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Drug Users Prediction Using Backpropagation Educational Method

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Drug Users Prediction Using Backpropagation Educational Method

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Abstract. The Artificial Neural Network in this study has been used to predict drug users by using the backpropagation method with the Matlab 7.7 software program. The variables consist of the number of drug users, the type of drug used and the employment status of drug users. The data input from 2010 to 2012 while the target data is 2013 data consequently if input data and target data are processed on artificial neural networks will produce output that can predicts 2014 drug users. Predictions actually consider the value which has not been seen in the future based on past data. Prediction is the process of predicting something by correcting the previous action. To predict a condition, it requires proper calculation to answer the problem. The calculation can use artificial neural networks with the backpropagation method.



1. Introduction

Cases of drug abuse are increasing rapidly in Indonesia, even though the government and the public have made various efforts. Drug abuse is indeed difficult to eradicate. What can be done is to prevent and control so the problem is not widespread, and it is detrimental to the future of the nation, due to the deterioration of the quality of human resources, especially the younger generation. Drugs are narcotics and drugs/dangerous substances. In addition "drugs", another term introduced specifically by the Ministry of Health of the Republic of Indonesia is drugs for "narcotics, psychotropic substances and addictive substances" [1].

Backpropagation is a systematic method on artificial neural networks using supervised learning algorithms and is usually used by perceptrons with multiple layer screens to change the weights in the hidden layer. Backpropagation is a controlled type training which uses a weight adjustment pattern to achieve a minimum error value between the predicted output and the real output [2].

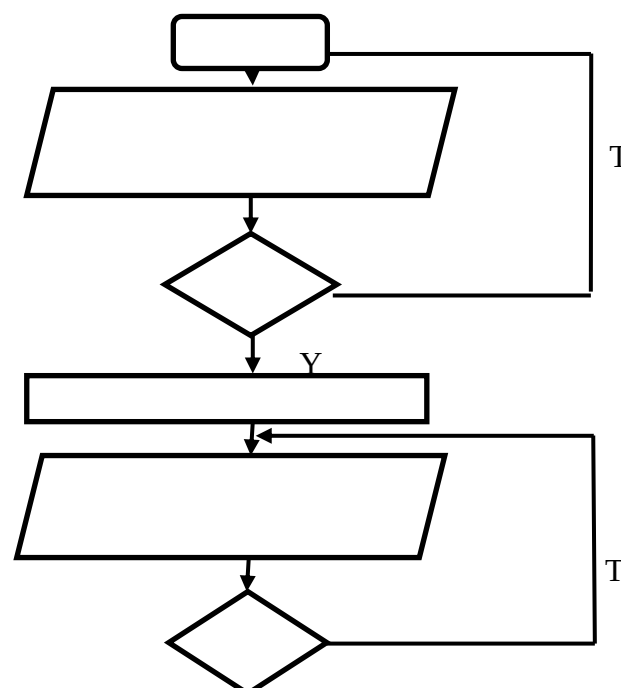
In this study the predictions that will be carried out are the number of drug users, the type of drugs used and the employment status of drug users, thus it is expected that a pattern will emerge with the input pattern in the form of data values of drug users every month. Then the computer will provide a prediction output pattern according to the data entered. The results of the development of this method are expected to provide benefits to determine the level of drug users.

2. Related Works

Predict of drug users by using Artificial Neural Networks Backpropagation Method, this prediction actually considers with values that have not been seen in the future based on patterns that occurred before. Prediction is a process of estimating something by looking at the previous action, to predict a condition that requires precise calculation to answer the problem [3]. The calculation used the Artificial Neural Network with the Backpropagation Method. The backpropagation method is an excellent method in dealing with the problem of recognizing complex patterns. The term "backpropagation" (or "rebroadcasting") is taken from the workings of this loop, like the hidden unit error gradients are derived from broadcasting the errors associated with the output units. This is because the target values for hidden units are not given [4].

3. Research Methodology

Artificial neural networks with backpropagation error propagation algorithms will make an expected to predict drug users every month. As for the flowchart design are shows below:



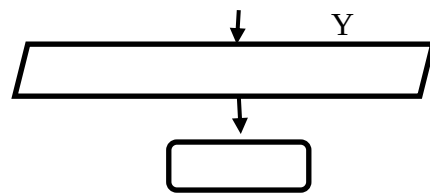


Figure 1. Flowchart of the prediction process using ANN

The flowchart begins with a terminal symbol that marks the begins of the system work. Then the steps continue to input training data, such as the average drug user data each month. After that the training data is processed, if the training data has converged, the process is repeated until the training data converges. If the training data is convergent, the test data is entered, the average data of drug users after that the data was tested, if the test data is accordance with the known target, the process is complete. But if the test data did not match with the target, the process is repeated until the target is reached[5], [6].

The data needed in this neural network analysis process is the result of pure database by taking input variables in the form of the number of drug users, the type of drug used and the employment status of drug users for 4 years and the total results as output, the stages of application development are as follows[7]:

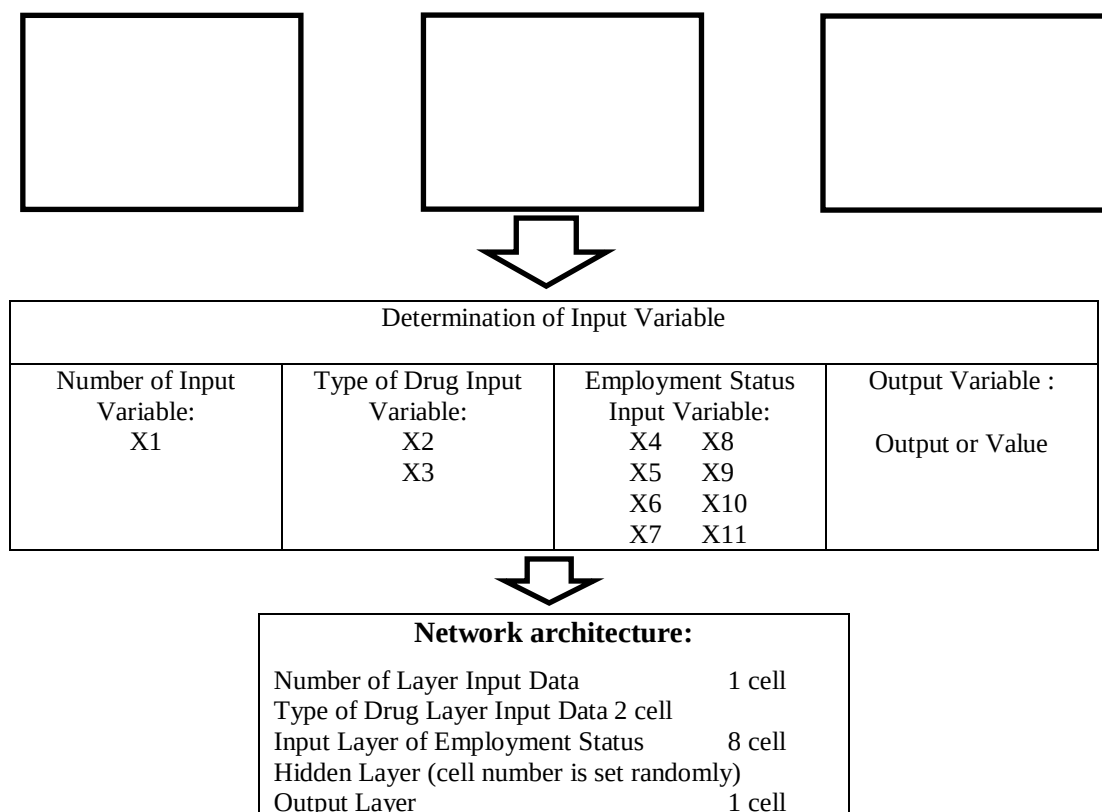


Figure 2. Stages of ANN-BP for prediction analysis of drug users

The design of network architecture predictive analysis with backpropagation method consists of 3 layers, the input layer consists of 11 input nerve cell units, the hidden layer consists of 3 nerve cell units, and the output layer consists of 1 nerve cell. Input layer is used to hold 11 variables, that is X1 to X11, while 1 output layer is used to present the output[8].

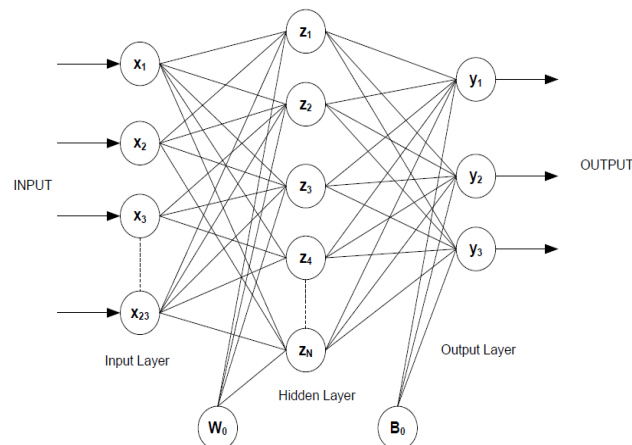


Figure 3. NetworkArchitecture with Backpropagation Method

4. Result and Discussion

Datatested was influenced by the network algorithm model. The number of hidden layers, data on drug user variables such as the number of drug users, types of drugs and the employment status of drug users[9].

Table 1. Configuration of ANN used

Parameter	Numberor Value
Number of hidden layer neuron	10 - 20
Target of momentum	0.5 - 0.9
Maximum of epochs	20 – 100
Learningrate	0.01
Value of mse limit (goal)	0.001
Display of mse frequency (show)	25
Hidden layer activation function	Logsig
Input layer activation function	Purelin
Learning function	<i>Trainlm</i>

To find out the most convergent prediction results and get the appropriate target results, Backpropagation ANN training was conducted in Matlab 7.7 application, Figure 4 is a picture when the training was conducted[10].

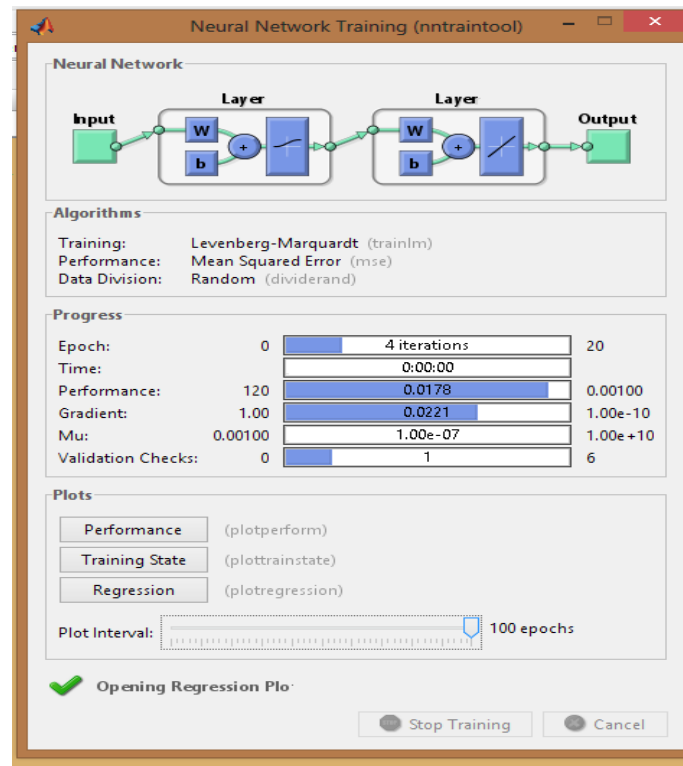


Figure 4. Display of Neural Network Training

The results of training data can be seen in Table 2, while testing the training data was carried out 7 times. It appears that the results of the first training data were 6 data (50%) in accordance with the target while 6 data (50%) did not match with the target. After that, the second data was re-examined, where the results showed that 8 data (80%) were in accordance with the target while 4 data (20%) were not in line with the target. Next, the third data was tested again, where the results showed that 3 data (15%) were in accordance with the target while 9 data (85%) were not in accordance with the target. Then the fourth test was conducted again, where the results showed that 10 data (90%) were in line with the target while 2 data (10%) were not in line with the target, followed by the fifth test, where the results indicated that 8 data (80%) were in accordance with the target, while 4 data (20%) did not match with the target. Then the sixth test is continued, where the results show that 7 data (65%) matches the target, while the 5 data (15%) did not match the target. After that, it is resumed with the seventh test, where the results show that 10 data (90%) are on target, while 2 data (10%) are not suitable with the target[11].

Table 2. Results of Testing the training data into ANN

Testing	Data suitable with the target	Percentage %	Data not suitable with the target	Percentage%
I	6	50%	6	50%
II	8	80%	4	20
III	3	15%	9	85%
IV	10	90%	2	10%
V	8	80%	4	20%
VI	7	60%	5	40%

VII	10	90%	2	10%
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Based on the results of the training and trial of drug user data, describes the data in the fourth test and the seventh test is the highest data with a 90% convergence rate[12].

5. Conclusion

The conclusions obtained after doing this research are:

1. The results of prediction of drug users for the following year increased from years ago.
2. Prediction results for the following year the most use drugs are December X1 (number) of 22,0001, X2 (shabu) of 14,9991, X3 (marijuana) of 7,0040, X4 (entrepreneur) of 8,0015, X5 (unemployment) of 11,0022, X6 (employee / laborer / farmer) of 0.8007, X7 (student) of 1.0012, X8 (student) of 1.2898, X9 (PNS) of 0.4767, X10 (national police) of 0.3276, X11 (private employees) of 0.0002.
3. The results of artificial neural network testing show good results for achieved in target network.
4. The training and testing function used in Matlab is `traindx` because this training function has a high training speed.

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