOGNITION USING FACIAL EXPRESSION

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1.ABSTRACT

This paper aims to present the facial expression recognition needs and implementations. It conveys the human perspective or filling & his or her mental state. A big work to improve human-computer interaction (HCI) has been tackled over two decades. This paper includes the introduction of the emotional facial recognition system, an overview of the implementation. In this, we explore the application of facial expressions extraction function combined with neural networks to identify different facial emotions (happy, sad, angry, fear, shocked, neutral, etc.).

2.INTRODUCTION

We recognize that in human life, feelings play a significant role. The human face represents how he/she feels or in which mood he/she is at various kinds of moments or times. Subtle changes in one or more distinct features also convey emotion or intent. Including or not adding one or more facial movements will alter its perception. Additionally, certain facial expressions may have a similar gross morphology but may suggest a number of meanings for different intensities of speech.

Recognition of human feelings plays a significant part in interpersonal relationships. Automatic recognition of emotions has an active subject of early-era research.

Emotions are expressed by the body's voice, hands and gestures, and by facial expressions.

Fear, surprise, sorrow, joy, rage, disgust are the six basic emotions which were agreed unanimously. Fear, rage, disgust and sadness are negative emotions and most people don't like them because happiness is a good emotion and everyone wants to enjoy it.

Fig 1. Types of emotion

STEPS INVOLVED IN FACE DEDUCTION:

2.1. Face Detection and Cropping:

The Viola-Jones detection algorithm is used in Face Detection in this method. The basic idea behind the Viola-Jones algorithm is that it scans a sub-window that can detect faces within the frame of the input image. A basic extraction method is used after identification of the face to remove the face and then cropping of the face is performed. The device output is improved by using face cropping, as it

involves removing non-skin components such as hair and background from the extracted face image.

2.2. Edge Detection and Size Reduction:

Edges of the cropped facets are detected in this step. Edge detection uses the MATLAB toolbox for image processing. Using it to identify endpoints of different features such as eyes and lips. Plays edge detection tests. After edge detection, the low-dimensional facial space of qualified facial database images is constructed using the main component analysis (PCA) and selected Eigenvectors with higher Eigenvalues. Then the face database test images are also projected onto face space. Today, PCA is widely used in computer vision dimensionality reduction and often in facial recognition systems. It is also known as methods for the Karhunen-Loeve. PCA chooses a dimensionality that reduces linear projection, increasing the scattering of all predicted samples. Using a linear method of data reduction called the Principal Component Analysis, the feature vectors were normalized to zero mean and further compressed.

2.3. Distance Measurement:

The Euclidean distance is used to measure the distance between various characteristic points. If the features have n-dimensions then the generalized Euclidean distance formulation between the feature points (x, y) is defined by Euclidean Distance (x, y) = √(X1-Y1)2+(X2-Y2)2 + ...) Using this we also measure other distances between any feature points.

2.4. Emotion detection:

Emotion detection is based on measuring distances between various points of devices. In this step a comparison is made between the test image distances and the neutral image, and the best possible image match is also selected from the training tab. It detects the emotions even on the basis of certain measured distances. Andit shows the final results.

2.5. Methodology

STEP1:
Organizing the dataset

- Make separate folder for each emotion type.
- Extract all the images in a source folder.
- Each image sequence has a natural face image followed by depicting various emotions.
- Task is to separate a natural face image and an emotion image from an image sequence.

STEP2:
Extracting the faces

- Use HAAR filter classifier provided by open CV to extract face from an image, crop it and save it in the database.

STEP3:

- Creating training and classification set.

STEP4:

- Test and analyze the results.

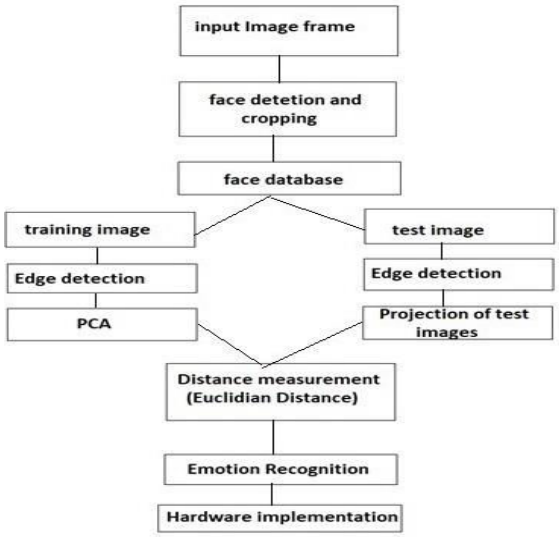

Fig. 2 Steps of Emotion Recognition

3. Face detection

The first important step to understanding facial expression is automatic and accurate facial detection. The facial detection algorithm used by Paul Viola and Michael Jones is used to isolate the face area. A face detection algorithm can process images and get high detection rates.

There are 3 major bits. The first is a detailed picture reflecting new images. It allows for very fast computation of the features used by the detector. The next one is a basic classifier that is used to pick a few features from a very wide collection of features. The third part combines the classifiers in a "cascade" that quickly discards background regions of the picture.

3.1. Eye detection and eye features extraction

For facial expression, eye recognition is very important as it plays a major role in facial symmetry and other facial features such as lips, eyebrows, nose, etc. The face is identified first, then the predicted area of the eyes is located using facial geometry. The eyes are situated at the upper part of the face in face pictures. Removing the top 1/5th part of the area of the neck, take the first 1/3rd vertical portion as the eye region predicted. Uses hair-like cascaded features and the target recognition algorithm for Viola-Jones to identify the eyes.

3.2 Eyebrow Feature extraction

The goal of extraction of the eyebrow function is to find a vector that describes the characteristics of the eyebrow and is further used for recognition of facial expression. Using simple facial anatomy, the eyebrow position is calculated, as the eyebrow area is located slightly above the eye area.

3.3. Nose Features detection

The nose lies underneath the eyes for a frontal facial portrait. Face Geometric is used to measure the location of the nose. The nostrils are found to be slightly darker than the area around the nose. The nostrils are found to be slightly darker than the area around the nose. The method of contour detection is applied to find two contours of our nostrils. The bases of each of these contours are known as the two nostrils.For the extraction of lip area an algorithm for contour detection is used. The next step is to detect the contour of the lip from the area calculated for the lip. To remove lip from the intended region a color dependent transformation method is used.

3.4. Facial Expression recognition

Kohonen self-organizing map (KSOM) has the ability to cluster the data in an order that preserves the input data topology. Due to this KSOM property, data of similar facial expressions (small changes in features) is clustered into closer zones. This in turn makes the ratings even higher. This KSOM property motivates us to use it to classify the data on features into six simple expressions.

4. PROPOSED SYSTEM

The proposed method is useful in the classification of six basic human emotions- Joy, Sorrow, Rage, Shock, Disgust and Fear. The first part of this model is to define and extract features from the faces and the second part is to use modified Self Organized Map to classify the emotions based on those features.

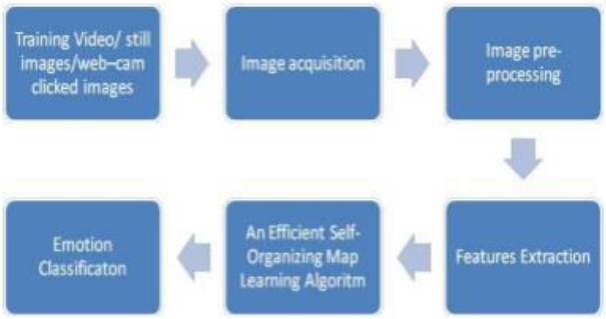

Fig 3. System diagram of the proposed training approach

4.1 Image Acquisition

Photos used for identification of the facial expression are static photos or series of images. A series of images that contain more information than a still image, which are colored or gray-colored images.

4.2 Pre-processing

Pre-processing is usually performed prior to extraction of the functionality, in order to increase the efficiency of the device. This involves cropping, scaling and smoothing of photos acquired to produce manipulated facial images that reflect a certain emotion.

4.3 Feature Extraction

Typically the most important step in the field of recognition of facial expression is the extraction of the facial feature, which is focused on discovering a collection of features that communicate information about facial expression. The system of geometric features is used to remove geometric features from the facials.

In this step 26 characteristics are extracted from the face image considering that the observed face is frontal or near frontal and assuming other geometric constraints such as: location inside the face, scale and symmetry to the facial symmetry axis. Feature points are measured using distance to the Euclidean.

4.4 An Efficient SOM algorithm

The changed SOM self-organized at every corner of the input data in a better way than the traditional SOM. The important feature of modified SOM is that it considers the winning frequency of neurons.

5. Conclusion

Throughout this paper we proposed an accurate, high-speed emotion recognition device. For future work the proposed method can be applied to the hardware implementation. Because of the simplicity of proposed method has simple structure Proposed algorithm is evaluated by 50 still images.

Also when using existing data, the results of their analysis were right in 31 to 81 percentages, from which only 72 to 81 percentage points were obtained using Fuzzy logic. This paper also gives us the idea that by reading and comparing the faces with pictures or data stored in the knowledge base, we can also experience human emotions.

Using a system trained by neural networks, we obtained accurate results of up to 97 per cent in this paper.

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