Combination of the Local Binary Pattern Histogram Method and SHA256 Bit in the Face Recognition System

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ABSTRACT

Recognition face technology is very fast at this time, there are many face recognition applications that have been applied to devices such as smartphones, time attendance machines, room access permits, location surveillance, and others. There are a lot of weaknesses in facial recognition so that implementation is needed so that it is not easily hacked with the local binary pattern histogram and SHA256 bit methods in a face recognition system that uses a webcam in realtime by combining the two methods. From the results of facial recognition can be recognized by someone's face in real time with good accuracy results.

Keywords: Local Binary Pattern Histogram, SHA256 Bit, Face Recognition System

INTRODUCTION

Face recognition is a technology that uses facial biometrics to recognize a person's face. Face recognition technology is developing quite rapidly at this time, where many face recognition applications have been implemented in various devices such as smartphones, attendance machines, room access permits, location monitoring, and others. However, the implementation of this facial recognition system also has a disadvantage that the face recognition system can be hacked using images.

This research is trying to improve the capabilities of the facial recognition system. One way to improve the capabilities of the face recognition system is to combine the face recognition system with the SHA256 bit cryptographic technique. This SHA256 bit cryptographic technique will work during the process of taking training data from the face and the face recognition process. Every face data will be saved by using a password or password that has been through the hashing process.

According to Aftab Ahmed, Jiadong Guo, Fayas Ali & Farha Deeba (2018) in his research entitled "Implementation of Digital Signature Applications Using the SHA-256 and RSA Hash Algorithm Function in the Cimahi City National Land Agency", secure hash algorithm-256 is one type of hash that is still commonly used. This function is a variant of SHA-1, SHA-256 created because the clash of SHA-1 has been found, SHA-1 itself is a substitute for SHA-0. Until now no one has been able to solve the algorithm for SHA-256. SHA-256 is commonly used as an intermediate function for other functions, including the MAC hash function, HMAC, and several digital signature producing functions.

To be able to detect the face of someone who is from the ether, then the algorithm used is the haft cascade classifier and the extraction algorithm of the oxygen face, fisherfolk and local binary patten histogram originating from open CV, where the algorithm is called a library of open CV that has been used.

K. Meena & A. Suruliandi (2011:782-786), "Local Binary Patterns and Its Variants for Face Recognition", in this research, it is said that face recognition is one of the most important tasks in computer vision and biometrics. Texture is an

important spatial feature useful for identifying objects or regions of interest in an image. Texture based face recognition is widely used in many applications.

LBP the method is the most successful for face recognition. It is based on characterizing the local image texture by local texture patterns. In this paper performance evaluation of local binary pattern (LBP) and its modified models multivariate local binary pattern (MLBP), center symmetric local binary pattern (CS-LBP) and local binary pattern variance (LBPV) are investigated. Facial features are extracted and compared using K nearest neighbor classification algorithm. G-statistics distance measure is used for classification. Experiments were conducted on JAFFE female, CMU-PIE and FRGC version 2 databases. The results show that CS-LBP consistently performs much better than the remaining other models. In this research, the writer took the conclusion that the introduction of faces by using the local binary pattern method succeeded in doing the introduction of faces, where features were extracted and compared with using the method of KNN (K nearest neighbor classification).

Image is a representation of an object. Literally an image is an image on a two-dimensional plane. Image has an important role as a form of visual information. The image has characteristics that are not owned by the text, namely the image is rich in information. The image can be defined as a two-dimensional function f (x, y), where x and y are flat plane coordinates, and the price of f at each coordinate (x, y) is called the intensity or gray level of the image at that point. If x, y, and f are all values and discrete values, the image is called a digital image (Gao Xiang, Zhu Qiuyu, Wang Hui & Chen Yan, 2016). Digital images can be divided into several types, namely binary images, gray images and color images.

Proceeding of the second international conference on intelligence computing and control systems (ICICCS,

2018:1439-1444), this study says that to create strong and distinctive features, increase the inter-personal variations and decrease the intra-personal variations simultaneously improve the problems in facial recognition. In this paper, the researcher explains how to improve the capability of face recognition system using local binary pattern (LBP) for feature extraction and convolution neural network (CNN) for classification of the images. The correspondence between the trained images helps CNN to convert faster and achieve better accuracy. There is a great improvement compared to other traditional methods too. To evaluate the accomplishment of this new method, it is found that the higher cognitive recognition accuracy can be achieved with less computational cost. The proposed framework is tested on the Yale dataset and achieved an accuracy of 98.6%.

In this research, the writer can conclude that the recognition of faces by using the local binary pattern method was successfully done by combining the convolution neural network (CNN) method to perform the classification of the symbol, so that the height of the facial recognition method can reach 98.6% using the Yale dataset.

By looking at the above research, then in this study the writer will combine the facial recognition system with local binary pattern histogram (LBPH) and SHA256 bit cryptographic techniques to improve the security of the face recognition system itself.

RESEARCH METHODS

Face image data used in this study provided images taken via webcams in real time. For training data, we use 40 imagery faces and every one person will be taken 50 images. So that the total training data used is 2,000 face draws. Whereas for the test data itself was taken in a timely manner by matching the image captured by the webcam to the image that had been traned.

This study uses the local binary patterns histogram (LBPH) method which has several stages to recognize a person's face, which is making a dataset, training (training) and the process of facial recognition or testing. Broadly speaking, the stages of the facial recognition system are as follows:

1. In the input section, the user must enter the personal data face.

2. After entering password pass. This password will go through the SHA256 bit hashing process and be stored in a database along with the user's personal data.

3. Then the user will create a dataset from his face that is inputted using a webcam. While the training data process is carried out for the face recognition process.

4. Preprocessing is the stage of cropping the face image in the area that characterizes the face which includes the upper border of the eyebrows to the bottom lip/upper chin. Furthermore, the image is converted into processing.

5. The stage of performing feature extraction is the stage of extracting features/information from objects in the face image that you want to be recognized/distinguished from other face images.

6. The method used for feature extraction is the local binary pattern histrogram, where this process aims to get the characteristics of inputting the image in the form of a histogram which is then represented by a matrix 1xn.

7. The values produced in the feature vector normalization are in the range 0-1. The results of this feature extraction will then be stored in a face database. Face database is a place to store facial pattern data/feature extraction results generated at the face data training stage.

8. Recognition results are recognized or not recognized. If a face is not recognized, whether the result is part of the system error/recognition error. If a face is recognized then the user will proceed by entering the password. The password will go through the process of matching the SHA256 bit hashing value stored in the database. If the match is successful, then the user is a valid user.

RESULT

Dataset Training Process

Select one of the data that has been stored in the application to be detected in the detection of someone's face whether it matches the data chosen for training. The following training dataset display in Figure 1.

Figure 1. Initial Display of Training Dataset

The training dataset process, to conduct training dataset must be in accordance with the instructions specified in the face detection application with the provisions that have been determined so that the detection process of detected faces. After that, enter the training dataset and the following display will appear in Figure 2.
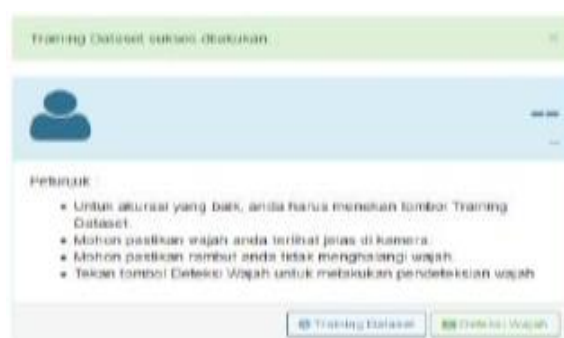

Figure 2. Display Successful Training Dataset

The function of the successful training dataset is to find out that the dataset has been successfully stored in a face recognition application. Then the next process of detecting the next face in the image Figure 3.
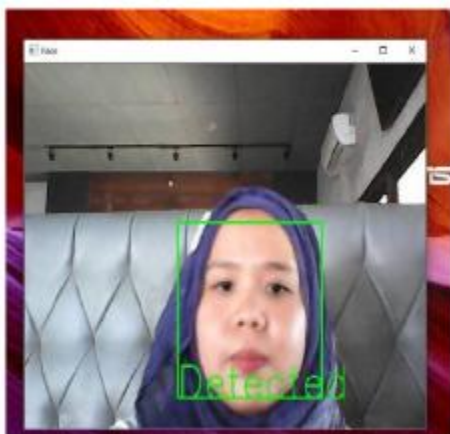
Figure 3. Retrieval of Detected Face Images

Taking face images detected face taking process is done to detect faces according to or not with the existing settings stored in the application. If the face matches the facial retrieval readability "detected" if it does not match then "unknown". After the face is detected, the following display will appear in Figure 4.
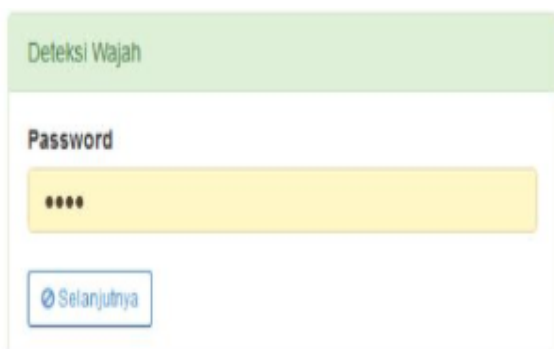

Figure 4. Successful Image Saved with a Password

After the face image is detected, the image will be saved using a predetermined password according to when inputting the initial data. Then the next display will appear that the face is detected in accordance with the dataset that is already stored in the face detection application and its appearance Figure 5.

Figure 5 face retrieval process is done to detect faces according to or not with the existing dataset stored in the application. If the face matches the look of the face read "detected" if it is not appropriate then "unknown" after the face is detected in a room with no light, the following display will appear as shown in the image.

Figure 5. Faces Detected According to The Dataset

Figure 6. Results Not Detected in a Dark Room

CONCLUSION AND SUGGESTION
CONCLUSION
In this research, face recognition was done using a combination of Local Binary Patten Histogram (LBPH) method and 256 bit SHA. From the results of the facial ingestion, the Local Binary Patten Histogram (LBPH) method can identify a person's face in real time with good accuracy.

SUGGESTION
The suggestions in this research are to perfect the face recognition process, it requires testing and training data sets by using more facial data so that the advantages and disadvantages of the applications built by the author are obtained.

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