Abstract

Guarantee the quality of education is an effort to improve the quality of education and human resource development. Improving the quality of education has been sought from various circles of education, the general public, especially the government. The number and diversity of potential local resources may result in school quality varies greatly. Therefore, efforts to homogenize the quality of education should be the center of attention in maintaining the quality of education nationwide. Steps taken by the government to ensure the overall quality of education is to make the National Education Standards (NES), which contains the eight indicators. Eighth these indicators referenced by the School Self-Evaluation (EDS) and the school’s accreditation. The purpose of this experiment is to evaluate the quality of school in junior high school. Artificial Neural Network (neural network) is an information processing system which is illustrated as the human brain. neural network has been widely used in several applications, one of which is clustering or grouping. ANN can be used in grouping is Kohonen Self Organizing Map (K-SOM). In this study, researchers used a method Kohonen Self Organizing (K-SOM) to evaluate the quality of schools based on data from EDS in North Maluku province. Best group generated with the validation Davies-Bouldin Index (DBI) The results of the evaluation of the quality of schools with the Kohonen-SOM algorithm, showing that the DBI obtained at junior level of 1.3970 with the Learning rate 0.9.

Keywords: Neural network, K-SOM, National Education Standards (SNP), the School Self-Evaluation (EDS).
1. Introduction

The low quality of education in Indonesia in general and specifically the quality of higher education from the perspective of a macro can be caused by poor national education system and lack of human resources (HR), which puts ranked 113 of 177 countries in the world. This data was obtained according to the survey on the Human Development Index (HDI) by the United Nation Development Program or UNDP. Lack of human resources in Indonesia is based on UNDP survey results are due to the low quality of education in various types and levels of education, because it is one of the principal national education development policy is to improve the quality and relevance of education. In addition, the expansion and distribution of educational and accountability is also a national education development policy (Hadis & Nurhayati, 2010).

Based on this grouping, it required quality of schools that will be used for school evaluation. Evaluation of the quality of education by the government today is the School Self-Evaluation (EDS) and the School Accreditation. Implementation of both these evaluations included two the same thing that refers to the SNP, but the evaluation is implemented on the government’s accreditation requires quite a long time, namely five years to see the quality of the school. In this study, researchers used Self-evaluation School (EDS) to see the quality of each school level in North Maluku province without waiting for school accreditation.

Biological neural networks composed of cells (neurons), has ties between these neurons. Neurons that will transform the information received through the connection leading to the release of other neurons. In the neural network, this relationship is known as weighting. The information is stored on a particular value in the weights. Figure 1. shows a simple neural network with the activation function F.

![Figure 1. Function Activation on Simple Artificial Neural Networks](image)

In Figure 1. that a neuron will process the N input \((x_1, x_2, ..., x_N)\) each of which has a weight \(w_1, w_2, ..., w_N\) and the weight of bias \(b\), with the formula:

\[
a = \sum_{i=1}^{N} x_i w_i
\]

Then the activation function activates becomes the network output \(x\) (Kusumadewi, 2004).

2. Research Methodology

The method in this study consists of several stages, namely stage study of literature, the stage of collecting data obtained from junior high school in Ternate and Tidore, the stage of data processing and data simulation stage to see the level of quality of education in North Maluku.

3. Finding and Discussion

School data is stored in Microsoft Excel 2010 with the name “School Data”. The following flowchart from the neural network-SOM Kohonen:
Figure 2. Flowchart Kohonen SOM neural network

Results of Clustering Quality Secondary School (SMP)

a. Results of Clustering with the First Data

Validation of clustering with the Davies-Bouldin index in Table 5.3 produces the lowest DBI 1.3970 with the learning rate 0.9 when iteration 10 and MSE $46 \times 10^{-7}$. Output size 4 is then used as the analysis of the quality evaluation of school in junior high school level.

Table 1. Results of Clustering with the size 4 cluster

<table>
<thead>
<tr>
<th>Cluster</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of SMP</td>
<td>3</td>
<td>29</td>
<td>18</td>
<td>10</td>
<td>60</td>
</tr>
</tbody>
</table>

Figure 3. Distribution of First Data for junior high school
b. Testing Results with the Second Data

After the result Data for clustering with the school in 2013 then used the new data is the data of 2014 as test data, for the purpose of comparison with the accreditation of the school. The test results with the school data of 2014 as follows:

<table>
<thead>
<tr>
<th>Cluster</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of SMP</td>
<td>6</td>
<td>26</td>
<td>19</td>
<td>9</td>
<td>60</td>
</tr>
</tbody>
</table>

![Figure 4. Distribution of junior high school cluster data](image1)

![Figure 5. Distribution first data for junior high school](image2)

![Figure 6. Distribution of junior high school cluster data](image3)

c. Comparison of Junior High School Accreditation
From the test results for the new data it appears that there are schools that are changing with the accreditation group that is different from the previous accreditation of the first group there are three schools with an average of accreditation 'A' while the three other schools accreditation 'B'. The second group there is 26 schools with an average of accreditation 'C', while three other schools are schools that switch cluster are two schools with the accreditation 'B' while the fourth group did not change cluster.

4. Conclusion
Based on the discussion in the previous chapter, the results in this study can be summarized as follows:

a. On the application of neural network Kohonen-SOM method capable of classifying Data for quality of the school in junior high school in the city of Ternate, Tidore and Halmahera Selatan North Maluku Province based on attributes of School Self-Evaluation (EDS).

b. Results of the evaluation of with the quality of school-SOM Kohonen algorithm, showing that the DBI obtained at junior level of 1.3970 with the Learning rate0.9.

5. References