False Identification Signature Analysis Method With *Error Sum Squared* (SSE)

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1. Introduction

1.1 Background

Today the level of falsification of signatures is very common. Perpetrators are often categorized based on the quality of the crime, and the motive of his actions. In falsifying signatures actors also have special characteristics that make it distinguishable from each other. Perpetrators forged the signatures of his actions as 'fine' so unknowingly carry have become victims of crime. The signature is one that is widely used biometric humans. Signature also special of handwritten forms that contain special characters and additional forms are often used as proof of identity verification of a person. In the process of identifying the signatures still done scientifically by matching signatures, but how did the introduction of a signature using a computer viding a challenge until now, because the form of a signature unique to each person. Differences signature manually can be seen from the hassle pattern used by the owner. Some sample signature of each person are generally identical, but not really the same. Signature of person often change over time, usually in terms of position and size of the signature. Usually a signature is used as the primary mechanism to authenticate and authorize the transaction legal. And can also be used to identify one person to another. Based on the description above, this research is expected to help in reducing the crime rate in the use of signatures. The authors take the title **"Analysis of the False Identification Signature Method Sum Squared Error (SSE)**". With the title of the analysis is the hope that people are not committing a crime by falsifying signatures.

2. Theoretical

2.1 Literature

To support this research, the authors take a few sources of previous similar studies in do it by previous researchers on detecting fake signature.

A. The first study conducted by Endina Putri, Diyah Puspitaningrum and Andre Mirfen on **"Identification Signature Approach Support Vector *Machine*,** Signature is a biometric that is widely used by humans. The training process and image recognition method Support Vector Machine as a method of classification, Centroid Image Zone and Zone Centroid Zone as feature extraction method. Here testing using 4 value zones: 2x2, 4x3, 5x4, and 3 types dan10x6 inserted prior to the application will be processed through the image preprocessing stage that binary, remove noise, thinning, cropping, and resizing. Preprocessing intended that all of the imagery used has the same size and shape. The results of the percentage of the introduction of which has been obtained in the application of image recognition of signatures, then the classification method of support vector machine combined with a method of feature extraction of image centroid zone and zone centroid zone has gained the zone and the degree of the polynomial with the best percentage in the pattern recognition image of the signature that is pda Zone 5x4 and the degree of the polynomial 2 amounted to 97.33%.

B. The second study was conducted by Annisa Hayatunnufus, Andrizal, MT, Dodon Yendri, M.Kom on **"Detection And Signature Verification Method Using Spatial Domain *Image"***, to identify the suitability of signatures used methods Sum Squared Error (SSE) to determine the value of the error of the sample data with the test data in the capture. Will get results in a reduction of the error value and squaring sample data with the data being tested. Determining the value of SSE's made several times of testing, so that would be obtained range of values to

be expressed SSE suitable or unsuitable. To be able to identify the suitability of signatures required by the method of Sampled Data SSE, SSE Value Data, and Data Tests. Things influence in this system is a lighting change resulting black values are different, too. From the results of tests conducted show that the SSE can recognize the signature with 96% accuracy in the data sample.

C. The third study was conducted by Difla Yustisia Qur'aini, Safrina Rosmalinda discusses **"Neural Network Learning Vector Quantization For Application Signature Recognition".** Neural network learning vector quantization (LQV) have the ability to train the patterns of neural network which is based on competition. Applications developed in this study using the page interface data processing, learning, and testing. On page data processing, image data can be entered signature scanning results into a database. Before stored into the database, the image of the signature will be processed first until the generated input vector (pattern input matrix) that represents the image. The image of the signature has been transformed to remove the color and line all the images, as well as converting to binary, the division of the region, as well as the formation of the input vector. Once the initialization phase is complete, will run a training procedure using signature data that has been stored. This process will produce a final weight that represent each class signature owner. Having obtained the final weights, to do the testing process. By taking the image that will be tested, processing the image to be testing the input vector. Classes that have a small distance to the input vector will be chosen as the winner. Signature tested recognizable as a signature class winner. The test is performed by using the image of the signature 54 from 9. The level of recognition accuracy of signatures made this application to the data tested was 98%. All the data that was tested, there is an image of a signature that can not be recognized correctly.

D. The fourth study conducted by R. Arum Kumalasanti, Ernawati, B. Yudi Dwiandiyanta, entitled **"Analysis and Design of Identification And Static Signature Verification Using Backpropagation And Wavelet transformation".** Signature is a biometric important attribute of a person or individual that can be used as an identity. This study discusses the analysis and design of identification and verification of the signatures to determine its authenticity. The process consists of two main parts include the training phase and testing phase. In the training phase, the image of the signature are subject to several processes, namely the threshold, wavelet transformation, next processed again using thinning. Training and testing will be trained and tested using Backpropagation algorithms and artificial neural network (ANN). Based on research done, it has to result in analys and proper design for pattern recognition tada static hand so as to minimize counterfeiting signatures.

3. Results Analysis And Discussion

In order to be able to identify or recognize the signatures used methods *Sum Squared Error (SSE)* to determine the error value of the sample data with the test data in the *capture.* with this method will be obtained from the error value and squaring the result of the reduction of the sample data with the data being tested. To determine the range of values SSE to recognize the signature done several times of testing, so that would be obtained SSE value range or NOT FIT FIT. To be able to identify the signature matches with the method *Sum Squared Error (SSE)* is required Sample Data, Data Value SSE and Test Data.

3.1 System Design

Design structured approach uses a linear sequential process model. Its design is composed of two parts, namely as follows:

3.1.1 Design Mechanical

Design Mechanical identification matches the signature requires some matter namely, acrylic white background. Then the object in the signatures *capture* using *webcame* C525 integrated with a laptop and a distance of 4cm between webcame the background.

3.1.2 Design software

In the design of *software*, there are three processes, namely as follows:

a. Design Process Image Processing

Figure 1 Flowchart Image Processing

b. Process Method *Sum Squared Error (SSE)*

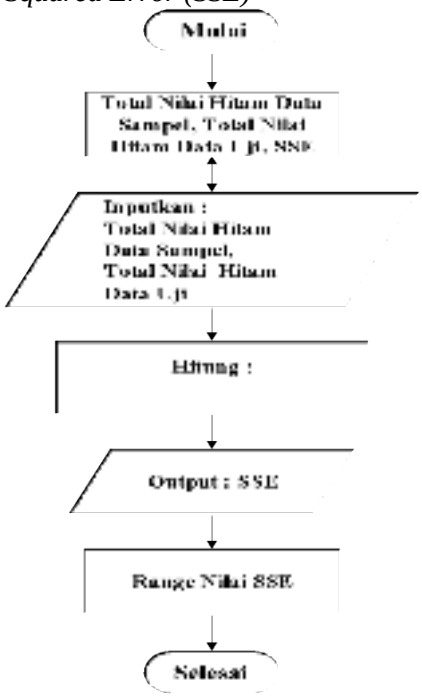

Figure 2 Process Method SSE

c. Identification Process

Figure 3 Flowchart Identification Process

3.2 Data Sample

In this research taken 10 pins hand to be used as sample data to be searched total indigo black pixels. Examples of data retrieval of samples as seen in the figure below:

Figure 4 Data Sample

Figure 5 SSE

Table overall for the storage of sample data is as follows:

Table 1. Sample Data

Code	Name	Gender	Address	Value
001	Fuadi	MEN	BUKITTINGGI	16467
002	IQBAL	MEN	PADANG	9970
003	ANNISA	WANITA	PADANG	15 845
004	IRA	WOMEN	BUKITTINGGI	12739
005	LENI	WOMEN	PADANG	18478
006	HUSEN	MEN	BUKITTINGGI	18468
007	DIAN	WOMEN	PADANG	14063
008	YEMMI	WOMEN	BUKITTINGGI	17553

009	Anum	WOMEN	PADANG	9527
010	Asril	MEN	BUKITTINGGI	18 645

3.2 Data Value Range SSE

To determine range values *Sum Squared Error (SSE)* which will be used as a threshold to identify the suitability of signatures, Data samples stored in the database, set the value of SSE her to take 3 pieces *Image*, then we will get the value range SSE of each the available sample data.

SSE following data span the overall value of each sample data:

Table 2 Overall Data To Determine the Value Range SSE

Based on the table datas, the importance of the range of value *Sum Squared Error (SSE)* to every sample data, as shown in the following table:

Table 3. SSE value range

Code	Value Range SSE		
001	0.0877734765625	s / d	0.19635015625
002	0.02512515625	s / d	0.10327640625
003	0.0030625	s / d	0.0572859765625
004	0.038750625	s / d	0.21793140625
005	0.0123816015625	s / d	0.233104
006	0.002805625	s / d	0.0887128515625
007	0.0105625	s / d	0.03094140625
008	0.0123816015625	s / d	0.3942706640625
009	0.0140156640625	s / d	0.1311025
010	0.0001269140625	s / d	0.04709390625

3.3 Data Results Identification

In the identification process the data used is the sample data stored in the database with the value range *Sum Squared Error* (SSE) on each of the sample data. The data will be processed directly from the image of the *image capture* signatures directly to a laptop using a Logitech webcam 525c. Theimage *captured* consists of several signatures and time taking a different and recognizable when the value of SSE SSE in accordance with the range of values specified in the method *Sum Squared Error* before. Each sample data is done 10 times of testing.

Examples of data retrieval identification result as shown in the figure below:

Figure 6 Result Identification Signature to-1

By performing 10 times of testing every sample data obtained the following results:

Table 4 the results of identification based lighting and average the same relative

Code	Name	Time	Lighting	Average	Percentage
001	Fuadi	Unlike	Almost Equal	Approaching	90 %
002	Iqbal	Unlike	Almost equal	Approaching	100%
003	Annisa	Different	Different	Approach	90%
007	Dian	Almost the same	Almost same	Approaching	100%
009	Anum	Almost the same	Almost same	Approaching	100%

Table 5 Results Identification based lighting and mean -rata relatively distinct

Code	name	Time	Lighting	average	Percentage
004	Ria	Different	Different	Different	70%
005	Leni	Different	Different	Different	30%
006	Husen	Almost the Same	Almost Same	Different	70%
008	Yemmi	Different	Different	Different	70%
010	Asril	Different	Different	Different	20%

Based on the above table overall percentage obtained for:

1. lighting d an average relatively the same:

100%

So we get:

100% = 96%

2. Lighting and average relatively different:

100%

So we get:

100% = 52%

Based on the above it can be analyzed, that the identification recognition the method signature with *Sum Squared Error (SSE)* were significantly associated with lighting. System-in can work well if the lighting is relatively the same, according to the results of a success rate of 96%. If the different relative illumination system success rate decreases, ie 52%.

(Detection And Signature Verification Method Using Spatial Domain Image, 20014, Annisa Hayatunnufus, Andrizal, MT, Dodon Yendri, M.Kom).

4 Conclusions And Recommendations

4.1 Conclusion

Based on the analysis results of the discussion in the process of identifying the introduction of Signature, it can be concluded that:

a. Identifies Test results showed that the introduction of the Signature of suitable or unsuitable.
b. Hopefully, by the application system that was built to prevent the falsification of signatures.
c. Identifying the introduction of a signature method sangant SSE with lighting effect.
d. This system can work well if the lighting is relatively similar.
e. With relatively similar lighting result success rate reached 96%.
f. Different relative illumination system success rate decreased to 52%.

4.2 Suggestions

Based on the results of research and discussion in the previous chapter there are some suggestions that can be given to the author for subsequent research:

a. With the analysis of this study can be utilized by the user associated with the well.
b. Analysis of the previous chapter, the author may be implemented for future research.
c. The author realizes that this paper is not perfect, it's still a lot min. Expected for other users to be able to develop it.

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