



Survey of Advanced Facial Feature Tracking and Facial Expression Recognition

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Abstract: The facial tracking and recognition technology is used to improve the image and video quality and security purpose. The facial tracking and recognition technology is used to improve the facial expression. The facial expression is used to combine the action unit and give the expression. The six basic expressions having in our face that expression is (Surprise, Happy, Anger, etc)... The new technology in facial activity the face we have to divide into three level top, bottom and middle level. The base level facial feature points more or less each facial component, i.e., eyebrow; mouth, etc., second middle level, facial action units, distinct in the faces. In the top level, six universal facial expressions represent the global facial muscle progress and are commonly used to describe the human feeling states. We are recognition the facial expression and check to the training data on neural database system and check expression and give the result. In this paper we discussed a “survey of Advanced Facial Feature Tracking and Facial Expression Recognition in image processing”. This paper describes the major improvement in the Facial Feature Tracking and Facial Expression Recognition Techniques for advanced image processing Researches.

Keywords: Action unit, Image processing, Simultaneous Tracking and recognition, Expression Recognition, Dynamic Bayesian Network, Sparse Representation

I. INTRODUCTION

The face detection system has been developed since in early 1970. System can't be satisfied the Requirements because the attacker can easy to track the image. Which is identifying passport Photograph real time? The beginning of 1990's Techniques are proposed focused on the face Recognition on and increase the need of face Detection. Image processing is used for tracking and recognizing the face of human being. In early days existing system tracking and recognizing are implemented separately .It takes more time to track and recognizing the image of the face. The tracking is done at first they sequentially recognition is processed. In facial tracking and recognizing technique we will track 26 facial feature points as shown

In Fig. 1 and recognize 15 AUs, i.e., AU1, 2, 4, 5, 6, 7, 9, 12, 15, 17, 23, 24, 25, 26 and 27 since summarized in Table I.

In facial feature points in fig 1, we are used to track and find the emotion. Now a days the facial tracking and recognition processed Simultaneous. Each facial feature point is usually tracked by performing a local search for the best matching position .The idea of combining tracking with recognition has been attempted before, such as simultaneous facial feature tracking and expression recognition and integrating face tracking with video coding.

Facial feature point:

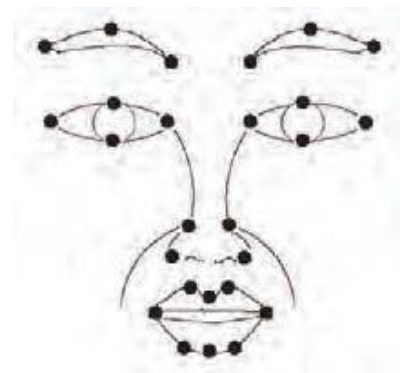


Fig. 1. Facial feature points

However, in most of these works the interaction between facial feature tracking and facial expression recognition is one-way, i.e., facial feature tracking results are fed to facial expression recognition

1. Six basic expression:

Combination of ac is called emotion:



II. LITERATURE SURVEY

Emotion Corresponding AUs

| | |
|------------|---------------------------|
| Surprise: | AU5, AU26, AU27, AU1+AU2 |
| Happiness: | AU6, AU12, AU25 |
| Sadness: | AU1, AU4, AU15, AU17 |
| Disgust: | AU9, AU17 |
| Anger: | AU4, AU5, AU7, AU23, AU24 |
| Fear: | AU4, AU1+AU5, AU5+AU7 |

2. Action unit:

Action Units (AUs) are the basic actions of personality muscles or groups of muscles.

3. FACS:

Facial action coding system [1] a practice to scientifically explain human facial expressions

TABLE 1 (FACIAL ACTION CODING SYSTEM AND ACTION UNIT NUMBER)

| AU Number | FACS Name |
|-----------|------------------------|
| 0 | face |
| 1 | Inner Brow Raiser |
| 2 | Outer Brow Raiser |
| 4 | Brow Lowerer |
| 5 | Upper Lid Raiser |
| 6 | Cheek Raiser |
| 7 | Lid Tightener |
| 8 | Lips Toward Each Other |
| 9 | Nose Wrinkler |
| 10 | Upper Lip Raiser |
| 11 | Nasolabial Deepener |
| 12 | Lip Corner Puller |
| 13 | Sharp Lip Puller |
| 14 | Dimpler |
| 15 | Lip Corner Depressor |
| 16 | Lower Lip Depressor |
| 17 | Chin Raiser |
| 18 | Lip Pucker |
| 19 | Tongue Show |
| 20 | Lip Stretcher |
| 21 | Neck Tightener |
| 22 | Lip Funneler |
| 23 | Lip Tightener |
| 24 | Lip Pressor |
| 25 | Lips Part |
| 26 | Jaw Drop |

A. WEB-BASED DATABASE FOR FACIAL EXPRESSION ANALYSIS:[3]

The main topic in machine vision research is automatic analysis of facial expression.

It is difficult to maintain a facial expression database for different faces. So the Maja Pantic, Michel Valstar, Ron Rademaker and Ludo Maat takes samples of (m & m) initiative database that consist of front view of profile view. Which display different emotion and multiple facial muscles. Using the samples a web based discreet manipulation application has built and that image can be searched in internet and it is useful for research person who are in this field can easily access the application.

M & MI database is easily accessible and searchable. The database is used to present such as effective and easily accessing searchable database.

B. HAAR FEATURES FOR FACS AU RECOGNITION:[14][16]

The Action unit recognition system. The system consists of 4 stages.

- IMAGE NORMALIZATION,
- FACE REGION SEGMENTATION,
- FEATURE EXTRACTION,
- AU CLASSIFICATION.

Jacob Whitehill, Christian W. Omlin demonstrated that the powerful image feature is haar wavelet. This is a digital image feature used for object recognition .they obligated their names to their intuitive similarity with haar wavelet and where used in the first real time face detector.

The advantage of this haar feature compared to other method is the calculation speed .the calculation speed for any size of image is constant. They conclude that the haar+adaboost approach is better than the Gabor+SVM approach while comparing both. The accuracy is similar but the calculation speed more.

C. DETECTION, TRACKING AND CLASSIFICATION OF ACTION UNIT IN FACIAL EXPRESSION: [5]

In this paper James Jenn-Jier Lien, Takeo Kanade, Jeffrey F. Cohn, Ching-Chung Li proposed automated facial expression analysis among the six types of idle expression they concentrated

On joy and fear. These two emotion occurs infrequently .this system include three module to extract the feature information.

- Dense flow extraction,
- Facial feature tracker,



- Edged line extraction.

These feature is extracted and if it fed to the hidden Markov models that classify the face unit. This system takes tests the image sequences for 100 male and female subjects and the agreement with manual facial action coding system coding for the three modules are strong.

D. TRACKING FACIAL FEATURE POINTS WITH GABOR WAVELETS AND SHAPE MODELS:[6][14]

The flexible and inflexible facial motions are tracked in the feature based approach. The feature points are individually tracked by phase based displacement estimation. There are many approach and application the other textured object.

- *FEATURE TRACKING:*

The individually point are selected and the other point are tracked using that single point .the drawback in the feature tracking is displacement error.

- *POINT DISTRIBUTION MODEL:*

The PDM is mainly used to capture the nonrigid object in a dense manner.

If provides a method that represents the nonrigid object based on the feature point .these describes the deformable shape.

This method uses only the 2d shape information derived for the sample image .this concept can also be applied for 3d image that has been implemented in future.

E. RECOGNITING ACTION UNITS FOR FACIAL EXPRESSION ANALYSIS:[7]

Most analysis system recognizes the idle expression of face such as anger, surprise, fear and happiness that occurs infrequently. A few changes in facial feature were occurred by the discrete communication between human emotion and intention.

In this paper Ying-li Tian, Takeo Kanade and Jeffrey F. Cohn developed a automatic face analysis system that analysis the facial expression based on permanent facial feature. Only in the front view of image sequence while tracking the image parameter of facial feature are extracted and given the inputs. Using these inputs a group of au is recognized. All ready trained datas are called in neural database.

Four methods used in this approach:

- Facial action coding system,
- Multistate feature based action unit recognition
- Facial feature extraction
- Neural database

Concluded that automatic face analysis is a better improving to facial action unit system.

F. AN EXTENDED SET OF HAAR LIKE FEATURES FOR RAPID OBJECT DETECTION:[8] [13]

In this a novel set of rotated haar like feature are introduced .this set is calculated efficiently by using the additional rotated feature an average of 10% false alarm rate is at a given hit rate .also they present a new optimization procedure for the given boosted cascade.

Concluded that they proposed two idea to compute fastly the haar like feature also post optimization procedure for boost classifying .the overall performance is improved by about 23.8%.

G. FULLY AUTOMATED UPPER FACIAL ACTION RECOGNITION: [9]

The upper facial action reorganization method is fully automated methods that do not need any human specifically .the system first energetically detects the person using the infrared sensitive outfitted with infrared led. The person position normalizes the edge, eyebrow raiser region as frames and analysis using pca.

This parameter is given as an input to support vector machine recognize upper facial action unit also recognize the all possible combination of action units.

The frame work achieves the recognize accuracy of 69.29% for each action unit and 62.5% of all possible action unit combinations. Principle component analysis (pca)

UPPER FACIAL ACTION UNIT:

AC NUMBER FACIAL ACTION

- inner brow raiser
- outer brow raiser
- brow lower
- upper eye raiser
- lid tightener

Method:

- Pupil detection
- Feature extraction
- Action unit classification

They concentrated on upper facial action unit .the limitation in this is if people wearing a class the detection of face has been failed. In future the lower facial action unit can be recognizing the feature like lips and nose.

H. A HIERARCHICAL FRAMEWORK FOR SIMULTANEOUS FACIAL ACTIVITY TRACKING: [10] [12]

Jixu chen, qiang ji proposed a method that exploit the relationship between the facial activity and track them in three level .specifically proposed a unified stochastic



framework based on dynamic Bayesian network. These improve the tracking performance in all three levels.

The DBN model has three layers:

- Facial feature point layer
- Action unit layer
- Expression layer

They conclude that there is an little improvement in both the tracking and reorganization result.

I. ROBUST FACE TRACKING USING COLOR:[11]

The (au) discussed a new technique called robust tracking .which applied to the histogram of normalization color. This technique support the video codes .The orthonormal basic coding is efficient to code the image that has changing size of required basic space.

The advantage in this technique is greater stability less jilter and higher precision using color Histogram .The mean and variance can be mathematically describable.

This face tracker enhances the usage of video communication system by asking the user to move the face infant of the camera while communicating. This system provided a positive outlook on development of low bandwidth video communication.

J. SIMULTANEOUS FACIAL FEATURE TRACKING AND FACIAL EXPRESSION RECOGNITION: [2] [15]

Image processing is used for tracking and recognizing the face of human being. In early days existing system tracking and recognizing are implemented separately .it takes more time to track and recognizing the image of the face. The tracking is done at first they sequentially recognition is processed.

Yongping Zhao, Qiang Ji, Yongqiang Li, Shangfei Wang proposed the model by combining these two model (tracking and recognition).which takes less time to implement .the implement is processed simultaneously .in tracking and recognition technique the image of the face is divided into bottom level, middle level and top level.

The emotion of the human face are measured by the facial muscles movement .the six basic global expression of face are surprise, happiness, sadness, disgust, anger, fear.

Action unit:

The individual of every muscles are grouped to form an expression in a human face is called the action unit.

III. CONCLUSION

Image processing side is the best improvement in facial tracking and recognition technology because of expression recognition .expression detection is main part of the human identification purpose. In the future work,

We plan to introduce the rigid head movements, i.e., head pose, into the model to handle multi view faces. In addition, modeling the temporal phases of each AU, which is important for understanding the spontaneous expression, is another interesting direction to pursue.

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BIOGRAPHIES



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