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Network Nerves Mock Backpropagation Prediction Graduation Student Elementary School With Practice Values Exam

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Abstract

The backpropagation method is a computer technique to help predict and sort data. This method is usually used to change the connection between parts of the computer's brain in the hidden layer. Meanwhile, the Nervous System Network (ANN) is an information-processing system that is very similar to the function of human brain cells. Value is a benchmark for a student's graduation, if the student's score is getting better, the more opportunities for the student's graduation. In predicting this pass using the method of Artificial Neural Networks (ANN), namely Backpropagation, and using Matlab software with the MSE (Mean Square Error) result of 0.099512.

Keywords *: Graduation Prediction, Backpropagation, Examination Practice Value, Artificial Neural Networks, Matlab.*

1. INTRODUCTION

In education, grades are a benchmark for assessing students' ability to understand what they understand at school. This means that during the learning process, a good relationship is created between teachers and students, especially in the learning subjects that are tested nationally, namely Natural Sciences, Indonesian, and Mathematics [1].

Prediction has the meaning of guessing or forecasting something that will happen in the future. The prediction process can be carried out with data sets whose patterns are recognized. There is a way To predict what is possibly happening in the future with the tool specifically mentioned algorithm. This tool can help predict things happen in a way regular or things change over time [2].

Several studies have been carried out, such as research conducted by Hetty Rohayani and Muhammad Choirul Umam using *backpropagation algorithm calculations* to predict study program determination based on student grades with a data sample of 50 for training data and test data. In this study, the *backpropagation method* used classification performance with Rapidminer software and produced the greatest accuracy of 77.42% [3]. Research conducted by Nur Nafi'iyah analyzed the *backpropagation algorithm* with *SVM* in predicting national exam scores in first-level schools using 701 dataset lines, 561 lines for training, and 140 lines for testing but the method between backpropagation and SVM *produced* the lowest *MSE value, namely backpropagation* with The average *MSE is 103.3 but if you use the SVM algorithm* it produces a

total *MSE value of* 200 [4]. Research by Harly Okrana, Muhammad Ridwan Lubis, and Jaya Tata Hadinata with the title *TOEFL* graduation prediction using the resilient backpropagation method with processed data of 182 student data in 2016-2018 with a very good accuracy level of 100% with a small *MSI value of 0.00342* with an epoch value that is also small, namely 5 [5].

2. RESEARCH METHODS

Artificial Neural Network (ANN) is a system processing information that is very similar to the function of human brain cells. The *Backpropagation* method uses learning rules to correct errors *and* is classified as monitoring or supervising training. The *Backpropagation* method is a form of artificial intelligence (*Artificial Intelligence*) in computer science that is widely used to make it easier to solve various problems related to prediction [6]-[10].

2.1. Research Stages

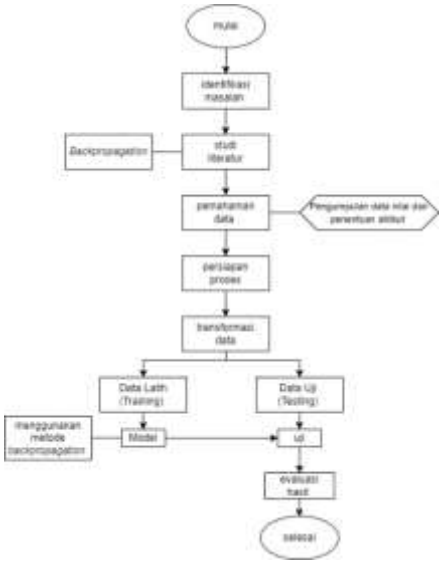

Figure 1. Research Stages/Flow

The stages of research work are problem identification, literature study, collecting data, understanding the data, carrying out the *backpropagation process* to get results, and getting the results you want to get. This analysis is very necessary to test the accuracy of data processing using the backpropagation method [11].

In research Using exam score data, the data that has been collected will be processed to determine the predicted results of elementary school students' graduation using the *backpropagation method.* The Backpropagation method itself is a computer technique that helps predict and sort data. This method is usually used to change connections between parts of the computer's brain in hidden layers [12].

backpropagation architecture, backpropagation has the meaning of a learning supervision model on Neural System Networks (ANN) to teach computers how to do something. This can help to find a good balance between what they do and the examples they learn and practice [13]. The architectural design of *backpropagation* consists of 3 network models, *an input layer*, a *hidden layer*, and an *output layer* [14].

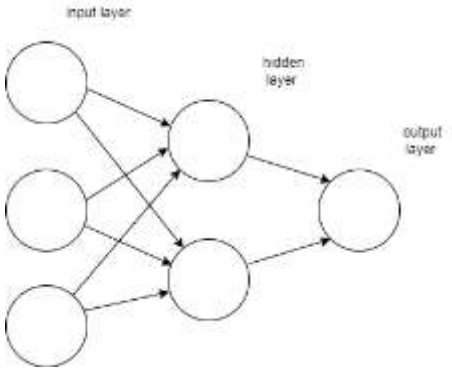

Figure 2. ANN- *Backpropagation*

Artificial Neural Networks have several layers [15], namely:

1. Input Layers
   This input layer consists of special parts called neurons that get information from the outside world. This information is like describing a problem.
2. Hide layers
   The special parts that help in thinking and learning are called hidden layers, and each hidden part is called a neuron.
3. Output Layer
   Each neuron in the outer layer is called an output neuron and this layer is responsible for providing the final answer or result of the problem that is tried to be solved using Artificial Neural Networks (ANN).

Meanwhile, for backpropagation method training, there are 3 phases [16], namely:

1. Feedforward (Forward Propagation)
   When a computer gets information, it uses a special method called "input processing" to figure out what to do. This method has different steps, such as setting things up first and doing calculations to get the right answer. It's like a puzzle that the computer solves to give a response to the user.
2. Backpropagation (backpropagation)
   Backpropagation is when finding out how wrong a computer network is by comparing what it predicted with what it should have predicted. Start at the edge of the network and work backward to find an error.
3. Weight Change

2.2. Data Collection Stages

1. Observation
   Observation is the observation of things that will be noticed or learned by looking closely or finding clues. This can be done in a variety of ways and there is no limit to what can be observed [17].
2. Interview
   Interview is a special kind of conversation in which a group of people ask questions of others to find out information. It is different from ordinary conversation because it has a specific goal and the person wants to learn something [18].
3. Literature review
   A literature review is collecting data using the library method, meaning collecting various types of written information such as articles and journals to study certain topics or to find materials, [19] to be written according to the case of graduation predictions using the *backpropagation method*.
4. Data Normalization

When processing data you can use various types of data: training data, testing data, and real data. Training data is used when conducting tests, such as student grades. Test data is accompanying input data, such as information that needs to be used for testing. Real data is actual information used in real life or real data [20].

3. RESULTS AND DISCUSSION

The research data used was 150 data that had been processed and normalized. Network training with Matlab uses epoch parameters of 10, a goal (error) or error limit of 0.001, learning rate of 0.2. and using sigmoid activation (logsig). From these results, the MSE (Mean Square Error) value is obtained. The output graph of the network research results on 150 data records can be seen in Figure 3. Meanwhile, the process of running the neural network in Matlab can be seen in Figure 4.

The data taken for this research was obtained from elementary schools, which are the results of the try-out test scores of students and girls there. The data collected contains three types of subjects, namely Mathematics, Science, and Indonesian, which are the subjects that will be included in the national exam later. You can see Table 1 below.

MTK	IPA	B.INDO	KELAS
52	76	58	6a
40	47	57	6b
66	51	55	6b
68	83	53	6b
84	88	53	6a
46	30	48	6b
46	37	46	6a
54	40	43	6a
52	94	41	6a
52	91	40	6b

Table 1 . Data table for students' TO scores ...

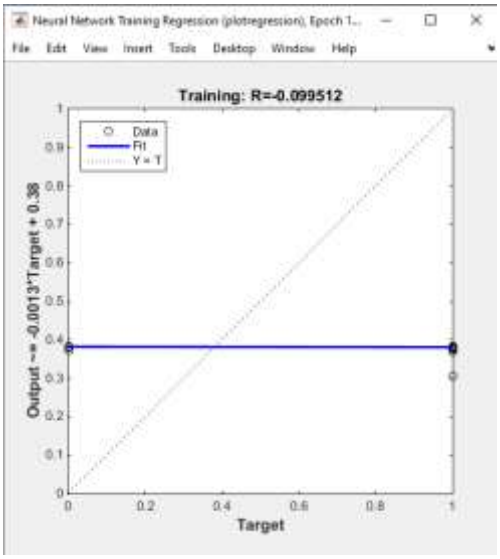

Figure 3 . JST Backprogation research results

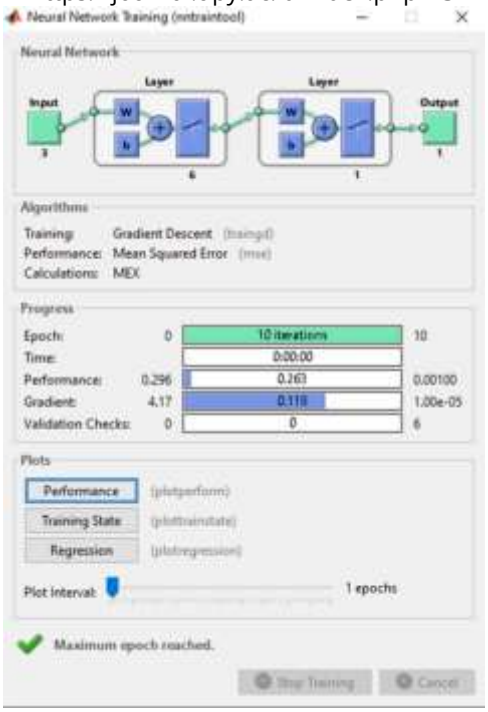

Figure 4. Backpropagation program from Training

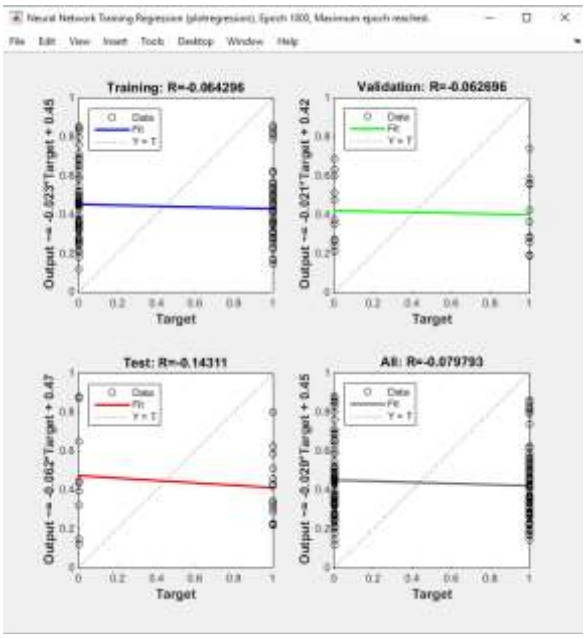

Figure 5. Regression Training Results (plot regression)

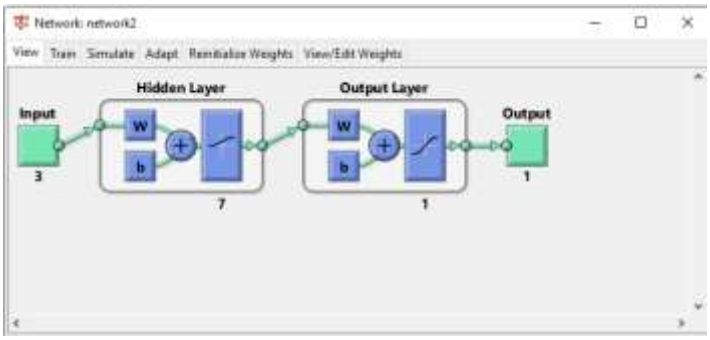

Figure 6. Process of ANN Regression Results in Matlab

Based on the formula below, this is a step to separate the research dataset for training and testing data. Where later the calculations will be continued using source code with Matlab.

$$x' = \frac{0{,}8\ (x-b)}{(a-b)} + 0{,}1(1)$$

Below is the Training and Testing code with the Backpropagation program. Where this training is, to initialize and make weight changes to student grade data. For the Testing code, is used to predict graduation data using data results that have been changed in the previous Training code

```
#TRAINING
load ('data latih1.mat');
load ('target latih1.mat');
hidden layer=6;
output=1;
net=newff (min-max (data latihl), (hidden layer,
output], ('logsig', 'logsig'), 'traingd');
net.performFcn='mse';
net.trainparam.epochs=10;
net.trainparam.goal=0.001;
net.trainparam.Ir=0.2;
net=init (net);
[net,tr]=train (net, data latihl,target latihl);


#TESTING
load ('data ujil.mat');
```

CONCLUSION

After conducting research on predictions of elementary school students' graduation using Artificial Neural Networks - Backpropagation. Previously, graduation predictions used manual methods which were still less accurate. This research is able to determine and predict elementary school students' graduation even better. Implementation of graduation after using the Backpropagation method with the Matlab Application, can calculate student graduation data which is done in two ways, namely by Training (Training) and Testing (Testing) where this method can better determine and predict the graduation of Elementary School Students.

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