Introduction of Face Image as Identifier of Using in Principal Component Analysis Method (PCA)

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Abstrac. Face recognition is a person identification system that uses a person's facial characteristics. Facial recognition is itself a branch of biometrics, which is a science that uses physical characteristics of a person to determine or disclose his identity. The system developed in this thesis is a system that uses face recognition feature extraction based on Principal Component Analysis (PCA). This technique involves taking a major component of facial database. To determine the accuracy of human face recognition system designed in this final project, has conducted trials using the system with as many as 60 input facial image of the database. From the results of testing this system, the result is a 80% system performance in recognizing the input image correctly.

Keywords : Facial Recognition, biometrik, PCA.

I.   INTRODUCTION

System biometrics is a technology of self-recognition by using a part of body or behavior of person. System will search and match of the identity of person with a data base of reference which has been prepared previously through the registration process. Fingerprint and signature, each is an example of biometrics based on part of the body and human behavior. A system of self-recognition is a system to recognize the identity of person automatically by using computer technology and aims to improve the system security so that ability of the system self-introduction in recognizing the target is very important.

The utilization of image processing in the field of biometrics has experienced very rapid progress. One area that a lot of researched and developed is the ability of the computer to be able to recognize the identity of person through face image. Face recognition of course very easy if done by human. But not for computer technology are not yet been equipped with intelligent system. Therefore, required an intelligent system which can conduct the process of face recognition. The systems of face Recognition is divided to three parts that is segmentation /detect, feature extraction and face recognition. The most important thing in face recognition is extraction all information that is relevant at face image. Feature extraction the face is divided into two, that is Holistic (recognizing face as a whole) and Partial (recognizing face as part per part, for example eyes, nose, mouth and other).

A proven approach to provide the best result in conducting feature extraction the face is the process of face image as a whole. One

method of recognition of face image as holistic is PCA (Principal Component Analyses) or also known as Karhunen-Loeve (KL). Method of PCA for the face recognition is defined by M Turk & Pentland, 1991. Basically the method of PCA takes the Eigen face by the way to extract the important information in face image. Through, accounting of matrix vector's average and matrix covariant in database of face image. so that it will result the eigenface which is used for the introduction. The Eigen face becomes the basis of the calculation of the distance of the face which presented the value of the weights of the individual is deputizing one or more face image. Calculation apart the value weights is conducted by the calculation of the Euclidian distance (Euclidian Distance). According To M Turk & Pentland, need to be considered that a lot of application of face recognition which cannot identify perfectly. For the database of the biggest, of course it will become better than using the smaller database. Like its applying in the field of security systems or interaction of human with the computer, system should to able to do the recognition during which relative short in quantification of second or minute.

II. RESULT AND DISCUSSION

2.1 Definition Biometrics

2.1.1 Biometrics

Literally, biometrics comes from word of bio and metrics. Bio means the something that lives, and metrics means to measure.

Biometrics means to measure the distinguishing characteristic (distinguishing traits) to body or behavior person that is used to do the recognition automatically to the people identity, by comparing it with the previous characteristic have been kept at one particular database. In general the distinguishing characteristic can be classified to be two, that is physiological characteristic or physical (physiological / physical characteristic) and behavioral characteristic (behavioral characteristic). Biometrics of pursuant to physiological characteristic / physical uses the parts of physical from somebody else as unique code for the recognition, like DNA, ears, hot footstep at face, hand geometry, small channel hand, fingerprint, slice the, palm, retina, tooth and aroma (chemical composition) from body sweat. While biometric of pursuant to behavioral characteristic uses behavior person as unique code to [do/conduct] the recognition, like gait, knob pounding, signature and voice. Psychology characteristic /behavior of every human is different each other. Therefore, identifier biometric is assumed more reliable than compared to [by] pursuant to inclusion of token and recognition knowledge.

2.1.2 System Biometrics

System Biometrics is the technology of self-recognition by using part of body or human behavior. System of self-Recognition is system to recognize the identity of person

automatically by using computer technology. System will look for and match of the identity of person with a data base reference which has been prepared previously through registration process. System of self-Recognition aims to increase the system security so that the ability of system of self-recognition in recognizing target precisely is vital importance.

Mechanism of System biometric can be depicted with a few phase, first of classification phase (enrollment). Such as those which seen [at] Picture 1, [At] classification phase of inputting face will be amended the (scan) by sensor biometric is the character representation of the digital. Hereafter adaptation phase, in this phase, inputting database will be reconciled with identifying data. It Can be possible the reduction, so that is yielded representation of the digital. This result will be processed by extractors distinguish to yield a expressive representation in the form of template. Depend on its application that template can be kept in database on system biometric or can be recorded at magnetic card (or smartcard). And then recognition phase, individual characteristic is read by reader biometric (reader). Hereafter it is converted with the digital format, for processed as extractors distinguish the (template). This results' Template hereafter is reconciled with identify individual.

2.2 Image And processing

2.2.1 The Definition of the image

Literally, the image (image) is picture of area dwimatra (two dimensions). Evaluated from the aspect of mathematical approach, image represent the function non-stop the (continue) from intesitas light of area dwimatra. Iight source enlighten the object, object bounce to return some of the beam. this Light bound be under arrest by appliance optic, like eye of human being, camera, pemindai (scanner), and others so that object shadow in the form of image earn the terekam. Image can be grouped to become two shares that is image kept quiet (still images) and image make a move the (moving images). Image kept quiet by motion less single image. Medium image make a move is image network kept quiet presented by beruntun (sekuensial), so that make an impression on eye as peripatetic picture. Each;Every image in that network is referred by frame. visible pictures at wide [screen/sail] film or television is intrinsically consisted of by hundreds of until thousands of frame Digital image is a function 2D, f(x,y), representing light intensity function, where value of x and y represent the co-ordinate spasial and assess function in each;every dot (x,y) represent the storey;level of keabuan image of the dot expressed Digital image with a matrix of where line and its column express an dot of the image and its matrix element (so-called as element draw or piksel) expressing storey;level keabuan of the dot. Matrix from fairish digital image of Nxm (high of wide x), where

N = sum up the line 0 < y = N - 1

M = sum up the column 0 = x = M - 1

L = degree keabuan 0 = f(x,y = L - 1

In the following   is matrix picture from digital image:

$$f(x,y) \approx \begin{bmatrix} f(0,0) & f(0,1) & \dots & f(0,M-1) \\ f(1,0) & f(1,1) & \dots & f(1,M-1) \\ \vdots & \vdots & \vdots & \vdots \\ f(N-1,0) & f(N-1,1) & \dots & f(N-1,M-1) \end{bmatrix}$$

Where line index (x) and make an index to the column (y) express a[n dot co-ordinate [of] [at] image, while f(x,y) representing intensity (degree greyscale) [at] dot (x,y). Pursuant to its type, divisible digital image become three , that is.

BIBLIOGRAPHIES

Anil K Jain, et. al., *Biometric Identification, Communications of The ACM,* Vol 43, No 2, pp. 91-99, 2000.

Broks, Alan. *Face Recognition: Eigenface and Fisherface Performance Across Pose.* 2004, diakses pada tanggal 7 maret 2012, Pukul 15:00 WIB.

http://dailyburrito.com/projects/facerecog/FaceRecReport.html.

Chellappa, Rama and Wenyi zhao. *Face Processing: Advanced Modelling And Metods.* Burlington:elsevier, 2006.

Chellappa, Rama and Wenyi zhao. *Unsconstrained Face Recognition.* NewYork: Springer, 2008.