Utilization of Content Base Image RetrievalTechnique Based Sketch for Facial Recognition

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ABSTRACT

As the rising up Including terrorist crimes in our society due to issues politics, economy, poverty, religion and ethnic conflicts. Many ways and techniques have been tried to crack down Reviews those crimes, but unfortunately the Efforts to seize person or group of suspected criminal is far from our expectation. Face recognition is one of techniques Introduced by many Researchers for the last Decades with many methods and approaches they tried to Recognize a person based on his or his faces. Some of the methods such as face recognition with Query by Example (QBE) using shape, color, and texture to match a query face with the face in the database; however the result is not good enough to Recognize the faces. One of the problems of face recognition by QBE is sometime we do not have a picture or a face image to the make QBE. In order to sort it out the problem, in this research we will try to introduce of face recognition method by generating a face image by a face sketch.Many sketch based face recognition was Introduced by some Researchers and experts, but most of reviews their methods have been applied directly inputting a sketch into a database the which is very costly and Involved a complex algorithm. In addition to the research, we are applying our proposed method compressed into face images, as the compressed images will save storage and unsumming the algorithm.

KEY WORDS

Query by Example, Face recognition, criminal

1. Introduction

The development of facial recognition techniques or *face recognition* is quite difficult because the human face is very complex, multidimensional, and often change with the environment and situation. Therefore, the automatic facial recognition system is a challenge for experts. Of changes in facial conditions such as changes in facial identity and facial variations that occur because of radiation and the angle of the face image that is different is a challenge itself how to represent the face for purposes of face recognition or face recognition. How do I or techniques that can be used to represent a face under changing conditions are right.

Face recognition or face recognition, face recognition, especially offenders is an area that is popular and attracts many experts in the field of biometrics .. A lot of research on face recognition has been done to date *image processing* experts include [1] [2] , Meanwhile [3] describes the technique of face recognition system automation someone in a real time environment using a hierarchical method of *wavelet* image and *your* scheme *coarse* to increase the effectiveness of search and detection of face images. Likewise, [4] which has been introduced facial recognition techniques to a method eginfaces *subspaces* with a combination of techniques and techniques *Fisher faces* and *Tensor faces.*

Other libraries are expressed by [5] has proven that research field of face recognition is that a lot of research done by experts. As with other areas in the *pattern recognition,* identification or face recognition much

directed and carried out by a variety of approaches in how to represent the face and design or design methods of classification are used. Besides, many companies and institution-agency or agencies both public and private, especially abroad began interest with research related to *face recognition* for various applications such as for identification, verification of the face or also *posture* or *gesture* (movement) and other smart systems.

Today the method known as machine learning *(machine learning)* becomes more and more becoming a trend and widely published in the field of *computer vision.* Various applications, means, techniques and methods have been widely carried out by experts among the earliest done by [6]. In this study will try to build or automatically *generate* sketches made by the operator or other user of a body or a face photo of the face he had seen. The reason for using a sketch of a face for face recognition of the crimes committed is because the sketch is a shape or form the simplest picture because only the form lines just

Figure 1 Research Method

Facial Image Database

In the study will be used *ground truth* more than 1 .000 face images with various postures or positions and various radiation *(brightness).* Database built consists of normal facial image (facing perpendicular or 90 degrees to the face). After the photo shoot, followed by conversion of photos into sketches. The process of making sketches from photos to photos using Photoshop software.

The introduction of Facial Sketch

After the conversion of the facial image into a sketch using Photoshop. Furthermore this research using a technique or method Principle Component Analysis (PCA) and Bayesian Clasiffier for face recognition. The initial process begins by extracting a number of salient geometric graphs for represent fish face shape, features, and size and relative position of the nose, eyes, eyebrows, and the surface or contour of the face and the texture normalized vector with the form.

To make this simple method, used the formula G ε R ε R ^{N1} and I ^{N2} each a vector shapes and textures, where N1 and N2 is the length of the vector to the shape and texture. Fi tour vector used in this technique is almost the same with features used for recognition based photo in the model form. After that Eigen spaces to the shape and texture of the sketch training calculated. In PCA classifier, a feature vector is projected to eigenspaces to obtain features with small dimensions, so that:

$$x = E_G (G - m_G)$$
$$y = E_I (Im_I)$$

Where E_G and E_I is the eigenvector matrix of shapes and textures, sedangan $_I$ m $_G$, and m is the average of the shape and texture. Further features of the shape and texture normalized and form a combination of features such as the following:

$$z = \left[\frac{\mathbf{x}^T \cdot y^T}{\|x\|\|y\|} \right]$$

After that classification is based on Euclidean distance.

$$d = |z_s - z_g|$$ Where z_s and z_g is an integrated feature to sketch sought.

After the stages of generating a face image based on sketches, then later to find the likeness or *similarity* we

use calculations Eigen faces, metadata or Eigen faces approach taken to extraction features - features a vector which will be used to customize the and face recognition. Simply put Eigen faces have the procedure as follows: i). The first assumed that the facial image training *(training set of images)* is $I_1, I_2, I_3, ..., I_n$. Where each face image has dimensions of I (x, y), then each face image is converted to a vector that has matrix (MXP), and *m* is the number of face image px exercise while p is y. ii). After the arithmetic mean or average of the matrix face. iii). After that count each face with a Mean Matrix. Iv).After that is done t r a information matrix, so that the vector matrix is reduced. v). Then calculated eigenvector and Eigenvalues so based on this Eigen faces each image will have a face vector, vi). Finally the face image will be fabricated or formed with respective vectors and vectors previously

NORMAL face recognition which we will do in this study can be illustrated by the following figure.
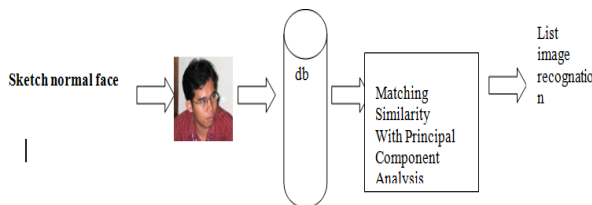
Figure 2 Architecture SystemRecognation

3. Results and Discussion

Picture below is an image of the images taken by normal using LDR camera.

Figure 3 Face Normal

Furthermore, from a normal photo next process which is to convert photos with Photoshop software to sketch the face. Below is the drawing of pictures taken from the previous photo

Figure 4 Results Sketch with Photoshop

Furthermore, the program made OpenCV algorithms eigenfaces and it will show the following.

Figure 5 The process of checking similarity face

The next process the test results of detection by obtaining the precision and recall.This study has been obtained 1,000 face images. Which consists of male and female 167 and male 833. The result is more complete facial image retrieval can be seen in Table 1.

$$ precision = \frac{Number\ of\ relevant\ face\ retrieval}{Total\ number\ of\ face\ retrieval} $$

$$ recall = \frac{Number\ of\ irrelevant\ face}{Total\ number\ relevant\ face\ in\ the\ collection\ or\ category} $$

Query	Precision	Recall
1	0,45	0.04
2	0,45	0.03
3	0,45	0.01
4	0,43	0.01
5	0,45	0.01
6	0,45	0.01
7	0,45	0
8	0,34	0.001
9	0,35	0.001
10	0,45	0.02
11	0,34	0.003

12	0,45	0.002
13	0,35	0.006
14	0,35	0.065
15	0,25	0.11

Here we display report precision at graphics.
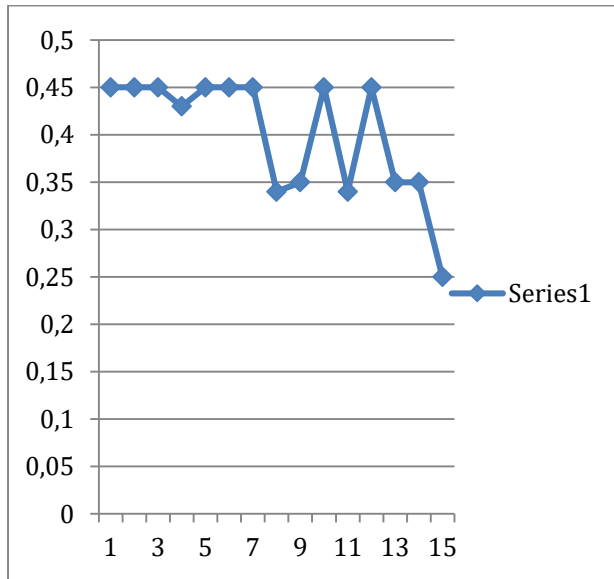
Graphics 1 Precision

4. Conclusion

The conclusions of this research:

1. This study uses the method of Principle Component Analysis (PCA) and Bayesian Classifier for face recognition.

2. Photo normal face first converted into photo sketches using the program.

3. Photo Facial Sketch as a keyword to find a picture of a normal face.

4. Need to be tested against a database of more and more complex with a mix of male and female faces impartial.

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