

A Survey on Analysis of Facial Expression

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Abstract— Facial expressions square measure the quickest means that of communication whereas conveyance of title any form of info. These aren't solely exposes the sensitivity or feelings of a person however can even be wont to decide his/her mental views. This paper includes the introduction of the face recognition Associate in Nursing countenance recognition and an investigation on the recent previous researches for extracting the effective and economical methodology for countenance recognition.

Keywords: Facial Expression Recognition, Face Detection, Face Extraction and Expression Classification

I. INTRODUCTION

As we tend to square measure stepping forward from one generation to a different, infinite technologies square measure permanent North American nation in step with our requirements. Thus, we tend to square measure completely counting on these technologies as a locality of human-computer interaction. And one in all them is countenance recognition. Face plays a very important role in social communication, equally facial expressions square measure very important. A facial expression not solely exposes the sensitivity or feelings of a person however can even be wont to decide his/her mental views. Countenance recognition may be a methodology to acknowledge expressions on one's face. a large vary of techniques are planned to sight expressions like happy, sad, fear, disgust, angry, neutral, surprise however others square measure tough to be enforced.

Facial expression recognition consists of 3 major steps: (1) Face detection and preprocessing of image, (2) Feature extraction and (3) Expression classification. the target of this paper is to grasp the essential distinction between the face recognition and countenance recognition and to research the effective countenance recognition rates by acknowledging the prevailing planned models.

This paper is organized in six sections and also the second section includes the essential terminologies that square measure essential to grasp for each face recognition and countenance recognition. The third section of this paper includes the distinction between the face recognition and countenance recognition. The fourth section explains concerning the procedure being followed for the popularity of facial expressions. The fifth section includes a review of 10 previous researches within the expression recognition victimization varied techniques. The sixth section is conclusion and it's concerning acknowledging the countenance rate higher than ninetieth, calculated from the collected review. The ultimate and seventh section discusses concerning the longer term scope.

II. BASIC TERMINOLOGIES

A. Face Detection:

Face detection is to see that a definite image contains a face we'd like to be ready to outline the overall structure of face.

Fortunately human Faces don't greatly disagree from every other; we tend to all have noses, eyes, foreheads, chins and mouths; and every one of those compose the overall structure of a face. It's a thought of two-class classification: face versus non-face.

Face detection are often considered a selected case of object-class detection. In object-class detection, the task is to search out the locations and sizes of all objects in a picture that belong to a given category. It are often understood as



Fig. 1: Object class classification of Face detection

B. Face Identification:

During this the system compares the given individual to all or any the opposite people within the info and offers a stratified list of matches.

C. Face Verification:

In this the system compares the given individual with who that individual says they are and gives a yes or no decision.

D. Facial Expressions:

Facial expression is one or more motions or positions of the muscles beneath the skin of the face. These movements express the emotional state of the person to observers. It is a form of non-verbal communication. It plays a communicative role in interpersonal relations. The common ones are:

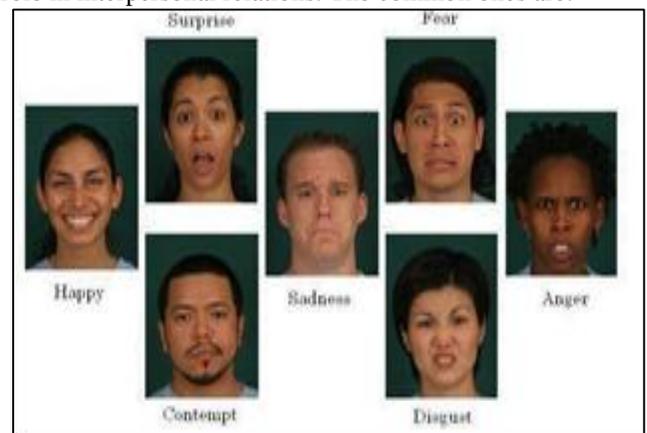


Fig. 2: List of Facial Expression

III. DIFFERENCE: FACE RECOGNITION AND FACIAL EXPRESSION RECOGNITION

FACE RECOGNITION	FACIAL EXPRESSION RECOGNITION
It is a computer application For automatically identifying or verifying a person from a digital image or a video frame.	It is a computer application For identifying the facial Expressions of any person either using an image or a video clip or the person itself.
Procedurals steps: Data acquisition, Input processing, Face image classification and decision making.	Procedurals steps: Face detection, feature extraction and expression Classification.
Applications: Voter verification, banking using ATM, mobile password.	Applications: Health care, games, e-learning.

IV. FACIAL EXPRESSION RECOGNITION

Generally, face may be a union of bones, facial muscles and skin tissues. once these muscles contract, crooked countenance area unit created. Facial expressions area unit the quickest means that of communication whereas conveying any form of data. AN implementation of face expression recognition could result in a natural human-machine interface. In 1978, Vagn Walfrid Ekman and Frisen according that face expression acts as a fast signal that varies with contraction of countenance like eyebrows, lips, eyes, cheeks etc., thereby touching the popularity accuracy, also happy, sad, fear, disgust, anger and surprise area unit six basic expressions that area unit pronto recognized across terribly totally different cultures. face expression recognition involves 3 steps face detection, feature extraction and classification of expression.

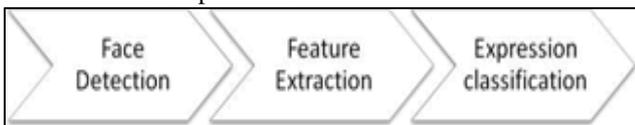


Fig. 3: Process of facial expression recognition

A. Face Detection:

The pre-processing step for recognizing facial expressions is face detection. The steps concerned in changing a image to a normalized pure facial image for feature extraction is

sleuthing feature points, rotating to line up, locating and cropping the face region employing a parallelogram, in step with the face model. The face detection involves strategies for sleuthing faces during a single image.

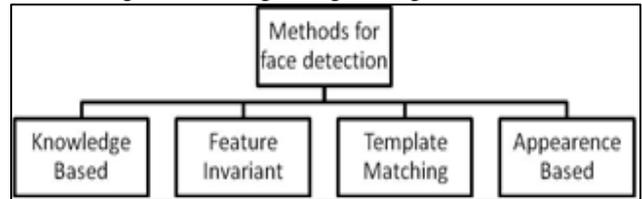


Fig. 4: List of Methods for face detection.

B. Feature Extraction:

Feature extraction converts picture element knowledge into a higher-level illustration of form, motion, color, texture, and special configuration of the face or its parts. Feature extraction typically reduces the spatiality of the input house. The reduction procedure ought to retain Essential data because it is a very important task in pattern recognition system. Feature extraction is done victimization numerous techniques.

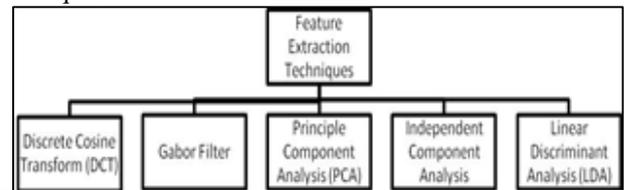


Fig. 5: List of Feature Extraction Techniques

C. Expression Classification:

Expression classification is performed by a classifier, which regularly consists of models of pattern distribution, coupled to a choice procedure. Vagn Walfrid Ekman outlined 2 main sorts of categories employed in face expression recognition those area unit action units and archetypal facial expressions. There area unit numerous classification strategies that area unit wont to extract expressions.

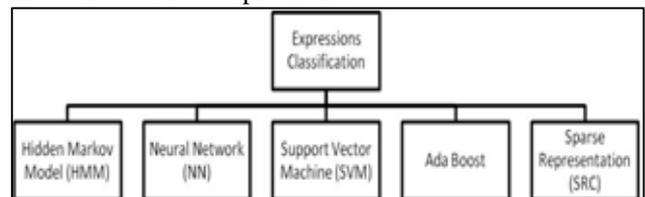


Fig. 6: List of expressions classification

V. A REVIEW OF PREVIOUS RESEARCH PAPERS ON FACIAL EXPRESSION RECOGNITION

AUTHOR	TITLE	EXPRESSIONS	FACE DETECTION	FEATURE EXTRACTION	EXPRESSION CLASSIFICATION	ACCURACY (%)
Banu, Danciu, Boboc, Moga, Balan[1]	A novel approach for face expression recognition	Angry, disgust, fear, happy, neutral, sad	Appearance based	Bezier-curve, k-mean	Feed-forward neural network	85
Wang Zhen, Ying Zilu[2]	Facial expression recognition based on adaptive local binary	Angry, disgust, fear, happy, neutral, sadness, surprise	JAFFE database (fusion approach: GRAY+SRC and	Gabor filter	SRC	70

	pattern and sparse representation		ALBP+SRC)			
Deepti, Archana, Dr. Jagathy[3]	Facial expression recognition using ANN	Happy, sad, normal	Appearance based	DCT	NN	-
Jizheng, Xia, Lijang, Yuli, Angelo[4]	Facial expression recognition considering differences in facial structure and texture	Joy, sadness, surprise, angry, disgust, fear	(1) Cohn-kanade database (2) BHU facial expression database	FPDRC+CARC+SDEP	RBF	(1)88.7 (2)87.8
Jiawei, Congting, Hongyun, Zilu[5]	Facial expression recognition based on completed local binary pattern and sparse representation	Angry, disgust, fear, happy, neutral, sadness, surprise	JAFFE database (Fusion approach: GARY+SRC and CLBP+SRC)	Gabor filter	SRC	69.52
Jizheng, Xia, Yuli, Angolo[6]	Facial expression recognition based on t-SNE and adaboost M2	Angry, disgust, fear, happy, neutral, sadness, surprise	JAFFE database	t-SNE	(1) SVM (2) Ada boost M2	(1) 90.3 (2) 94.5
J.J. Lee, Md. Zia Uddin, T.S. Kim[7]	Spatiotemporal human facial expression recognition using fisher independent component analysis and hidden markov model	Anger, joy, sad, surprise, fear, disgust	Cohn-kanade database	FICA	HMM	92.85
Weifeng, Caifeng, Yanjiang[8]	facial expression recognition based on discriminative distance learning	Angry, disgust, fear, happy, neutral, sadness, surprise	JAFFE database (1)Gray (2)LBP (3)Gabor	Gabor filter	SRC (D-KSVD)	(1)85.7 (2)78.6 (3)94.3
Ying, Zhang[9]	facial expression recognition based on NMF and SVM	Angry, disgust, fear, happy, neutral, sadness, surprise	JAFFE database	NMF	SVM	66.2
Anagha, Dr. Kulkarnki[10]	Facial detection and facial expression recognition system	Angry, fear, disgust, surprise, sad	Feature invariant	AAM	(1)Euclidean distance method (2)ANFIS	(1)90-95 (2)close to 100

VI. CONCLUSION

After investigation varied face detection, feature extraction and expression classification ways and techniques we tend to conclude that the effective countenance recognition are often achieved by ANFIS tool, that is near to 100 percent. and also the algorithms with ninety and on top of countenance recognition rate tested by the [6], [7], [8], [10] also are economical.

VII. FUTURE SCOPE

The countenance recognition are often tested victimization physiological signals, because the physiological signals square measure powerfully co-related to human emotions. These signals don't seem to be governable by humans. the most signals on that facial expressions square measure accountable square measure temperature, respiration, skin electrical phenomenon, and viscus operate. The economical output is often created victimization physiological signals.

REFERENCES

- [1] Banu, Danciu, Boboc, Moga, Balan; "A novel approach for face expression recognition", IEEE 10th Jubilee International Symposium on Intelligent Systems and Informatics 2012.
- [2] Wang Zhen, Ying Zilu; "Facial expression recognition based on adaptive local binary pattern and sparse representation", 2012 IEEE.
- [3] Deepti, Archana, Dr. Jagathy; "Facial expression recognition using ANN", IOSR Journal of Computer Engineering 2013.
- [4] Jizheng, Xia, Lijang, Yuli, Angelo; "Facial expression recognition considering differences in facial structure and texture", IET Computer Vision 2013.
- [5] Jiawei, Congting, Hongyun, Zilu; "Facial expression recognition based on completed local binary pattern and sparse representation", Ninth International Conference on Natural Computation (ICNC) 2013.
- [6] Jizheng, Xia, Yuli, Angolo; "Facial expression recognition based on t-SNE and adaboost M2", IEEE International Conference on Green Computing and Communications and IEEE Internet of Things and IEEE Cyber, Physical and Social Computing 2013.
- [7] J.J. Lee, Md. Zia Uddin, T.S. Kim; "Spatiotemporal human facial expression recognition using fisher independent component analysis and hidden markov model", 30th Annual International IEEE EMBS Conference 2008.
- [8] Weifeng, Caifeng, Yanjiang; "facial expression recognition based on discriminative distance learning", 21st International Conference on Pattern Recognition (ICPR 2012).
- [9] Ying, Zhang; "facial expression recognition based on NMF and SVM", International Forum on Information Technology and Applications 2009.
- [10] Anagha, Dr. Kulkarnki; "Facial detection and facial expression recognition system", International Conference on Electronics and Communication System (ICECS -2014).
- [11] Claude C. Chibelushi, Fabrice Bourel; "Facial Expression Recognition: A Brief Tutorial Overview", 2002.
- [12] G.Hemalatha, C.P. Sumathi; "A Study of Techniques for Facial Detection and Expression Classification", International Journal of Computer Science & Engineering Survey (IJCSES) 2014.
- [13] "Facial Recognition System", http://en.wikipedia.org/wiki/Facial_recognition_system.
- [14] Szwoch Wioleta; "Using Physiological Signals for Emotion Recognition", 2013 IEEE.