Recognition Of Person's Character Trought The Shape Of Nose Using Learning Vector Quantization (LVQ) Method

Faisol*, Tony Yulianto, Suryani*****
* Departement of Mathematics, Universitas Islam Madura Pamekasan
** Departement of Mathematics, Universitas Islam Madura Pamekasan
*** Departement of Mathematics, Universitas Islam Madura Pamekasan

Article Info

Article history:

Received Jul 12th, 2017
Revised Aug 20th, 2017
Accepted Oct 26th, 2017

Keyword:

Curcuminoid
TLC
Contact bioautography
Antibacterial
Endophytic bacteria

ABSTRACT

Humans as social beings are never separated from interactions among others. The interaction can be done in the form of friendship, business or romance. In a relationship will be established balance and harmony if already know each other, one of them by recognizing the character. Psychology science is much discussed about character recognition one of them through the shape of the face. In this study focused on the shape of the nose and the data entered in the form of image images. The method used to identify the characters using Artificial Neural Networks is the LVQ method. From the result of the research, it can be concluded that character recognition using LVQ method has been produced from 20 trainings image there are 12 images of 4th nose type, 7 images of nose type 5, and 1 image of nose type 6th..

Corresponding Author:

Faisol,
Departement of Mathematics,
Universitas Islam Madura Pamekasan
Email: faisol.munif@gmail.com

1. INTRODUCTION

Character is a perpetual and eternal habit that can be used to identify individuals [1]. Characters can be recognized in several ways, such as recognizable through fingerprints, writings, signatures and through face shapes.

Beautiful face or a beautiful face cannot be used as a guarantee that the person has a good character and vice versa. Humans as social beings that must interact among others. The interaction can be done in the form of friendship, business, and romance. In the process can be established balance and harmony among others, so it can be recognized characteristics such as honesty, intelligence and credibility. Everyone tries as far as possible to recognize what the person's character is like. According to [2], physiognomy is an art and science that is used to recognize the character of a person by looking at the face, because the face is a member of the body that is usually a point of attention.

The facial profile consists of instruments such as lips, eyes and nose. Each of these parts has characteristics that represent certain traits and characters. For example, the lips show the ability to communicate, the eyes associated with the state of one's soul and the nose shows how one manages money [3]. In this study, researchers want to introduce one's character through the shape of the nose in order to know the ability person in managing finances so as to foster strong trust especially in business relationships and methods to identify his character using Artificial Neural Networks.

Artificial Neural Network (ANN) is an information processing system that has characteristics resembling a biological neural network [4]. There are two types of learning methods on artificial neural networks, namely supervised learning (Supervised Learning) and Unsupervised Learning (Unsupervised Learning). In the introduction of a person's character, supervised learning is more suitable because it uses output targets, one of which can be used is Learning Vector Quantization (LVQ). LVQ is a learning method in a competitive layer that will automatically learn to classify input / learning vectors [5]. The method of artificial neural network has been widely used, among others, on pattern recognition in the form of letters, voice recognition.

2. RESEARCH METHOD

2.1. Methods

In this section will be explained about the method used in this study along with the literature underlying theories in this study, such as previous research, Nose, Feature Extraction using PCA, Neural Network (ANN) and Learning Vector Quantization Method (LVQ).

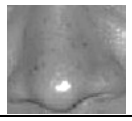
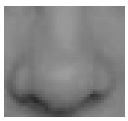
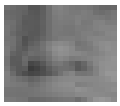
2.2. Previous Research

Based on [6] with a study entitled "Implementation of artificial neural network LVQ in the case of handwriting recognition" which states that the level of accuracy of the handwriting recognition system in the character segmentation of 98.32%. As for research conducted by [7] with a study entitled "Barcode recognition system using neural network artificial LVQ "which states that the results for a normal barcode has an introductory accuracy of 96%.

2.3. Nose

According to [2], the nose is the most prominent instrument on the face. The nose has many shapes and sizes, from small to very large. The shape of the nose shows a firm stance as well as how one manages money and what makes a person different in work or endeavor [3]. The image for the output weights can be seen in Table 1.

Table 1. Data for weight w

No	Type of Nose	Picture	Character
1	Big		Much energy, especially in the material field rather than spiritual and show will be rich.
2	Big nose at the bottom		Not good at saving money.
3	Eagle		Have brilliant business ability, success in life, good financial management.
4	Short		Hard worker, so good finance from the hard work.
5	Bumpy		Work back and forth, financially unstable.
6	Holes are more closed than open		Have a commitment to maintain wealth.

2.4. Digital Images

Image is another name of the image; the term image is usually used in the field of image processing. The image is defined as the function of two variables f (x, y), x and y are spatial coordinates and the value of f (x, y) is the image intensity at the coordinates. While the digital image is the image that has undergone the process of digitization that is used as input on the process of image processing using a computer. Digital images can be represented in the form of an M × N dimension with M representing the base and N representing the column. Each value on the matrix represents the gray degree value of the image. Equation (1) is an image representation in the form of a matrix.

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

2.5. Feature Extraction Using PCA

Image character extraction is done by changing the dimensions of each image into a single column so that it becomes the matrix vector for each image. These vectors are then combined into one large matrix as input for the feature extraction process [8].

Principal Component Analysis is a technique used to simplify a data, in a way to transform linearly to form a new coordinate system with maximum variance. In the PCA method the best information describing the face is derived from the overall face image. PCA requires data inputs that have zero-mean properties on each image. The zero-mean properties of each data image can be obtained by subtracting all values by means of the mean. X data sets with dimensions M × N, where M is row and N column, will be seen in equation (2) [9].

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1N} \\ x_{21} & x_{22} & \cdots & x_{2N} \\ \vdots & \vdots & \vdots & \vdots \\ x_{M1} & x_{M2} & \cdots & x_{MN} \end{bmatrix} \quad (2)$$

To calculate the mean of all sample data obtained by using equation (3):

$$\bar{x}_j = \frac{\sum_{ij=1}^{n} x_{ij}}{n} \quad (3)$$

For the jth image, all values in the column of equation (2) are reduced by the mean in equation (3) and are formulated in (4).

$$x'_{ij} = x_{ij} - \bar{x}_j \quad (4)$$

with:

$X' = [x'_{ij}]$

$i = 1,2,\ldots,M$

$j = 1,2,\ldots,N$

$\bar{x}_j =$ nilai rata-rata kolom ke-j

The process is then carried out to obtain the covariance matrix from equation (4), i.e. C in equation (5).

$$C = \frac{1}{M} X'.X'^{T} \quad (5)$$

By:

X'^{T} is transpose matrix of X'

The eigenvalues and eigenvectors of the covariance matrix of (5) are calculated using equations (6) and (7).

$$|C - \lambda I| = 0 \quad (6)$$

$$(C - \lambda I)v = 0 \quad (7)$$

By:

C = Covariance matrix
I = Identity Matrix
λ = Eigen value
v = Vektor eigen

The largest eigenvalues corresponding to the largest eigenvector value are selected to be Principal Components. The eigenvectors composed from the largest to the smallest are selected to be the image vectors.

$$VF = (eig_1, eig_2, eig_3, \cdots, eig_n) \quad (8)$$

To find Principal Component with X' is transpose the initial data of equation (2) by the formula:

$$PC = X' \times VF^{T} \quad (9)$$

From equation (9), then transformed data to produce PCA data with X as initial data.

$$\text{PCA data} = PC^{T} \times X' \quad (10)$$

2.6. Artificial Neural Networks (ANN)

According to [4], ANN is an information processing system that has characteristics similar to a biological neural network, just like a brain that processes information. Artificial neural networks are formed as generalizations of mathematical models of biological neural networks, assuming that:

a. Information processing occurs in many simple elements (neurons)
b. The signal is sent between the neurons through the connecting link.
c. Liaison between the neurons has a weight that will strengthen or weaken the signal.
d. To determine the output, each neuron uses an activation function (usually not a linear function) imposed on the sum of inputs received. The magnitude of this output is then compared with a threshold.

2.7. Learning Vector Quantization (LVQ)

Learning Vector Quantization (LVQ) is a method for conducting learning on a supervised competitive layer. The learning method of the neural network is called supervised if the expected output is known previously.

Here is a step in the Learning Vector Quantization (LVQ) JST algorithm:

Step 1: Initialization of learning rate (α), weight (w), epoch maximum, minimum error expected.

Step 2: For each of the training input vectors X is done by repeating step 3 and 4.

Step 3: Find the minimum J (distance) with: $\|X - w_j\|$

Step 4: Updating w_j by:

a) If $T = C_j$ then: $w_j(new) = w_j(old) + \alpha[X - w_j(old)]$

b) If $T \neq C_j$ then: $w_j(new) = w_j(old) - \alpha[X - w_j(old)]$

Step 5: Reduce learning rate (α)

$$\alpha = \alpha - (0{,}1 * \alpha)$$

Step 6: Check the termination conditions by:

$$MSE = \frac{\sum_{i=1}^{n} e_i^2}{n}$$

3. RESULTS AND ANALYSIS

Using the Learning Vector Quantization (LVQ) method, the solution to determine the minimum distance from equation (1) is obtained:

$$J_5 = \|X - w_5\| = \|3{,}6728 - 3{,}7790\| = 0{,}1062 \quad (11)$$

And from equation (11) the simulation result using Matlab R2013a can be described as in Figure 1.

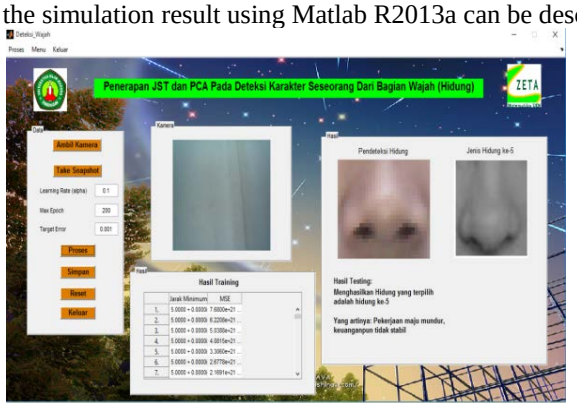


*Figure 1. Simulation Results Character recognition using **Matlab R2013a***

In Figure 1 shows that the trained image is the nose type 5, which means work back and forth, financially unstable.

Here is the character recognition result using LVQ method from 20 data of training image used in this research which can be seen in Table 2.

Table 2. The result of character recognition through nose shape with 20 image data using LVQ method

No	Student Name	PCA results	Type of Nose To-
1	Zakiatun Nurul Q.	3,6728	4
2	Suryani	2.8759	6
3	Hasan	1.2086	4

4	Susi	1.3145	4
5	Dian Islami	3,0386	4
6	Siti Zamha	5.5430	5
7	Rohemah	1.1564	5
8	Sarifatur Riskiyah	1.0434	5
9	Titin pramiswari	1.6443	4
10	Juwairiyah	1.7752	4
11	Siti Lailiya	4.6226	4
12	Mafhatuz Zahrah	2.46714.837	5
13	Zaifullah	1.1131	5
14	Alfin Maghfirah	8.0461	6
15	Sarifatun Nisa’	7.3472	5
16	Siti Mamdudah	1.5443	4
17	Anis Watun H.	5.6574	4
18	Suyibah	5.8301	4
19	Dian Fitriani	4.6436	5
20	Luluk Sarifah	4.8370	4

REFERENCES

[1] Pratama, Y. (2016). *1 Menit Bisa Membaca Wajah, Pikiran, dan Karakter Orang Lain.* Yogyakarta: Real Book Perum Boko Pertama Asri C5/3.
[2] Prasetyono, D. W. (2013). *Membaca Wajah Orang.* Yogyakarta: DIVA Press.
[3] Mu'min, A. (2015). *Who Are You 2.* Jakarta: Penebar Swadaya Grup.
[4] Siang, J. (2005). *Jaringan Syaraf Tiruan dan Pemrogramannya Menggunakan Matlab.* Yogyakarta: ANDI.
[5] Azizi, M. (2013). Perbandingan Antara Metode Backpropagation dengan Metode Learning Vector Quantization Pada Pengenalan Citra Barcode. In *Skripsi.* Semarang: Universitas Negeri Malang.
[6] Novelianti, S., & Dharma, E. M. (2007). Implementasi Jaringan Syaraf Tiruan LVQ Dalam Kasus Pengenalan Karakter Tulisan Tangan . In *Skripsi.* Universitas Telkom.
[7] Cahyono, G. P. (2010). System Pengenalan Barcode Menggunakan jaringan Syaraf Tiruan Learning Vector Quantization. In *Skripsi.* Surabaya: Institut Teknologi Sepuluh Nopember.
[8] Fiqhi, Z. b., Isnanto, R. R., & Somantri, M. (2013). Pengenalan tanda tangan menggunakan Analisis komponen utama (principal component analisis PCA) dan metode jaringan syaraf tiruan perambatan balik. *Jurusan tekhnik elektro, universitas Diponogoro semarang*.
[9] Hardiansyah, B. (2015). Pengenalan Ekspresi Wajah Menggunakan Jaringan Syaraf Tiruan Kohonen Self Organizing Maps (K-SOM). In *Tesis* (pp. 12-15). Surabaya: Institut Teknologi Sepuluh November.