Review Paper On Human Emotion Detection By Hybrid And Active Appearance Techniques

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Abstract-In modern human computer interaction systems, human emotion recognition is becoming an important feature. In various papers they propose a new and different method for automatic recognition of facial expressions related to categories of basic emotions from image data. The techniques that are presented involves the creation of an active appearance model (AAM) which is trained on face images from a publicly available database to represent shape and texture variation key to expression recognition. The results of the study demonstrates the effectiveness and use of AAMs in capturing the important facial structure for expression identification and also help suggest a framework for future development. The other techniques these papers presents is a novel approach for the detection of emotions using the cascading of Mutation Bacteria Foraging optimization and Adaptive Median Filter in highly corrupted noisy environment. The proposed method uses cascading of MBFO & AMF for the removal of noise and Neural Networks by which emotions are classified.

1 INTRODUCTION

Facial expressions provide a key mechanism for understanding and conveying emotion. Even the term "interface" suggests the primary role of the face in communication between two entities. The ability for humans to interpret emotions is very important to effective communication, accounting for up to 93% of communication used in a normal conversation. The work presented in this paper explores the recognition of expressions and a biometric representation of an individual which is a measurable characteristic, whether physiological or behavioral, of a living organism that can be used to differentiate that organism as an individual. Biometrics offers the identity of an individual may be viewed as the information associated with that person in a particular identity management system

In addition, they developed a scoring system used to systemically categorize the physical expression of emotions known as the Facial Action Coding System (FACS). The study of the facial muscle movements classified by FACS in creating certain expressions was used to inform the choice of landmarks for active appearance model (AAM) shape parameters in our work. AAM was built using training data and tested on a separate dataset. Test face images were then classified as one of the six emotion-based expressions or a neutral expression using the AAM parameters as classification features. The technique achieved a high level of performance in classifying these different facial expressions based on still images. This paper presents a summary of current contributions to this area of research, discusses our approach to the problem, and details techniques we plan to pursue for this work.

2 RELATED WORK

Facial expressions provide the building blocks with which to understand emotion. In order to effectively use facial expressions, it is necessary to understand how to interpret expressions, and it is also important to study what others had done in the past. Automated analysis of facial expressions for behavioral science or medicine is another possible application domain. From the viewpoint of automatic recognition, a facial expression can be considered to consist of deformations of facial components and their spatial relations, or changes in the pigmentation of the face. Recent discoveries suggest that emotions are intricately linked to other functions such as attention, perception, memory, decision making, and learning. The AAM approach is used in facial feature tracking due to its ability in detecting the desired features as the warped texture in each iteration of an AAM search approaches to the fitted image.

FACS may incorporate other sources of emotional stimulus including non-emotional mental and physiological aspects used in generating emotional expressions. Much of expression research to date has focused on understanding how underlying muscles move to create expressions. Much of previous work has used FACS as a framework for classification. First approach-Facial Expressions with Active Appearance Model. In this work the main goal was to study the effectiveness of using AAMs to build a robust framework for recognizing expressions indicative of emotion in still images of the human face. A method for feature extraction and classification that yields successful results and builds a framework for future development.

3 Background

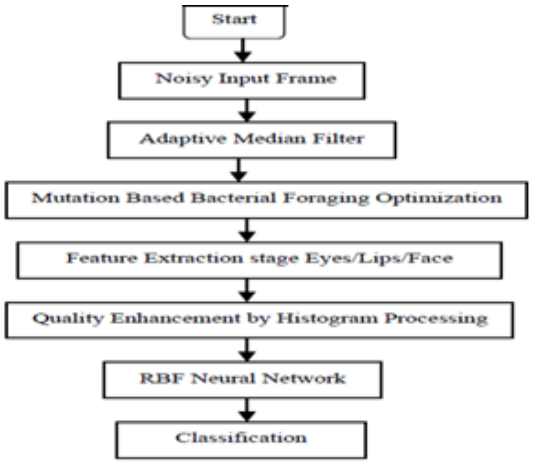
Acquiring appropriate data for both training and testing. In the experiment we create classification states for each of these basic emotions and also for neutral facial expressions. A method for feature extraction from the training data is also needed. AAMs are well suited for the task of handling various poses and expressions and are thus chosen for this work. Building an appearance model entails choosing images to be used as training data and then properly labeling those images using a pre-defined format based on the nature of the experiment.{1} The following subsection discusses the selection of data, landmark labeling, and AAM creation. Key areas were chosen to capture the movement of the brow, eyes, mouth, and nasio-labial region as formed by the underlying muscles expected for expression of the face. Once an initial AAM was trained on several subjects, the search function helped automate the labeling process.

In this experiment we used a leave-one-out approach to improve testing methods with relatively few subjects. {2}Stills from each of the fifteen subjects were used for testing data after an AAM and class parameter-vector means were found using the other subject stills as training data. Vectors from both the training and test data were extracted from the appearance model and loaded into MATLAB code to create the mean parameter vectors and compute the distances for classification.

Second approach-Hybrid Techniques For Human Face Detection. The design and implementation of the Facial Expression Recognition System can be subdivided into three main parts:

	Percentage Correct
Subject 1	80.0%
Subject 2	74.0%
Subject 3	90.5%
Subject 4	90.9%
Subject 5	96.3%
Subject 6	79.2%
Subject 8	83.3%
Subject 9	100%
Subject 10	60.0%
Subject 11	100%
Subject 12	75%
Subject 13	100%
Subject 15	83.3%
Subject 16	89.7%
Subject 18	100%
Total Average Correct	91.7%

Table 2. Classification results by subject.



3.1 Image Pre-processing

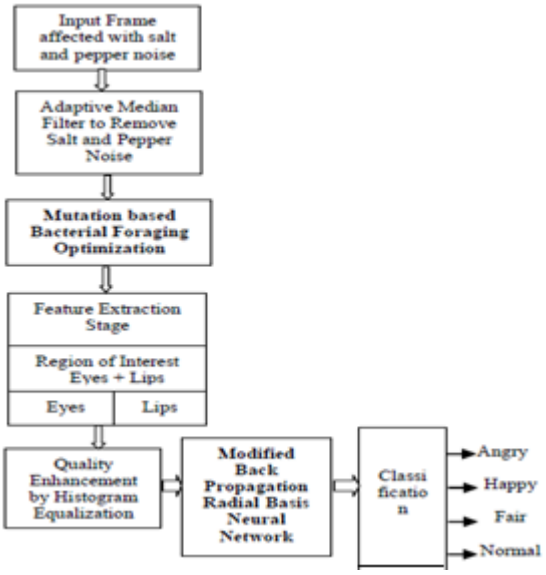
The image processing part consists of image acquisition of noisy image. Filtering, Feature Extraction, Region of Interest clipping, Quality enhancement of image. This part consists of several image-processing techniques.

3.2 Recognition technique

The Second part consists of the artificial intelligence, which is composed by Back Propagation Neural Network and Radial Basis Neural network. First training of the neurons is there and then testing is done. Back-propagation and RBF algorithms are used in this part.

3.3 Testing First

Testing and then there is result of classification of images. The third phase consists of testing of expressions that shows the percentage of accurate results and result of classification for different expression.



4 Experimental Results

For approach one-
An analysis of the results in Table 2 show that the system correctly classified anywhere between 60% and 100% for each individual using only still images. Most subjects were in the 80% to 90% range, but a few subjects showed poor performance recognition {3}.The overall success in this first classification approach leaves room for future development, particularly in some areas. Overall, though, AAM parameters achieved significant success using only a Euclidean distance measure and produced results that compare well with other techniques.

4.1 CLASSIFICATION RESULT

	Percentage Correct
Fear	90.0%
Joy	93.3%
Surprise	79.7%
Anger	63.9%
Disgust	93.3%
Sadness	63.9%
Neutral	93.3%

For approach two-
The proposed algorithm technique is applied on sample images. Applying the technique on the sets forms the feature set. In the experimental phase, they took the first image of the first subject from the prototype image set as the query image and the top matching ten images are found from a set of all probe images. In the experiments, they have taken 1 person images as 21 images for a single person from that 13pairs are trained in the training with different emotions we have used common type of noise namely, salt and pepper impulsive noise that affect the biometric image processing applications.

Statistical features of lips

Statistical Features	Noisy Frame	Restored Frame	Cropped Frame	Enhanced Frame
Mean	0.5022	0.5016	0.5000	0.4998
Median	0.5469	0.5429	0.4921	0.4221
Standard Deviation	0.4578	0.2229	0.2134	0.2014

Statistical features of mouth

Statistical Features	Noisy Frame	Restored Frame	Cropped Frame	Enhanced Frame
Mean	0.5021	0.5016	0.5001	0.5002
Median	0.5510	0.5469	0.5079	0.5079
Standard Deviation	0.4585	0.2229	0.2937	0.2935

Statistical features of eyes

Statistical Features	Noisy Frame	Restored Frame	Cropped Frame	Enhanced Frame
Mean	0.5018	0.5016	0.5005	0.4996
Median	0.5510	0.5469	0.5079	0.4921
Standard Deviation	0.4583	0.2229	0.2134	0.2035

Noise Details	Techniques				
	Mutation BFO&AMF	CGLPF	PCA	LDA	LPP
Salt &Pepper Variance=0.05	95.9	95.8	66.9	94.725	74.525
Salt &Pepper Variance=0.1	94	94.275	64.775	90.7	71.3
Salt &Pepper Variance=0.15	93.32	92.825	60.075	80.125	67.275
Salt &Pepper Variance=0.2	92.2	87.725	56.775	76.725	60.6

5 Conclusions

Using the AAM as a feature method has proven successful even with a simple Euclidean-distance classification

scheme. Classification is certainly likely that more sophisticated classifiers such as SVMs will provide better results on this data set. Overall, though, this initial work has shown potential for AAMs as a feature set for expression classification. And the other technique/approach involves different algorithm and understanding.

This technique can be used as robust face emotion detection algorithm. In this work a multiple feature options such as face, eyes and lips are used for emotion detection. The global, local features of facial expression recognition images can be independently selected through the mouse for identification for feature extraction. Comparative analysis shows that the proposed technique is more efficient in recognizing expressions even under noisier environment.

References

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