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Classification of Interests and Talents in Early Adult Phase Based on RMIB Test with Neural Network

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ABSTRACT

The brain in the human body is responsible for regulating the overall work of the human body and mind. The left part of the brain is the center of intelligence or commonly called Intelligence Quotient (IQ). Intelligence can come from genes received by children from their parents that will continue to develop along with a person's maturity process. An individual will go through a transition period or transition period, namely in the early adult phase so that individuals in the early adult phase often experience unstable psychic conditions. This labile condition occurs in early adult individuals in this case, namely students who are still not sure what potential interests and talents they have, causing students It felt wrong to take the major. The purpose of this study is to classify interests and aptitudes from EEG data obtained from interviewees with RMIB test stimulus. In this study, testing will be carried out on the object of study where the object of study is an individual in the early adult phase with an age range between 18-30 years. The test is carried out using a beta signal (12-30 Hz) resulting from an Electroencephalogram (EEG) signal filter generated from recording EEG data with the NeuroSky Mindwave tool and then reduced to get the best value or component with the Principal Component Analysis (PCA) method. EEG data recording is carried out 3 times with data recording intervals every 14 days. EEG data is information that we can get from activity waves in the brain, because waves in the brain cannot be observed visually. Testing on this study. The EEG data obtained will go through the pre-processing stage, namely signal filters and signal reduction and then will be classified using neural networks with a backpropagation algorithm with Using 1 layer of hidden layer. In this study, the results of the RMIB test carried out by the interviewees were calculated by psychologists (expert judgement) which were used as comparison data or the output produced by the system. Testing is carried out by cross validation, which is to cross-test each data retrieval. Accuracy testing on the first fetch resulted in an accuracy of 92.8571%, in the second data retrieval it produced an accuracy of 78.571%, in the third data retrieval it resulted in an accuracy of 71.4285% with an average accuracy produced by the system of 80.9523%.

1. Introduction

The brain in humans is responsible for regulating the entire set of work of the human body and mind. Therefore, that is the reason for the strong connection between the brain and the mind. The big brain is divided into two parts, namely the right brain and the left brain. Experts say that the left brain is the center of intellectual ability or Intelligence Quotient (IQ) [1], [2].

The intelligence, interests and talents possessed by each individual are different. Intelligence can be interpreted as a talent or ability possessed by an individual is innate obtained from his parents. The level of intelligence can reflect the abilities of an individual and abilities can also come from other people around that individual. Ability is directly proportional to interest, therefore if an individual has an interest in a certain activity then the individual can like and pay attention to the activity with a sense of pleasure and interest is an activity or activity that is fixed and is carried out to listen or pay attention and keep memories of some of the activities carried out both intentional and unintentional [3].

So that intelligence, interests and talents can be measured or known through electroencephalogram (EEG) signals because EEG signals are bioelectrical signals that come from the surface of human skin, EEG signals are complex and can be used as a source of information from what the brain does or the functions of the brain. EEG signals are in the form of electrical waves that are very small in size and different in each individual.

In this case, the intelligence test or commonly called the IQ test with the RMIB test question type is a stimulus to obtain EEG data in the search for interests and talents from interviewees in the early adult phase with an age range of 18-30 years. Where at this age is a transitional phase from adolescence to adulthood (Natari, 2016). The reality that occurs today is not uncommon for individuals in the early adult phase in this case, namely students who are still not sure what potential interests and talents they have. So we also find various cases of students taking the wrong major because of the uncertainty that arises in the chosen major with what has been lived is different from what they decided when choosing the major to be pursued.

This problem is proven by the results of research by Youthmanual, Tech Incubator of Multimedia Nusantara University that 92% of high school / K students and equivalent are confused and do not know what major they will take in the future and 45% of students feel wrong in taking a major and this research also found the main factor that causes the problem, namely they do not understand what interests and talents or potentials they have. Meanwhile, the results of research by the Indonesia Career Center Network (ICNN) stated that 87% of Indonesian students took the wrong major [4], [5].

In this study, EEG raw data obtained from interviewees who had done the RMIB test as a stimulus would go through the pre-processing stage, namely the filter process into beta waves (13-30 Hz). The next process is to reduce beta waves with the Principal Component Analysis method to get the best value components and then in the process with a backpropagation artificial neural network to be classified and then the results are compared with the RMIB test results that have been done by the examiner and have been calculated by psychologists as experts.

2. Literature Review

2.1. Previous Studies

The research conducted by Ani and Hindarto (2017) resulted in the Extraction of EEG Signal Characteristics for Epilepsy Disease Disorders Using the Wavelet Method. This study was conducted because epilepsy occurs because there is a disturbance of the nervous system in the human brain, which is recorded from the EEG signal [6].

2.2. Artificial Intelligence

Artificial intelligence is a part of computer science that studies how a computer or machine can be made in such a way as to be able to do work like the ability of humans to get work done. Artificial intelligence is a computer system formed to know and model human thought processes and design machines to mimic human behavior [7].

2.3. Electroencephalogram (EEG)

EEG signals are bioelectrical signals that come from the surface of human skin, these EEG signals are complex and can be used as a source of information from what the brain does or brain function. EEG signals are in the form of electrical waves that are very small in size, so direct visual observation is very difficult to do. EEG signals are recorded and processed to provide information on electrical activity within the brain. The form of EEG signals in each person is different because it is influenced by various types of influences such as emotional state, mental, age, activity and health conditions. These EEG signals make it easier to provide information from the mind to an individual [8].

The frequency of the dominant EEG signal wave generated will differ depending on the activities carried out by one person to another. The first signal wave is Alpha (8-12Hz) with the activity carried out is relaxation starting to rest or in the transition period from the conscious state to the unconscious state. Beta waves (13-30Hz) are activities that are fully concentrated in, including in a state of thinking, focus, and alertness. Theta waves(4-7Hz) individuals are in a mild sleep state, or very drowsy. Delta waves (0.1-3Hz) are conditions in which an individual is fast asleep [9].

2.4. Neural Network

In this study using the neural network method, it is a paradigm of processing information inspired by biological nerve cell systems, just like the human brain processing information. The element that forms the basis of this paradigm is the new structure of an information processing system. Artificial neural networks are just like humans, where they can learn from an example seen. Artificial neural networks are formed to solve or provide solutions to specific problems such as pattern recognition or classification resulting from the learning process [10]. As in Fig. 1. Fig. 1 is an artificial neural network structure with a backpropagation algorithm.

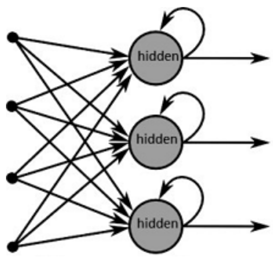


Fig. 1. Neural network structure

2.5. Interests and Talents

According to the Big Indonesian Dictionary (KBBI) talent is the basis (intelligence, traits and bearings) carried from birth. Talent is closer to the word aptitude which means carrying skills, which is related to certain abilities and potentials possessed by an individual [11]. There is another opinion that talent is a condition in an individual that allows him with a specific practice activity to achieve abilities, knowledge and skills special [12].

Talents can be divided into 2 types, including:

1. General Talent

   General talent is an ability that is a basic ability of a general nature. General talent can be defined if all or many people have it.

2. Special Talents

   Special talent is an ability that does mean special, not everyone has it.

2.6. Rothwell Miller Interest Blank (RMIB) Test

The Rothwell Miller Interest Blank Test (RMIB) is a type of inventory test in psychology. This RMIB test focuses on assessing interests and aptitudes in an individual. The RMIB test is a standardized test of potential interest and aptitude originally invented by Rothwell in 1947 and later developed and updated by Miller in 1950.

In this RMIB test, there were initially 9 types of work on Rothwell's idea and then developed into 12 types of work by Miller and those types of work included, namely [13].

1. Outdoors
2. Mechanical
3. Computational
4. Scientific
5. Personal Contact
6. Aesthetic
7. Literary
8. Musical
9. Social Service
10. Clerical
11. Practical
12. Medical

3. Method

3.1. Object of Research

Because the purpose of this study is to find out the potential interests and talents in the early adult phase, the object of this study is individuals with the age of 18-30 which in this case is students.

3.2. System Testing

In this study, system testing was carried out with several tests, namely:

1. Testing Training Data and Test Data

   Testing of training data and test data is carried out with cross validation models, namely by creating 3 cross validation models.

2. Calculation of Accuracy Rate

Calculation of the accuracy rate using the confussion matrix, based on the values in Table 1 can produce precission, recall and accuracy values

Table 1. Confussion matrix

		Actual Value	
		TRUE	**FALSE**
Predicted Results	**TRUE**	TP (True Positive) Correct result	FP (False Positive) Unexpected result
	FALSE	FN (False Negative) Missing result	TN (True Negative) Correct absence of result

4. Results and Discussion

After the text edit has been completed, the paper is ready for the template. Duplicate the template file by using the Save As command, and use the naming convention prescribed by your conference for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper; use the scroll down window on the left of the MS Word Formatting toolbar.

4.1. EEG Data Collection

The initial stage is to collect EEG data from 14 speakers with an age range of 18-30 years which will be used as training data and test data that have been obtained using the NeuroSky Mindwave tool which have one electrode in the FP1 position to obtain the EEG data.

4.2. Identify the Headings

This stage is to carry out the process of filtering raw EEG data. This stage aims to separate the beta signal (13-30 Hz) from other signals, because in this study the signal used is only a beta signal.

From Fig. 2 it can be explained that:

1. Filter the resulting signal
2. Type of response type, namely bandpass
3. Fill in the signal specification values to be made with the following details:
   a. FS value = 512
   b. Fstop1 value = 12.9
   c. Fpass1 value = 13
   d. Fpass2 value = 30
   e. Fstop2 Value = 30.1

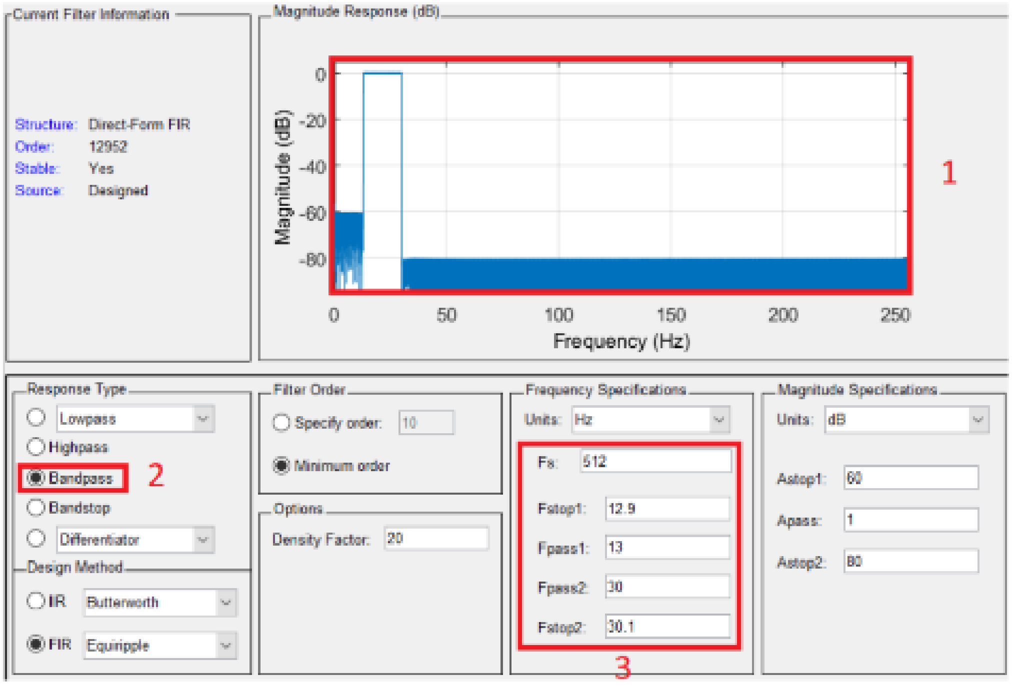


Fig. 2. Bandpass filter

4.3. Signal Reduction

153600 beta signals that have been obtained from the raw data filter process will then be reduced by the Principal Component Analysis (PCA) method to get the best value or component as input in the system.

Table 2. Reduction yield weights

Data to -	Data Weights	Data to -	Data Weights	Data to -	Data Weights
1.	14.00872	**16.**	1.89689	**31.**	0.35904
2.	6.011329	**17.**	1.05062	**32.**	0.35904
3.	4.999991	**18.**	2.510126	**33.**	0.35904
4.	3.994988	**19.**	0.059721	**34.**	0.35904
5.	3.036725	**20.**	0.07709	**35.**	0.35904
6.	2.960654	**21.**	0.244079	**36.**	0.359041
7.	2.042503	**22.**	0.376898	**37.**	0.35904
8.	2.02533	**23.**	0.35904	**38.**	0.359041
9.	1.921084	**24.**	0.358499	**39.**	0.359041
10.	5.9986	**25.**	0.849942	**40.**	0.35904
11.	8.050322	**26.**	0.35985	**41.**	0.35904
12.	3.1244	**27.**	0.384994	**42.**	0.991159
13.	1.34651	**28.**	0.358499	Total Weights 84.77%	
14.	6.26359	**29.**	0.35985		
15.	4.43951	**30.**	0.35904		

In Table 2, it can be explained that the reduction results in the initial EEG data of 153600 to 42 data have a total weight of 84.77%, which means that the 42 data of the reduction results represent 84.77% of the initial 153600 data.

4.4. System Design

1. Flowchart Design

   a. Fig. 3 flowchart classification of interests and talents

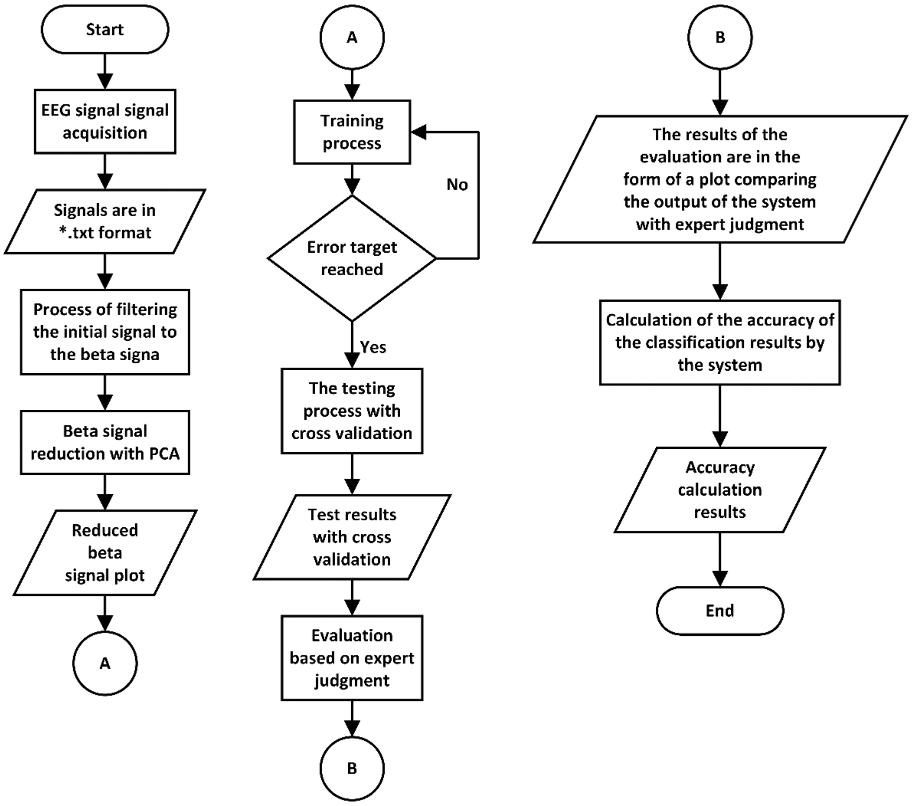


Fig. 3. Flowchart determination of potential interests and talents

b. Fig. 4 flowchart Method Neural Network Backpropagation

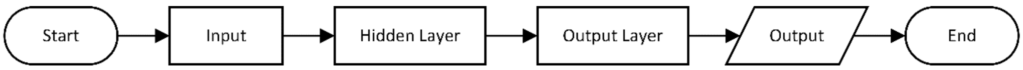


Fig. 4. Neural network backpropagation method flowchart

4.5. Implementation

1. Initial View

The initial view of the created system is as shown in Fig. 5 to Fig. 7.

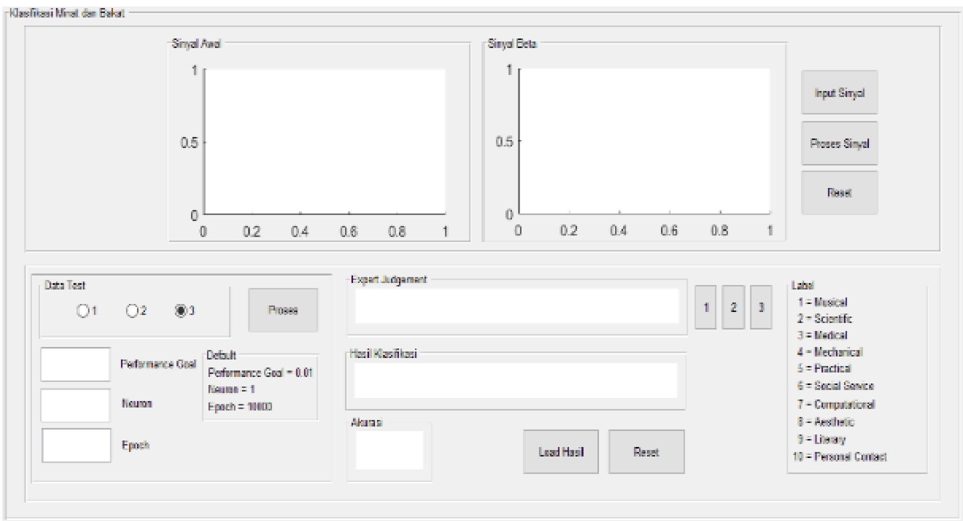


Fig. 5. Initial view

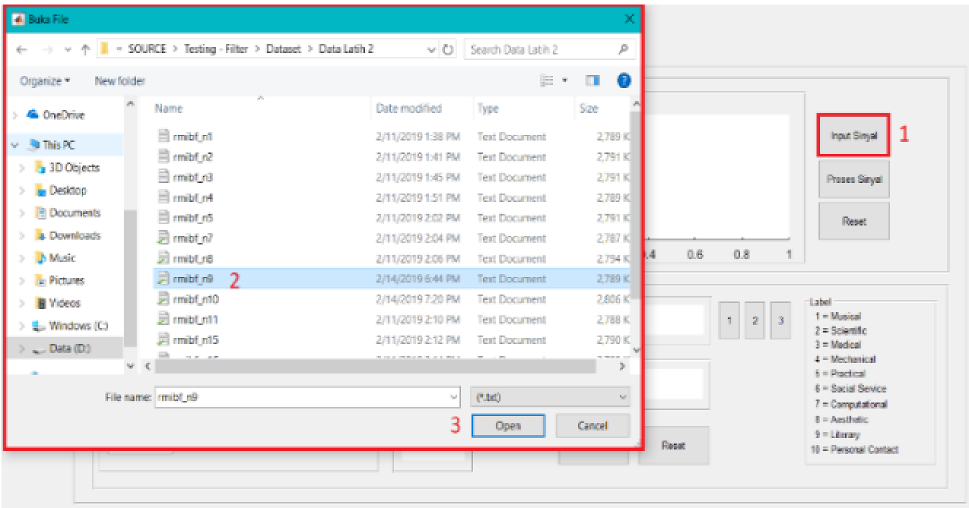


Fig. 6. Signal load process

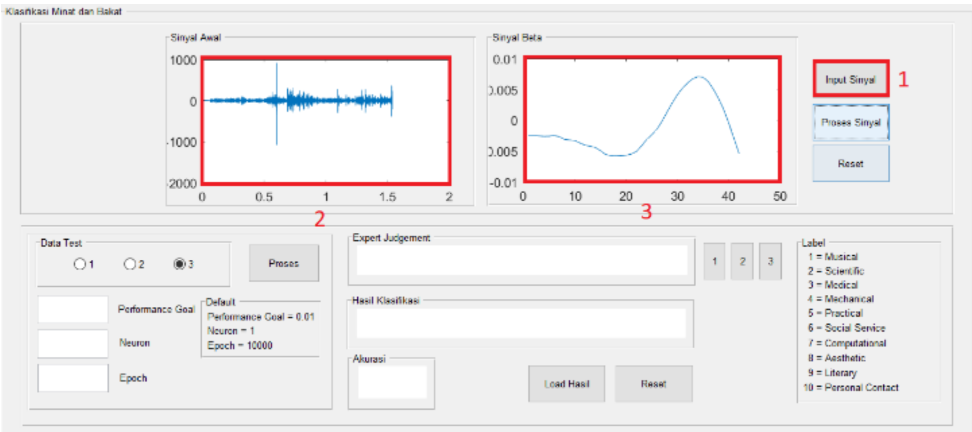


Fig. 7. Filter results and signal reduction

No	Source Code	No	Source Code

1.	function sinyal_Callback(~, ~, handles)
	clear global data;
	[nama_file1, directory] =
	uigetfile({'*.txt'},'Open File');
	data = csvread([nama_file1 directory]);
	axes(handles.axes);
	plot(data);
	global data;
		2.	function proses_Callback(~, ~, handles)
			clear global filt;
			global data;
			d = fdesign.bandpass('N,Fst1,Fp1,Fp2,Fst2,C',3,11.9,20,30,30.1,512);
			d.Stopband1Constrained = true;
			d.Astop1 = 60;
			d.Stopband2Constrained = true;
			d.Astop2 = 80;
			Hd = design(d,'equiripple');
			filt = filter(Hd,data);
			axes(handles.axes1);
			save ('hasil_beta');
			load ('hasil_beta','blanket');
			filt2 = zscore(filt);
			[COEFF SCORE] = princomp(filt2);
			inputRMIB = SCORE(1:42,:);
			plot (inputRMIB);
			save ('hasil_reduksi');
			global blanket;

Listing 1. Process load and signal filter

Listing Description 1:

a. The first line is for the data load process by retrieving files that have the format *.txt.

b. The second line is to filter the signal into a beta signal (13-30 Hz) and reduce it with PCA.

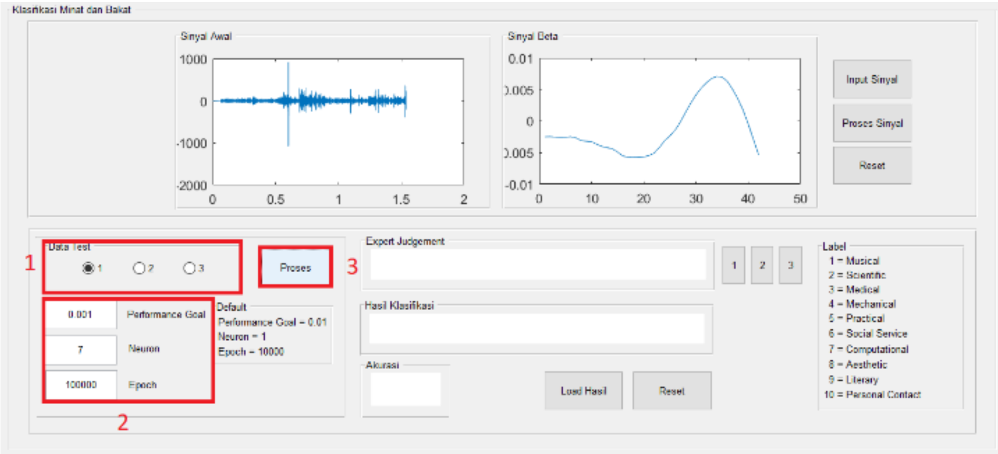


Fig. 8. Parameter Value Input and Test Data Selection

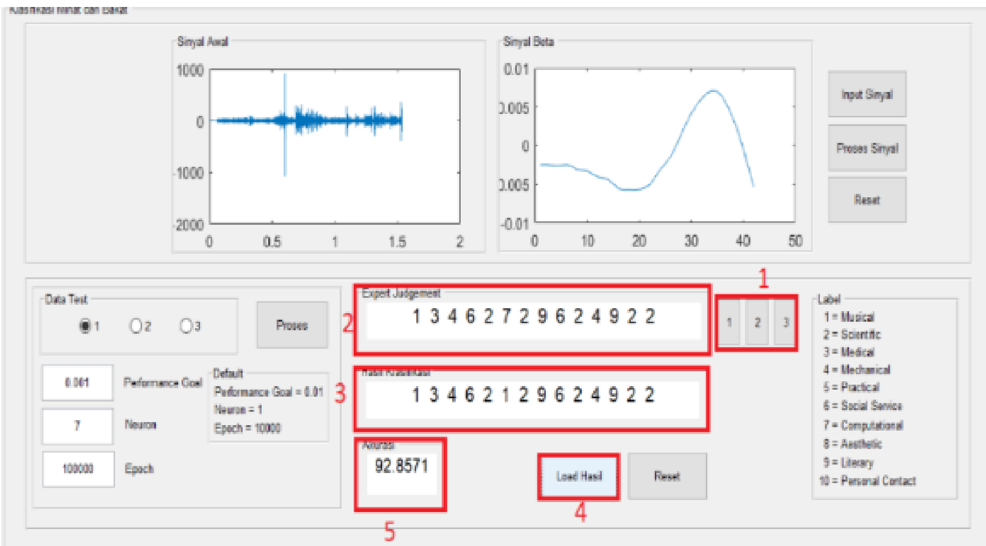


Fig. 9. Load Accuracy System

No	Source Code	No	Source Code

1.	function proses_Callback(hObject, eventdata, handles)
	g = str2double(get(handles.goals,'string'));
	hl = str2double(get(handles.h_layer,'string'));
	ep = str2double(get(handles.epoch_,'string'));
	load ('hasil_PCA.mat');
	%%% value retrieval from radio button selection %%%
	if get(handles.r1,'Value')
	target = [inputRMIB(:,1),inputRMIB(:,2),inputRMIB(:,3),inputRMIB(:,4)...
	inputRMIB(:,5),inputRMIB(:,6),inputRMIB(:,7),inputRMIB(:,8)...
	inputRMIB(:,9),inputRMIB(:,10),inputRMIB(:,11),inputRMIB(:,12..
	inputRMIB(:,13),inputRMIB(:,14)];
	targetLatih = [targetData23];
	dataLatih = [inputRMIB(:,15),inputRMIB(:,16),inputRMIB(:,17),inputRMIB(:,18)...
	inputRMIB(:,19),inputRMIB(:,20),inputRMIB(:,21),inputRMIB(:,22)...
	inputRMIB(:,23),inputRMIB(:,24),inputRMIB(:,25),inputRMIB(:,26)...
		1.	inputRMIB(:,31),inputRMIB(:,32),inputRMIB(:,33),inputRMIB(:,34)...
			inputRMIB(:,35),inputRMIB(:,36),inputRMIB(:,37),inputRMIB(:,38)...
			inputRMIB(:,39),inputRMIB(:,40),inputRMIB(:,41),inputRMIB(:,42)];
			xlRange = 'Q49:AD49';
			else
			target = [inputRMIB(:,29),inputRMIB(:,30),inputRMIB(:,31),inputRMIB(:,32)...
			inputRMIB(:,33),inputRMIB(:,34),inputRMIB(:,35),inputRMIB(:,36)...
			inputRMIB(:,37),inputRMIB(:,38),inputRMIB(:,39),inputRMIB(:,40)...
			inputRMIB(:,41),inputRMIB(:,42)];
			targetLatih = [targetData12];
			dataLatih = [inputRMIB(:,1),inputRMIB(:,2),inputRMIB(:,3),inputRMIB(:,4)...
			inputRMIB(:,5),inputRMIB(:,6),inputRMIB(:,7),inputRMIB(:,8)...
			inputRMIB(:,9),inputRMIB(:,10),inputRMIB(:,11),inputRMI

	inputRMIB(:,27),inputRMIB(:,28),inputRMIB(:,29),inputRM
	IB(:,30)…
	inputRMIB(:,31),inputRMIB(:,32),inputRMIB(:,33),inputRM
	IB(:,34)...
	inputRMIB(:,35),inputRMIB(:,36),inputRMIB(:,37),inputRM
	IB(:,38)...
	inputRMIB(:,39),inputRMIB(:,40),inputRMIB(:,41),inputRM
	IB(:,42)];
	xlRange = 'C49:P49';
	elseif get(handles.r2,'Value')
	target =
	[inputRMIB(:,15),inputRMIB(:,16),inputRMIB(:,17),inputR
	MIB(:,18)...
	inputRMIB(:,19),inputRMIB(:,20),inputRMIB(:,21),inputRM
	IB(:,22)...
	inputRMIB(:,23),inputRMIB(:,24),inputRMIB(:,25),inputRM
	IB(:,26)...
	inputRMIB(:,27),inputRMIB(:,28)];
	targetLatih = [targetData13];
	dataLatih =
	[inputRMIB(:,1),inputRMIB(:,2),inputRMIB(:,3),inputRMIB
	(:,4)...
	inputRMIB(:,5),inputRMIB(:,6),inputRMIB(:,7),inputRMIB(:
	,8)...
	inputRMIB(:,9),inputRMIB(:,10),inputRMIB(:,11),inputRMI
	B(:,12..
	inputRMIB(:,13),inputRMIB(:,14),inputRMIB(:,29),inputRM
	IB(:,30)...
			B(:,12..
			inputRMIB(:,13),inputRMIB(:,14),inputRMIB(:,15),inputRM
			IB(:,16)...
			inputRMIB(:,17),inputRMIB(:,18),inputRMIB(:,19),inputRM
			IB(:,20)...
			inputRMIB(:,21),inputRMIB(:,22),inputRMIB(:,23),inputRM
			IB(:,24)...
			inputRMIB(:,25),inputRMIB(:,26),inputRMIB(:,27),inputRM
			IB(:,28)];
			xlRange = 'AE49:AR49';
			end
			% Prepare training data and training targets
			data_latih = [dataLatih];
			target_latih = [targetLatih];
			[~,N] = size(data_latih);

2.	% JST process creation
	net = newff(minmax(data_latih),[hl
	1],{'logsig','purelin'},'traingdx');
	% Provide value to influence the training process
	net.performFcn = 'mse';
	net.trainParam.goal = g;
	net.trainParam.show = 20;
	net.trainParam.epochs = ep;
	net.trainParam.mc = 0.95;
	net.trainParam.lr = 0.1;
	% Training process
	[net_keluaran,tr,Y,E] = train(net,data_latih,target_latih);
	% Results after training
	bobot_hidden = net_output. IW{1,1};
	bobot_keluaran = net_output. LW{2,1};
	bias_hidden = net_output.b{1,1};
	bias_output = net_keluaran.b{2,1};
	jumlah_iterasi = tr.num_epochs;
	nilai_keluaran = Y;
	nilai_error = E;
	error_MSE = (1/N)*sum(nilai_error.^2);
	%%% test data %%%
	data_test = [target];
	hasil_uji = round(sim(net_output,data_uji))
		3.	%plot compare
			filename = 'Book1.ods';
			sheet = 1;
			target_latih_asli = xlsread(filename, sheet, xlRange);
			figure,
			plot(hasil_uji,'bX-')
			hold on
			plot(target_latih_original,'ro-')
			hold off
			grid on
			title(strcat(['Output Graph NN vs Expert Judgement with
			value MSE = ',...
			num2str(error_MSE)]))
			xlabel('Data to -')
			ylabel('Label to -')
			legend('Output NN','Data Target','Location','Best')
			save ('hasil_uji1.mat')

4.	function load_hasil_Callback(hObject, eventdata, handles)
	load('hasil_uji1','hasil_uji')
	set(handles.hasil_klasifikasi,'string',num2str(hasil_uji));
	A = get(handles. expjud,'string');
	B = get(handles.hasil_classification,'string');
	xx = strsplit(A)
	yy = strsplit(B)
	b1 = yy(~cellfun(@isequal,yy,xx))
	b2 = length(b1)
	b3 = 14-b2
	d = (b3/14)*100
	set(handles.akurasi,'string',num2str(d));		

Listing 2. Classification and testing process

Description:

a. The first row is a fork to specify the training data and the target data.

b. The second line is the process of creating artificial neural networks such as assigning parameter values that affect the training process, training process and results after training.

c. The third line is the creation of a comparison graph plot between the system output and the results of expert judgement.

d. The fourth line is a function to calculate the accuracy of the system.

4.6. Testing

Testing is carried out to conduct trials on systems that have been completed by applying them using EEG data that has been obtained as many as 42 data from three data collections and the results have been determined by experts to be used as a reference on the system can be seen in the Table 3.

Table 3. Cross validation

	Cross Validation	Test Results
CV 1	P2 & P3 = Training data P1 = Test Data	P1
CV 2	P1 & P3 = Training data P2 = Test Data	P2
CV 3	P1 & P2 = Training data P3 = Test Data	P3

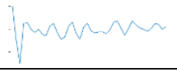
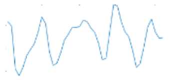
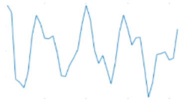
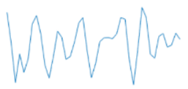
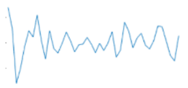
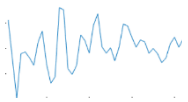
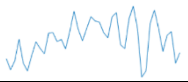
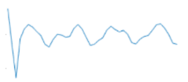
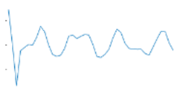
The explanation of the test stages as shown in Table 3 is as follows:

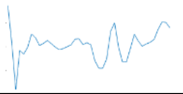
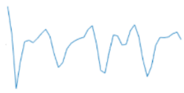
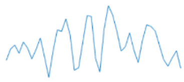
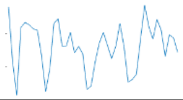
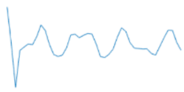
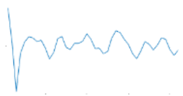
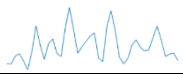
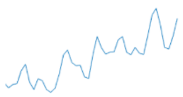
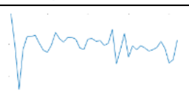
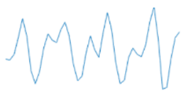
1. Cross Validation Testing
   a. Cross Validation 1
      1. The values of P1, P2 and P3 are stored in the input RMIB variables which are 42 x 42 in matrix size.
      2. P2 and P3 as training data.
      3. P1 as test data.
      4. Determine expert result labels for P2 and P3 training data.
   b. Cross Validation 2
      1. The values of P1, P2 and P3 are stored in the input RMIB variables which are 42 x 42 in matrix size.
      2. P1 and P3 as training data.
      3. P2 as test data.
      4. Determine expert result labels for P1 and P3 training data.
   c. Cross Validation 3
      1. The values of P1, P2 and P3 are stored in the input RMIB variables which are 42 x 42 in matrix size.
      2. P1 and P2 as training data.
      3. P3 as test data.
      4. Determine expert result labels for P1 and P2 training data.

Test results can be seen in the Table 4.

In Table 5 The Number of iterations can be stated that neurons in the hidden layer worth 7 have a better number of iterations compared to the number of iterations in the neuron value in the hidden another layer.

Table 4. Identification results

No	Beta Signal Reduction	Expert Judgement	System Results (Neuron Hidden Layer)				
			6	7	8	9	10
1		1	1	1	1	1	1
2		3	3	3	3	3	3
3		4	4	4	4	4	4
4		6	6	6	6	6	6
5		2	2	2	2	2	2
6		7	2	2	2	2	1
7		2	2	2	2	2	2
8		9	9	9	9	9	9
9		6	6	6	6	6	6
10		2	2	2	2	2	2
11		4	4	4	4	4	4
12		9	9	9	9	9	9
13		2	2	2	2	2	2
14		2	2	2	2	2	2
15		1	1	1	1	1	1
16		2	2	2	2	2	2
17		5	5	5	5	5	5

No	Beta Signal Reduction	Expert Judgement	System Results (Neuron Hidden Layer)				
			6	7	8	9	10
18		6	6	6	6	6	6
19		2	2	2	2	2	2
20		7	1	3	3	4	5
21		7	1	3	3	4	5
22		9	9	9	9	9	9
23		10	8	3	8	6	6
24		2	2	2	2	2	2
25		4	4	4	4	4	4
26		9	9	9	9	9	9
27		2	2	2	2	2	2
28		2	2	2	2	2	2
29		1	1	1	1	1	1
30		2	8	6	3	6	5
31		5	5	5	5	5	5
32		2	2	2	2	2	2
33		2	2	2	2	2	2
34		8	5	6	5	6	4
35		7	5	6	5	6	4

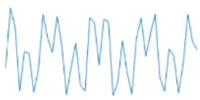
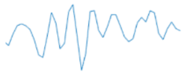
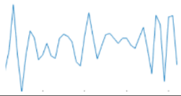
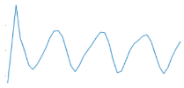
No	Beta Signal Reduction	Expert Judgement	System Results (Neuron Hidden Layer)				
			6	7	8	9	10
36		9	9	9	9	9	9
37		4	4	4	4	4	4
38		2	2	2	2	2	2
39		4	4	4	4	4	4
40		9	9	9	9	9	9
41		8	5	6	6	6	4
42		3	3	3	3	3	3

Table 5. Number of iterations

CV	Number of iterations on a Hidden Layer (HL)				
	HL = 6	**HL = 7**	**HL = 8**	**HL = 9**	**HL = 10**
CV 1	619	626	945	3219	5590
CV 2	3195	602	1203	573	423
CV 3	147	91	154	132	136

2. Calculation of Accuracy Rate

After conducting tests using the system then compared with the results of expert judgement and comparing the results of the process that has been carried out, the accuracy of the test results with the following calculations Table 6 and Table 7.

Table 6. Test result data

Data	Test Data	
	Appropriate	**Non-Compliant**
CV1	13	1
CV2	11	3
CV3	10	4

Table 7. Accuracy of test results

	CV 1	CV 2	CV 3
1	$\frac{13+0}{13+0+0+1}\times 100\ \% = 92.857\ \%$	$\frac{11+0}{11+0+0+3}\times 100\% = 78.571\ \%$	$\frac{10+0}{10+0+0+4}100\ \% = 71{,}4285\ \%$
2	$\frac{13}{13+0}\times 100\ \% = 100\ \%$	$\frac{11}{11+0}\times 100\% = 100\%$	$\frac{10}{10+0}\times 100\ \% = 100\ \%$
3	$\frac{13}{13+1}\times 100\ \% = 92{,}857\ \%$	$\frac{11}{11+3}\times 100\% = 78{,}571\ \%$	$\frac{10}{10+4}\times 100\ \% = 71{,}4285\ \%$

In Table 7, it is explained that in number 1, namely accuracy number 2 precision and number 3 is recall.

5. Conclusion

The results of identifying potential interests and talents using the Neural Network Backpropagation method resulted in the largest percentage of accuracy in the first retrieval data of 92.8571% using the neuron value on the hidden layer = 7 which resulted in a better number of iterations compared to the use of neuron values on the hidden layer others such as 6, 8, 9 and 10 while the average accuracy produced by the system of the three antiquities on each take is 80.9523%. This result is directly proportional to the problem of psychological tests regarding where the subject will remember the first measurement and simply repeat the answer at the next measurement without thinking about it again. The speaker will feel that the first measurement has already been made so that the next measurement will answer not seriously. This causes the percentage of accuracy in each data retrieval to always decrease. The application of the Neural Network Backpropagation method to the system created is able to classify interests and talents from EEG data and is able to provide feature value information on each data.

If you use the same stimulus continuously in multiple data retrievals, the data retrieval time interval is extended again with a minimum of 15 days apart. Using other methods of EEG data extraction to obtain values that are important for the testing and training process because of the very length of data in EEG data will consume more time if directly through the training and testing process. Ensure that the EEG data recorder is properly attached to the narrator during data recording so that the resulting data is good. In taking EEG data, the interviewee must get a more conducive place for the work of his stimuli such as the RMIB test or other tests because they are prone to getting a lot of noise on the data obtained if the narrator is disturbed by what is around him.

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