published by: Institute of Computer Science (IOCS)

Journal of Intelligent Decision Support System (IDSS)

journal homepage: www.idss.iocspublisher.org/index.php/jidss

Performance of Backpropagation Algorithm in Recognizing Patterns on Finger Print Machines at Jaya Krama Beringin Private Vocational School Using Artificial Neural Network

Sutini[1]*, R. Fanry Siahaan[2]

[1,2] *Informatics Engineering STMIK Pelita Nusantara, Jl.Iskandar Muda No.1 Medan*

[1]*tsutini7@gmail.com**; [2]*rfanry@gmail.com*
**Corresponding author*

ARTICLE INFO

Article history:
Received: 21/08/2020
Revised: 25/08/2020
Accepted: 30/08/2020
Available online 01/09/2020

Keywords:
Artificial Neural Networks
Backpropagation
Finger print attendance

ABSTRACT

This research is about Artificial Neural Networks in Identifying Patterns on Finger Print Machines at the Jaya Kerama Beringin Private Vocational School. The method used is Backpropagation, Backpropagation is applied to determine the finger print machine user with criteria, whether he arrives on time, is he late, and whether go home too early or come home on time. The system was built using Visual Studio 2010 programming language with Microsoft Access 2007 database. The result of this research is a finger print attendance application that identifies the attendance machine user which can help Jaya Kerama Vocational High School in controlling the discipline of teachers and employees.

1. Introduction

In the world of work, in any sector, in order to improve employee performance and performance which in turn has an impact on improving results both in terms of quality and quantity, one of the factors that must be considered is discipline. Discipline according to Government Regulation No. 53/2010. Civil Servant Discipline is the ability of Civil Servants to comply with their obligations and avoid the prohibitions stipulated in the official regulations which, if not obeyed or violated, will be subject to disciplinary action.

So far, the application of discipline to institutions or agencies, especially attendance, has been done manually (only in the form of an attendance list). As technological developments have entered the era of 4.0 manual attendance, many institutions or agencies have abandoned them and switched to finger print or fingerprint attendance. Finger print attendance has a direct effect on the conditionwant to work. [6] The advantages of using finger print attendance in various agencies can facilitate management control, especially the discipline of employee attendance compared to the use of manual attendance (only in the form of an attendance list). The use of finger print attendance has been implemented in private vocational high school Jaya Krama Beringin, but it has not been effective because the finger print attendance machine only records employee attendance and return.

Mtake advantage of the finger print sensor with the fingerprint method where fingerprint recognition is used with the filtergabor approach with 10 respondents, where each respondent takes 8 scanning fingerprints, which are varied from the angle of taking the fingerprint to the sensor 0o, 22.5*o*, 45*o*, 67.5*o*90*o*112.5*o*135*o*157.5*o* and the result is 157.50. [7]

Finger print machines are currently unable to provide temporary reports on employee attendance and return times. So that users do not know for sure whether their presence is late or too early to come home. This research focuses on increasing the ability of the backpropagation method in recognizing the presence pattern on the Fingerprint machine using Artificial Neural Networks. Artificial Neural Network uses the bacpropagation method to predict student achievement with test results with a 4-2-1 architectural pattern, the data is divided into two parts,

namely 20 training data with an error percentage of 95.6% and 20 testing data with a percentage of 100%. [16]

2. Method

2.1 Research Framework

In this method, the writer will provide an overview of the steps that include from the beginning of the study to the end of the study. In order for the research carried out to be carried out in a structured and systematic manner, it is necessary to develop a framework.

The following is a research framework

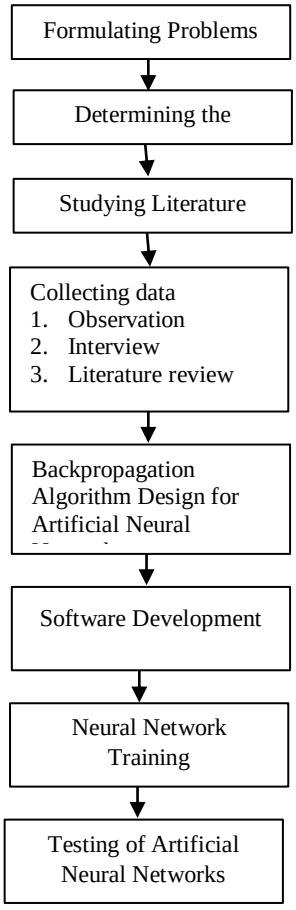

Figure 1. Research Framework

2.2 Data collection

The data collection techniques that the authors use in this study are:

a. Observation
At the observation stage, the authors collected data in the field by making observations by visiting the Jaya Krama Beringin Private Vocational School.

b. Interview
Doing questions and answers between the author and the Principal, Assistant Principal for Curriculum, Assistant Principal for Student Affairs, Head of Administration and Operators in order to get accurate data.

c. Literature review
Retrieval of data from books, e-journals, and other sources related toproblem so that it has a strong theoretical basis and foundation.

2.3 Analysis Method with Backpropagation Method

The Backpropagation Algorithm is a gradient descent method to minimize the squared output error. To conduct training on a network consists of three stages, namely:

1. Forward propagation
2. The propagation stage - reverse (backpropagation)
3. The weight and bias propagation stage.

The steps in the backpropagation algorithm by Siang JJ. (2018) are as follows:

a. Step 0: Initialize the weights (set weights to small random values).
b. Step 1: When the stop condition is wrong, do steps 2 - 9.
c. Step 2: For each training pair, do steps 3 - 8.
d. Step 3: Each input unit receives an input signal and transmits this signal to all units in the layer above (hidden unit)$(xi, i = 1, \dots . n)xi$
e. Step 4: Each hidden unit adds up the weight of the input signal. $(zj, j = 1, \dots, p)$

$$z\_in_j = v_{jo} + \sum_{i=1}^{n} x_1 v_{ji}$$

$$z_j = f(z\_net_j) = \frac{1}{1 + e^{-z\_net_j}}$$

applies the activation function to calculate the output signal

$$z_j = f(z\_in_j)$$

and send signals to all units in the layer above it (output unit).

f. Step 5: Each unit of output (Yk, k = 1,.., M)

$$y_{net_k} = w_{ko} + \sum_{j=1}^{p} z_j w_{kj}$$

$$y_k = f(y\_net_k) = \frac{1}{1 + e^{-y\_net_k}}$$

add the input signal weights. and applies its activation function to calculate the output signal.
yk = f (y_ink)
Phase II: Backward propagation

g. Step 6: Each output unit receives a target pattern according to the input training pattern, calculating the error information. $yk, (k = 1, \dots, m)$

$$\delta_k = (t_k - y_k) f'(y\_net_k) = (t_k - y_k) y_k (l - y_k)$$

calculating the corrected weights (used for updating) w_{jk}

$;\Delta w_{jk} = \alpha \delta_k z_j k = 1,2, \dots, m$; j = 0,1, ..., p

calculating the bias correction (used to update w0k) sends to the sublayer unit

$\Delta w_{0k} = \alpha \delta_k$

h. Step 7: Each hidden unit adds up the delta input (from the units on the top layer). $(z_j, j = 1, \dots . , p)$

$$\delta_{in_j} = \sum_{k=1}^{m} \delta_k w_{jk}$$

Hidden sequence factor:δ

$\delta_j = \delta\_net_j f'(z\_net_j) = \delta\_net_j z_j (l - z_j)$

Calculate the term change in the weight of vii

$\Delta v_{ji} = \alpha \delta_j x_i$; j = 1, 2, ... p: i = 0,1, ... n

Phase III: Change in weight

i. Step 8: Each unit of output updates the bias and weights $(Yk, k = 1, \dots, m)(j = 0, \dots, p)$

$W_{kj\,(baru)} = w_{kj(lama)+}\Delta w_{kj}$ $(k = 1,2, \dots, m\,; j = 0,1, \dots, p)$

Each hidden unit updates the weights and biases $(Zj, j = 1, \dots, p)$

$v_{ji(baru)} = v_{ji(lama)+}\Delta v_{ji}$ $(j = 1,2,.., p\,; i = 0,1, \dots, n)$

Step 9: Test the stop condition.

The network can already be used for pattern recognition. In this case, only Forward Propagation (rare 4 and 5) is used to determine the network output. And if the function used is not a binary Sigmoid, then rare 4 and 5 must be adjusted as well as their derivatives in steps 6 and 7.

3. Results and Discussion

3.1 Analysis and Application of Methods

Collecting data in the form of teacher absenteeism data by analyzing teacher absenteeism data from the first week to the third week of February 2020.

The following is data that has been created in formExcel report based on teacher absenteeism from week 1 to week III of February 2020 which will be used to forecast the coming month using the Backpropagation method.

Table 1.
Teacher absenteeism index for February, first week of 2020

Group	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Teacher 1	0.2246	0.22707	0.34804	0.22327	0.21948	0.30908

Source: Teacher Attendance

Table 2.
Teacher absenteeism index for February, second week of 2020

Group	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Teacher II	0.05055	0.06002	0.05054	0.05051	0.05047	0.06032

Source: Teacher Attendance

Table 3.
Teacher absenteeism index for February, Week III of 2020

Group	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Teacher III	0.23489	0.2325	0.02363	0.23237	0.34559	0.24921

Source: Teacher Attendance

Table 4.
Input Data Used

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
I	0.2246	0.22707	0.34804	0.22327	0.21948	0.30908
II	0.05055	0.06002	0.05054	0.05051	0.05047	0.06032
III	0.23489	0.2325	0.02363	0.23237	0.34559	0.24921

Source: Teacher Attendance

*Backpropagation*is a learning algorithm to reduce the error rate by adjusting the weight based on the difference in output and the desired target. Backpropagation is a multilayer network which is a development of a single layer network.

a. Backpropagation Method Network Architecture

Backpropagation method architecture consists of three layers in the learning process, namely the input layer, hidden layer and output layer.

1) *Input layer*
   Input layer functions to receive the value of the characteristic input pattern where the value of neurons in the input layer is numeric. The number of neurons in the input layer is influenced by the number of input patterns that will be inputted into the ANN. At the input layer there is no computation process, but the x input signal is sent to the hidden layer.
2) *Hidden layer*
   In the hidden layer, the computation process of weight and bias occurs and the amount of output from the hidden layer is also calculated based on a certain activation function. There are no definite provisions to determine the number of hidden layers. However, the number of hidden layers affects accuracy and speed. With the hidden layer, it can cause the error rate in Backpropagation to be smaller than the error rate on a single layer network. because the hidden layer in Backpropagation serves as a place to update and adjust the weights, so that new weight values can be obtained that can be directed closer to the desired output target.

3) *Output layer*
The number of layers used is 1 layer. The output neuron value is a binary sigmoid number. The output layer consists of several output neurons. The combination of all these neurons can be used to identify as well as learning as the proper output.

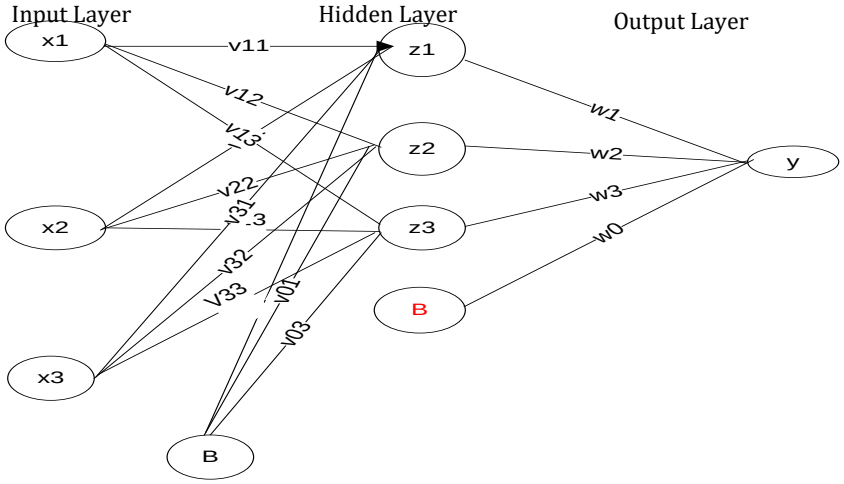

Figure 2. Shows the network architecture of the Backpropagation method in pattern recognition

Information :

1) Input Layer Designation

The artificial neural network for estimating the amount in backpropagation pattern recognition is carried out by entering the teacher absenteeism variable, namely the work day for 6 days of assignment as input which consists of:

a. Teacher 1 (X1)
b. Teacher II (x2)
c. Teacher III (x3)

The number of entries is determined based on the schedule of tasks that will be inputted into the system.

2) The weight between the input layer and the hidden layer
V01-V03 = hidden layer bias weight
V11-V33 = hidden layer weight
This application program uses the number of hidden layer neurons as much as 3 neurons, so that the hidden layer weight is 3 layer weights and the refractive weight is 1 layer weight.

3) Hidden Layer Designation
Z1-Z3 = hidden layer of 3 neurons

4) Weight between hidden layer and output layer W0
= bias weight
W1-W3 = output layer weight of 1 weight.

5) Output Layer Designation
Target 1 piece of Output (Y) from the output layer, namely the prediction that the next finger print machine can recognize the user.
The activation function used is the binary sigmoid function with a value range [0-1].

Step 0

Initialize all weights with small random numbers.

Table 5.
Weight From Input Screen to Hidden Screen = Vji

	Z1	Z2	Z3
X1	0.2	0.3	0.1
X2	-0.4	-0.2	0.3
X3	0.5	0.1	-0.3
b	-0.2	0.5	-0.4

Table 6.
Weight From Hidden Screen to Output Layer = Wkj

	Y
Z1	0.5
Z2	0.2
Z3	0.3
B1	0.4

Step 1
If the termination conditions are not met, perform steps 2 through 9
Step 2
For each pair of training data, perform steps 3 through 8
Phase I: Forward Propagation
Step 3
Each input unit receives a signal and passes it on to a hidden unit
Step 4
Count all the outputs in the hidden unit Zj (j = 1, 2, ..., p):

$$Z_{netj} = V_{j0} + \sum_{j=1}^{p} X_i V_{ji} \quad (1)$$

$$Z_{net1} = V_{10} + \sum_{j=1}^{2} X_i V_{ji} = V_{10} + X_1 V_{11} + X_2 V_{12} \quad \dots \quad X_i V_{ji} \quad (2)$$

= -0.2 + (-0.2 * 0.2) + (0.5 * -0.4) + (-0.4 * 0.5)
= -0.64

$$Z_{net2} = V_{10} + \sum_{j=1}^{2} X_i V_{ji} = V_{10} + X_1 V_{21} + X_2 V_{22} \quad \dots \quad X_i V_{ji} \quad (3)$$

= 0.5 + (-0.2 * 0.3) + (0.5 * -0.2) + (-0.4 * 0.1)
= 0.3

$$Z_{net3} = V_{10} + \sum_{j=1}^{2} X_i V_{ji} = V_{10} + X_1 V_{31} + X_2 V_{32} \quad \dots \quad X_i V_{ji} \quad (4)$$

= -0.4 + (-0.2 * 0.1) + (0.5 * 0.3) + (- 0.4 * -0.3)
= -0.15
>> Activation:

$$\boldsymbol{Z_j = \frac{1}{1+e^{-zinj}}} \quad (5)$$

$$\mathbf{Z1 == \frac{1}{1+e^{-0,64}}} \; 0.654\,753$$

$$\mathbf{Z2 = \frac{1}{1+e^{-zin2}}} \quad (6)$$

$$\mathbf{Z2 == \frac{1}{1+e^{0,3}}} \; 0.425557$$

$$\mathbf{Z3 = \frac{1}{1+e^{-zin3}}} \quad (7)$$

$$\mathbf{Z3 == \frac{1}{1+e^{-0,15}}} \; 0.53743$$

\ Step 5
Count all networks in the output unit (Yk)

$$Y_{netk} = W_{k0} + \sum_{j=1}^{p} Z_i W_{kj} \quad (8)$$

$$Y_{net1} = W_{10} + \sum_{j=1}^{p} Z_j W_{kj} = W_{10} + Z_1 W_{11} + Z_2 W_{12} + Z_3 W_{13} \quad (9)$$

= 0, 4 + (0.654 753* 0.5) + (0.425557* 0.2) + (0.53743* 0.3) = 0.97372

$$Y_k = f\,(Y_{netk}) = \frac{1}{1+e^{-Ynetk}} = \frac{1}{1+e^{0,97372}} = 0.27414$$

Phase II: Backward Propagation
Step 6

δk = (tk-Yk) f '' (Ynetk) = (tk-Yk) Yk (1-Yk) = (0-0.27414) * 0.27414 * (1-0.27414) = -0.0546
δk is the error unit that will be used in changing the weight of the layer below it (step 7).
The term change in weightWkj (where α = 0.9)
$\Delta Wkj = \alpha\delta_k\, zj$ (10)
$\Delta W10 = \alpha\delta_0(1) = 0.9.\ (-0.0546).\ (1) = -0.04914$
$\Delta W11 = \alpha\delta_1\ (z1) = 0.9 * (-0.0546) * (0.654\ 753) = -0.0322$
$\Delta W12 = \alpha\delta_2\ (z2) = 0.9 * (-0.0546) * (0.425557) = -0.0209$
$\Delta W13 = \alpha\delta_3\ (z3) = 0.9 * (-0.0546) * (0.53743) = -0.0264$

Step 7

Calculate the sum of the errors of the hidden units (=δ)

$$\delta_{netj} = \sum_{k=1}^{m} \delta_k W_{kj} \quad (11)$$

Since the network only has one output unit, δnetj = δ Wij
δnet1 = δk.W11 = (-0.0322). (-0.01) =0.000322
δnet2 = δk.W12 = (-0.0209). (-0.02) =0.000418
δnet3 = δk.W13 = (-0.0264). (-0.01) =0.000264
Error factor in hidden unit:δ
$\delta_j = \delta_{netj}\ f'(Znetj) = \delta_{net}\ Zj\ (1-Zj)$ (12)
$\delta_1 = \delta_{net1}\ Z1\ (1-Z1) = 0.000322^*\ (0.654\ 753) * (1-\ (0.654\ 753)) = -0.00405778$
$\delta_2 = \delta_{net2}\ Z2\ (1-Z2) = 0.000418^*\ (0.425557) * (1-\ (0.425557)) = 0.000102184$
$\delta_3 = \delta_{net3}\ Z3\ (1-Z3) = 0.000264^*\ (0.53743) * (1-\ (0.53743)) = -0.00296197$
The term change in weight to hidden units: $\Delta Vji = \alpha\delta_j xi$ (13)

Table 7.
Rate Change Weight to Hidden Units

	Z1	Z2	Z3
X1	0.0	0.0	0.0
X2	0.0	0.0	0.0
X3	0.0	0.0	0.0
B1	0.0	0.0	0.0

Phase III: Weight Change

Step 8

Calculate all changes in weight. Change in output unit weight:
Wkj (new) = Wkj (old) + ΔWkj (14)

Table 8.
Output Unit Weight Change

	Y	Wkj (old)	Wkj (new)
Z1	0.5	-0.01	0.49
Z2	0.2	-0.02	0.22
Z3	0.3	-0.01	0.31
B1	0.3	-0.03	0.33

Change in hidden unit weight: Vji (new) = Vji (old) + ΔVji

Table 9.
Hidden Weight Change

	Z1	Z2	Z3	Z4	Z5	Z6
X1	0.2	0.3	0.1	0.5	-0.3	-0.1
X2	-0.4	-0.2	0.3	0.3	-0.4	0.6
X3	0.5	0.1	-0.3	-0.4	-0.1	0.3
B1	-0.2	0.5	-0.4	0.6	0.2	0.5

b. Normalization Process

Before processing, the data is normalized first. Normalization of the data is done so that the network output matches the activation function used. In backpropagation, the activation function used must meet several conditions, namely: continuous, easily differentiated and a function that does not decrease. One of the functions that meet these three requirements so that it is often used is the binary sigmoid function which has a range (0, 1) and the bipolar has a range (-1,1).

Because the research uses the binary sigmoid activation function, the data to be studied first is normalized in the interval [0, 1] because the data used is positive. In addition, it is also related to the activation function given, namely binary sigmoid. The sigmoid function is an asymptotic function (it never reaches 0 or 1), so the data transformation is carried out at smaller intervals, namely [0.1; 0.9]

$$x^1 = \frac{0.9(x-a)}{b-a} + 0{,}1 \quad (15)$$

Information :
x' : Transformed data
x : Data to be normalized
a : Minimum data
b : Maximum data

c. **Data Processing (Normalization)**

Data processing that will be done is to change the teacher absentee index data based on the type of attendance to come and go home, namely by making the best architectural pattern to useArtificial Neural Networkwith backpropogation. The following will describe the data normalization in the prediction process based on table 4.10. in the previous discussion.

Table 10.
Initial Data of Week I – Week III Training Using Rotation Rotations

Data	Input Data						Target
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
Pattern 1	0.224602	0.227065	0.348039	0.22327	0.219484	0.30908	0.05005
Pattern 2	0.227065	0.348039	0.22327	0.219484	0.30908	0.05050	0.06002
Pattern 3	0.348039	0.22327	0.219484	0.30908	0.05050	0.06002	0.05054

Explanation:

- Training data for Week I - Week III is carried out using rotary rotation, meaning that each dataset has the same rights to achieve the target.
- The data value in pattern 1 is taken from the IPP for the type of attendance in week I. While the target value is taken from the IPP for the type of attendance for the second week of February 2020.
- The data value in pattern 2 is taken from the IPP for the type of attendance for week I to week II in February 2020. The target value in pattern 2 is taken from the IPP for the type of attendance for the second week of February 2020.
- The data value in pattern 3 is taken from the IPP of attendance for the first week of 2020 in February 2020. The target value in pattern 3 is taken from the IPP of attendance for the second week of 2020.
- And so on until all the values are finished playing.
- The maximum value (b) of the dataset is 06.02 while the minimum value (a) is 0.348039.
- By using the binary sigmoid function, the following normalization data will be obtained:
  $x' = \frac{0{,}9(0{,}224602-0{,}348039)}{06{,}02-0{,}348039} + 0{,}1$
  Then you will get the results of Normalization pattern 1 for Week I 0.080414. And so on for all data, normalized using the same function.

d. **Network Training**

In this step, the learning rate of network work will be observed with parameters of accuracy level, learning time, MSE during the training process and the length of iteration time (Epoch). The main purpose of this step is to obtain an optimal level of learning rate accuracy. By using the best network architecture in training, the learning rate of network performance will be observed. The architecture used for training is 3 patterns. These 3 architectural patterns use a Learning rate of 0.1, target error (goal) of 0.01 and the maximum epoch is 1000 iterations and forgenerate the lowest error using traingd.

The training architecture 1 uses an input layer of 3 neurons, a hidden layer of 3 neurons and an output layer of 1 neuron. In training 1 this resulted in training with an epoch of 530 iterations, a time of 00.32, an MSE of 0.078319 and an accuracy rate of 67%.

Table 11.
Architectural Training Data Accuracy 3-3-1

	Target	Input	Output	Error	SSE	Result
pattern 1	0.517489	0.080414	0.041613	0.47587564	0.226458	Wrong
pattern 2	0.015067	0.080804	0.001217	0.013849526	0.000192	Right
pattern3	0.092384	0.01341	0.001239	0.091145131	0.008307	Right
				Total SSE	0.234957	67%
				MSE	0.078319	

Patterns 1 to 3 are patterns used in training data. The target value is obtained from the training data table. Output values are obtained from the input and target training data. Error value obtained from: Target-Output. The SSE is obtained from: Error ^ 2. The number of SSE is the total of the total SSE. MSE obtained from: Number of SSE / 12 (amount of data). The result is true if the SSE value <= 0.01. 0.00 is the target error from backpropagation training. Accuracy (%) is obtained from: Number of True / 12 * 100.

The training architecture 2 uses an input layer of 3 neurons, a hidden layer of 6 neurons and an output layer of 1 neuron. In training 2 this resulted in training with an epoch of 82 iterations, time 00.05, MSE 0.00982 and an accuracy rate of 67%. In training architecture 3, it uses input layers of 3 neurons, hidden layers of 8 neurons and output layer of 1 neuron. In training 3 this resulted in training with an epoch of 499 iterations, 00.31 time, 0.00995 MSE and an accuracy rate of 67%. The training architecture 4 uses 3 neurons as input layers, 33 hidden neurons and 1 neuron output layer. In training 4 this resulted in training with an epoch of 96 iterations, time 00.06, MSE 0.00975 and an accuracy rate of 67%. The training architecture 5 uses an input layer of 3 neurons, a hidden layer of 34 neurons and an output layer of 1 neuron. In training 5 this resulted in training with an epoch of 148 iterations, time 00.09, MSE 0.00996 and an accuracy rate of 67%.

e. Testing Process (Testing)

Networks that have been trained and achieved the desired results need to be tested to determine their capabilities when studying the training data provided. Testing can be done using data sets that have been trained to see the performance of the application system that has been made by looking at the minimum error value. In addition, testing can also be carried out using data sets that have never been trained before to see the level of accuracy of the system that has been created. MSE in training test 1 is 0.051955

Table 12.
Architectural Testing Data Accuracy 3-3-1

	Target	Input	Output	Error	SSE	Result
pattern 4	0.05051	0.22327	0.011277	0.039232632	0.001539	Right
pattern 5	0.50047	0.219484	0.109845	0.390624843	0.152588	Wrong
pattern 6	0.06032	0.30908	0.018644	0.041676294	0.001737	Right
				Total SSE	0.155864	67%
				MSE	0.051955	

Patterns 4 to 6 are patterns used in training data. The target value is obtained from the training data table. Output values are obtained from the input and target training data. Error value obtained from: Target-Output. The SSE is obtained from: Error ^ 2. The number of SSE is the total of the total SSE. MSE obtained from: Number of SSE / 12 (amount of data). The result is true if the SSE value <= 0.01. 0.00 is the target error from backpropagation training. Accuracy (%) is obtained from: Number of True / 12 * 100.

MSE in training test 2 is 0.0142803. MSE in training testing 3 is 0.020554. MSE in training testing 4 is 0.036615 and MSE in training testing 5 is 0.017577.

3.2 System Implementation

a. Use Case

Use Case Diagram is a description of some or all actors, use cases, and the interactions between these components that introduce a system to be built. Use Case Diagrams explain the benefits of a system when viewed from the views of people outside the system. The following is the Use Case Diagram model in this study:

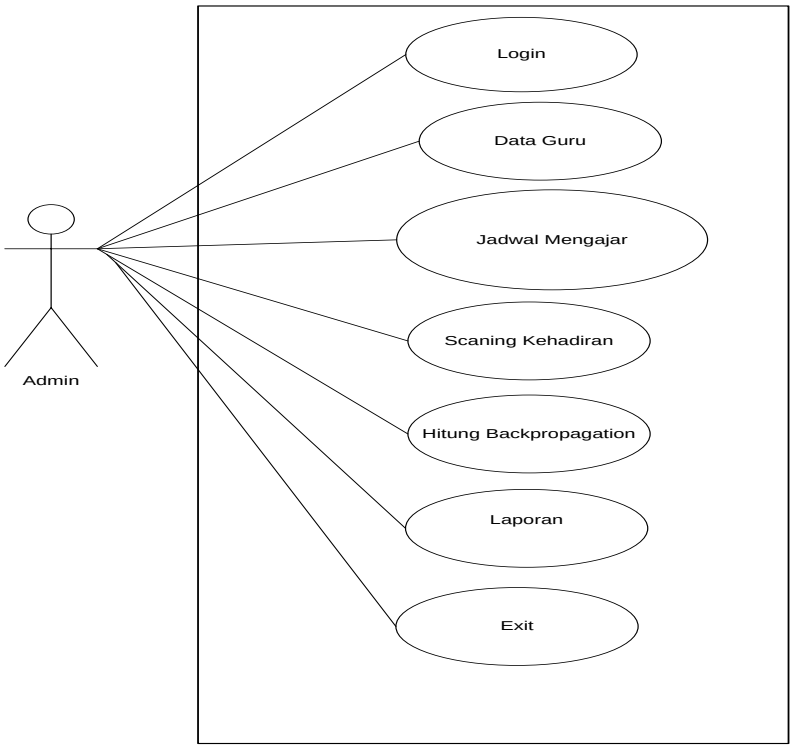

Figure 3. Use Case System Diagram

b. Result Display

A page display of the results of the backpropagation calculations that have been done. The data displayed from the teacher attendance list is known to teachers who arrive on time, arrive late, go home on time and return too early.

LAPORAN KEHADIRAN GURU

SMK SWASTA JAYA KRAMA BERINGIN

Sekolah	: smk swasta jaya krama	NAMA	: NOVALINA MADUWU	Absen	Ijin	: 1	Sekait	Ket

Tabel Kehadiran

Tanggal	Hari	Masuk	Keterangan
03-Feb-20	Senin	07.20	Terima Kasih Anda Datang Tepat Waktu
04-Feb-20	Selasa	07.13	Terima Kasih Anda Datang Tepat Waktu

Tabel Kepulangan

Tanggal	Hari	Masuk	Keterangan
03-Feb-20	Senin	17.30	Terima Kasih Anda Pulang Tepat Waktu
04-Feb-20	Selasa	15.00	Maaf Anda Pulang terlalu cepat

Sekolah	: smk swasta jaya krama	NAMA	: SAMUDRA KURNIAWAN	Absen	Ijin	Sekait	Ket

Tabel Kehadiran

Tanggal	Hari	Masuk	Keterangan
03-Feb-20	Senin	07.09	Terima Kasih Anda Datang Tepat Waktu
04-Feb-20	Selasa	07.33	Maaf Anda Datang Terlambat

Tabel Kepulangan

Tanggal	Hari	Masuk	Keterangan
03-Feb-20	Senin	16.32	Terima Kasih Anda Pulang Tepat Waktu
04-Feb-20	Selasa	17.10	Terima Kasih Anda Pulang Tepat Waktu

Sekolah	: smk swasta jaya krama	NAMA	: WALUYU	Absen	Ijin	Sekait	Ket

Tabel Kehadiran

Tanggal	Hari	Masuk	Keterangan
03-Feb-20	Senin	07.15	Terima Kasih Anda Datang Tepat Waktu
04-Feb-20	Selasa	07.22	Terima Kasih Anda Datang Tepat Waktu

Tabel Kepulangan

Tanggal	Hari	Masuk	Keterangan
03-Feb-20	Senin	17.30	Terima Kasih Anda Pulang Tepat Waktu
04-Feb-20	Selasa	16.30	Terima Kasih Anda Pulang Tepat Waktu

4. Conclusion

From the discussion in previous chapters, the following conclusions can be concluded:

a. The application of Artificial Neural Networks on finger print attendance machines using the Backpropagation Algorithm can provide a level of accuracy that matches the data needs.
b. The results of the decisions given by the system are given by the system in the form of reports that are easy to obtain. This ANN application is only a tool that is very dependent on the data input by a programmer so that this Artificial Neural Network application must always be developed.
c. Based on the results of the application design using the Backpropagation Algorithm method, the application can display the results of the satisfaction level criteria of the choices of the Jaya Krama Beringin Vocational School.

d. *Tools* provided by Visual Basic.NET 2010 is very accommodating in the process of making this application. In addition, Visual Basic.NET 2010 can properly connect database to Micosoft Access 2010.

5. References

[1] Amrinsani, Farid, Zainal Arief, and Agus Indra Gunawan. 2019. "Identification of Vastus Medialis and Erector Spinae Muscle Electromyography Signals in Movement Transition for Robot Foot Control." INNOVTEK POLBENG.

[2] Bose, Palash Kumar, and Mohammad Jubaidul Kabir. 2017. "Fingerprint: A Unique and Reliable Method for Identification." Journal of Six Medical College.

[3] Habibi, Mochammad Yusuf, and Edwin Riksakomara. 2017. "Forecasting the Price of Salt Consumption Using an Artificial Neural Network Feedforward-Backpropagation (Case Study: PT. Garam Mas, Rembang, Central Java)." Engineering Journal ITS.

[4] Hania, Abu Ahmad. 2017. "Get to know Artificial Intelligence, Machine Learning, Neural Networks, and Deep Learning." Indonesian Journal of Technology.

[5] Jek Siang, J. (2005). Neural Networks & Its Programming Using MATLAB. Yogyakarta: ANDI.

[6] Nurmalasari, Sari Hartini, Cep Adiwihardja, and Muniroh Muniroh. 2018. "The Effectiveness of Fingerprint Attendance Implementation Against Employee Work Discipline of PT. Hillconjaya Sakti Jakarta. " Snit 2018.

[7] Madden, Callif, and Tasker 2020 use a finger print sensor with the fingerprint method where fingerprint recognition is used with a filtergabor approach with 10 respondents, where each respondent is taken with 8 scanning fingerprint data, which is varied from the angle of taking the fingerprint to the sensor. 0o, 22.5*o*, 45*o*, 67.5*o*90*o*112.5*o*135*o*157.5*o* and the result is 157.50.

[8] Octaviano, Alvino et al. 2017. "Fingerprint Fingerprint Based Employee Attendance System." Proceedings of the National Seminar on Informatics and Information Systems 1: 106–22.

[9] Prasetyo, Hoedi, and Wahyudi Sutopo. 2017. "Industrial Engineering Scientific Development Towards the Era." In the 2017 IDEC National Seminar and Conference.

[10] Rifzan. 2018. "Understanding Artificial Intelligence and Examples in Life." 28 December 2018.

[11] Ritonga, Alven Safik, and Suryo Atmojo. 2018. "Development of Artificial Neural Network Model to Predict the Number of New Students in PTS Surabaya (Case Study of Wijaya Putra University)." Asian Scientific Journal of Information Technology.

[12] Romadhon, Ahmad Sahru, Vivi Tri Widyaningrum, and Ahmad Sahru Romadhon. 2015. "Method Fingerprint Image Recognition System." : 978–79.

[13] Surono, Surono (Pandanaran University Semarang), and Moh. Mukeri (Pandanaran University Semarang) Paramitha, Patricia Dhiana (Pandanaran University Semarang) Warso. 2016. "The Influence of Transformational Leadership Style, Organizational Culture and Work Discipline on Work Productivity with Work Ethic as an Intervening Variable at Pt. Muliapack Gravurindo Semarang. " Maharaja Agrasen Institute of Management and Technology Journal of IT & Management.

[14] Seminar, Rizky Mulya Sampurno and Kudang Boro. 2017. "Artificial Neural Network Application in Early Detection System for Food Crisis Management." Application of Artificial Neural Networks in Early Detection Systems for Food Crisis Management 11 (1).

[15] Sudarsono, Aji. 2016. "Artificial Neural Networks To Predict Population Growth Rate Using Backpropagation Method (Case Study In Bengkulu City)." Media Infotama. Sudarto, Singgih, Dewi Mayasari, Lia Listyana. 2002. "Artificial Neural Network." Dynamic-Journal of Information Technology 7 (2): 17–75.

[16] Sutojo.T, Mulyanto Edi and Vincent S. (2011). Artificial intelligence. Yogyakarta: ANDI

[17] Zola, Fatmi. 2018. "Artificial Neural Networks Using Backpropagation Algorithm to Predict Student Achievement." Journal of Technology and Open Source 1 (1): 58–72.