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Application of Nave Bayes Algorithm for Security Performance Evaluation at PT. Sei Mangke Nusantara 3

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Abstract

Security serves as a security guard in an agency. In carrying out his duties a security must have a balance and functions in achieving the needs of an agency itself. In the world of work at an agency, especially security, which plays a role in maintaining the security of the agency. In the current era of security, there are those who are not responsible for their duties, so that an agency does not feel comfortable with the security. The purpose of this study to evaluate the performance of security at PT. Sei Mangke Nusantara Tiga and to create a safe and orderly atmosphere. In this study, the researchers used a Data Mining technique using the Naïve Bayes algorithm. Sources of research data obtained from the provision of questionnaires or questionnaires to danton PT. Sei Mangke Nusantara Tiga. The variables of the research used are discipline, attendance, honesty, communication skills and responsibility. In this study, the alternative used as a sample is security at PT. Sei Mangke Nusantara Tiga. The number of data tested is 5 security with two classes. From the results of the calculation of the Naïve Bayes Algorithm, it is obtained that there are 3 classes of good security and 2 security classes that are not good. The results of this study found that the level of accuracy of 100.00%.

Keywords: *Data Mining, Naive Bayes, Evaluation, Performance, Security*

1. Introduction

The security unit (security guard) is a group in an agency tasked with maintaining security and order in the environment/workplace [1],[2]. Being a security guard is not an easy job, they must be responsible for their work and be disciplined in their work. The function of the security guard is to protect the environment in an agency from any inconvenience. In the world of work, especially in an agency, security is a human resource (HR) that plays a role in maintaining security in an agency [3],[4]. In the current era of security, there are those who do not want to be responsible for their work, so that an agency feels uncomfortable and dissatisfied with the existence of security in an agency itself. Therefore, researchers will evaluate security performance so that the company can run optimally.

The large number of security at PT. Sei Mangke Nusantara Tiga who is responsible for their duties, currently the company has conducted a security performance assessment with PT. Sei Mangke Nusantara Tiga danton, resulting in accurate values [5],[6],[7]. Therefore, in order to improve the security and order of the company, a system is needed that overcomes these problems by optimizing the security performance assessment process faced by the Security Units (security guards), one of which is being responsible and disciplined for their work [8], [9]. To evaluate the performance of the security guard, it must meet the criteria, including good performance, good enough and bad using the Naïve Bayes Classifier method [10],[11],[12]. Performance evaluation is obtained from processing discipline and communication skills which each security guard has these criteria [13].

2. Results and Discussion

In implementing the final result of the Naïve Bayes algorithm, two stages are carried out, namely the Nave Bayes calculation and the adjustment of the final result with RapidMiner 5.3 software.

2.1. Data Processing Using Naïve Bayes Algorithm

To obtain the results of the research conducted, the following is a description of the manual calculation of the Naïve Bayes classification process in determining the evaluation of security performance with the Nave Bayes method. The criteria used are 5, namely: Discipline, Attendance, Honesty, Communication Ability and Responsibility. The following data used in this study can be seen in table 1.

Table 1: Research Data

No	alternative	Discipline (D)	Presence (P)	Honesty (H)	Communicating Ability (CA)	Responsibility (R)	Classification (C)
1	A1	SB	SB	B	B	SB	Good
2	A2	B	B	B	SB	B	Good
3	A3	B	C	C	B	K	Bad
4	A4	B	B	C	C	B	Bad
5	A5	B	SB	SB	SB	C	Good

6	A6	SB	B	B	SB	B	Good
7	A7	B	B	B	B	SB	Good
8	A8	B	SB	SB	B	B	Good
9	A9	B	B	B	B	SB	Good
10	A10	C	C	B	B	C	Bad
...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...
40	A40	B	B	SB	B	B	Good
41	A41	SB	SB	SB	B	C	Good
42	A42	B	C	C	K	SB	Bad
43	A43	B	SB	B	B	B	Good
44	A44	B	B	SB	SB	SB	Good
45	A45	B	SB	B	SB	B	Good
46	A46	B	B	B	SB	B	?
47	A47	B	B	SB	SB	B	?
48	A48	B	B	B	SB	SB	?
49	A49	B	B	B	C	C	?
50	A50	B	B	C	C	B	?

After the data has been determined, the next step the author calculates the number of Good and Bad based on Table 2.1. Of the 45 training data used, it is known that the Good class is 34 data, and the Bad class is 11 data. Prior probability calculation is good in determining security performance evaluation, namely:

$$P(Good) = \frac{34}{45} = 0{,}7555$$

While the calculation of the probability of being dissatisfied is:

$$P(Bad) = \frac{11}{45} = 0{,}2444$$

After each criterion probability has been known, the next step is to calculate the value of one of the values given by Danton to determine the classification value. Based on the training data in table 2.1, the alternative data 46 to 50 are classified into good classes. So to calculate a good value on alternatives 46 to 50 are as follows:

P(46|Good) = P(D=B|Good) x P(P=B|Good) x P(H=B|Good) x P (CA=SB|Good) x P(R =B|Good)
= 0,8529 x 0,5882 x 0,4411 x 0,3823 x 0,5
= 0,0423

P(47| Good) = P(D=B|Good) x P(P=B|Good) x P(H=SB| Good) x P(CA=SB| Good) x P(R =B| Good)
= 0,8529 x 0,5882 x 0,5294 x 0,3823 x 0,5
= 0,0508

P(48|Good) = P(D=B| Good) x P(P=B| Good) x P(H=B| Good) x P(CA=SB| Good) x P(R =SB| Good)
= 0,8529 x 0,5882 x 0,4411 x 0,3823 x 0,3529
= 0,0299

P(49|Good) = P(Disiplin=B| Good) x P(P=B| Good) x P(H=B| Good) x P(CA=C| Good) x P(R =C| Good)
= 0,8529 x 0,5882 x 0,4411 x 0,0294 x 0,1176
= 0,0008

P(49| Good) = P(D=B| Good) x P(P=B| Good) x P(H=C| Good) x P(CA=C| Good) x P(R =B| Good)
= 0,8529 x 0,5882 x 0,0294 x 0,0294 x 0,5
= 0,0002

Meanwhile, to calculate the bad value in the 46th data, the 50 formula used is the same as the formula to determine good value. So to get the value is done as follows:

P(46|Bad) = P(D=B| Bad) x P(P=B| Bad) x P(H=B| Bad) x P(CA= SB| Bad) x P (R = B| Bad)
= 0,8182 x 0,5455 x 0,0909 x 0,0909 x 0,1818
= 0,0007

P(47|Bad) = P(D=B| Bad) x P(P=B| Bad) x P(H=B| Bad) x P(CA= SB| Bad) x P (R = B| Bad)
= 0,8182 x 0,5455 x 0,0909 x 0,0909 x 0,1818
= 0,0007

P(48|Bad) = P(D=B| Bad) x P(P=B| Bad) x P(H=B| Bad) x P(CA= SB| Bad) x P (R = B| Bad)
= 0,8182 x 0,5455 x 0,0909 x 0,0909 x 0,0909
= 0,0003

P(49|Bad) = P(D=B| Bad) x P(P=B| Bad) x P(H=B| Bad) x P(CA= SB| Bad) x P (R = B| Bad)
= 0,8182 x 0,5455 x 0,0909 x 0,5455 x 0,5455
= 0,0121

P(50|Bad) = P(D=B| Bad) x P(P=B| Bad) x P(H=B| Bad) x P(CA= SB| Bad) x P (R = B| Bad)
= 0,8182 x 0,5455 x 0,8182 x 0,5455 x 0,1818
= 0,0362

After the good and bad values in the data 46 to 50 are known, the writer then calculates the maximum for each classification. Calculation of alternative data 46 to 50 to calculate the maximization of good scores, namely:P(Good|C) = P(Rn|C) * P(Good)
= P(46|C) * P(Good)
= 0,0423 x 0,7556
= 0,0320

P(Good |C) = P(Rn|C) * P(Good)
= P(47|C) * P(Good)
= 0,0508 x 0,7556
= 0,0384
P(Good |C) = P(Rn|C) * P(Good)
= P(48|C) * P(Good)
= 0,0299 x 0,7556
= 0,0226
P(Good |C) = P(Rn|C) * P(Good)
= P(49|C) * P(Good)
= 0,0008 x 0,7556
= 0,0006
P(Good |C) = P(Rn|C) * P(Good)
= P(50|C) * P(Good)
= 0,0002 x 0,7556
= 0,0002

While the maximum calculation of the value of being dissatisfied with alternative data 46 to 50, namely:

P(Bad|C) = P(Rn|C) * P(Bad)
= P(46|C) * P(Bad)
= 0,0007 x 0,2444
= 0
P(Bad |C) = P(Rn|C) * P(Bad)
= P(47|C) * P(Bad)
= 0,0007 x 0,2444
= 0,0002
P(Bad|C) = P(Rn|C) * P(Bad)
= P(48|C) * P(Bad)
= 0,0003 x 0,2444
= 0
P(Bad|C) = P(Rn|C) * P(Bad)
= P(49|C) * P(Bad)
= 0,0121 x 0,2444
= 0,0030
P(Bad|C) = P(Rn|C) * P(Bad)
= P(50|C) * P(Bad)
= 0,0362 x 0,2444
= 0,008

After calculating the maximization of the good and bad values, the next step will be to compare the good and bad values. So that the results of the security performance evaluation are included in the good and bad categories.

R46 = Good >= Bad
= 0,0320 >= 0
= 0,0320 (Good)
R47 = Good >= Bad
= 0,0384 >= 0,0002
= 0,0384 (Good)
R48 = Good >= Bad
= 0,0226 >= 0
= 0,0226 (Good)
R49 = Good >= Bad
= 0,0006 >= 0,0030
= 0,0030 (Bad)
R50 = Good >= Bad
= 0,0002 >= 0,0089
= 0,0089 (Bad)

2.2. Testing Process With RapidMiner

From the results of the above probability, 5 data will be tested and resolved using the RapidMiner tool so that it is produced with the classification results as shown in Figure 1.

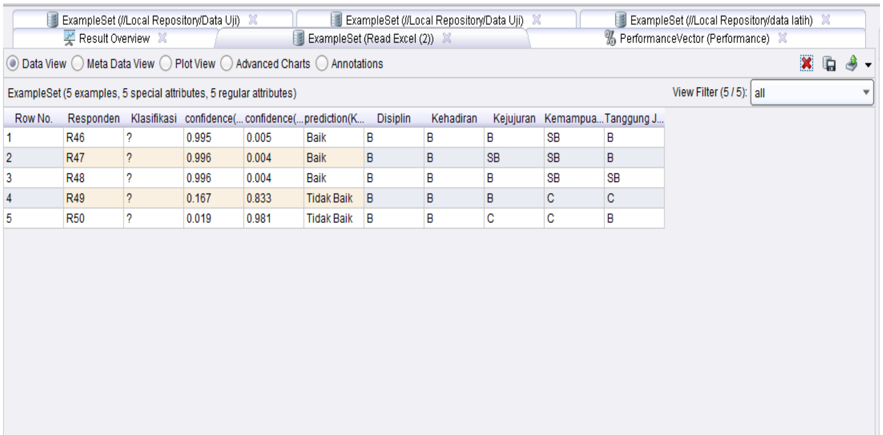

Figure 1. Calculations Using RapidMiner Tools

2.3. Data Validation

In conducting data validation, there are things that must be considered, including: manual calculation of the algorithm must display the final result in the form of a decision tree, and the data used must be valid and the same as that used in the tools. The test results of the Naive Bayes algorithm model are shown as follows:

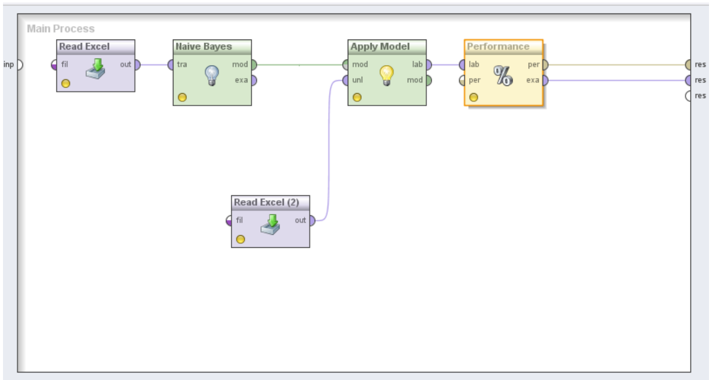

Figure 2. Classification Design of Training Data and Test Data

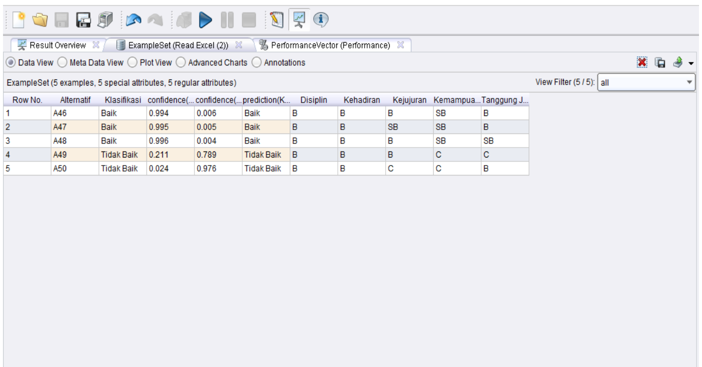

Figure 3. RapidMiner Results

Testing on the verification and validation side of the application, using the help of RapidMiner version 5. In processing and testing accuracy with the Naive Bayes algorithm, the RapidMiner version 5 application can be used. After forming 5 rules where there are 3 rules that have been successfully classified with a Good value, and the rest of the rules after classified are as many as 2 rules with a value of Bad.

The following are the results of the proof of the Naive Bayes calculation as follows:

Table 2: Proving results of Naive Bayes Calculation

<table>
<tr><th>Alternatif</th><th>C1</th><th>C2</th><th>C3</th><th>C4</th><th>C5</th><th>Clasification</th><th rowspan="6">prediction</th><th>Class Good</th><th>Bad</th><th>Clasification</th></tr>
<tr><td>A46</td><td>B</td><td>B</td><td>B</td><td>SB</td><td>B</td><td>Good</td><td>0,0423</td><td>0,0007</td><td>Good</td></tr>
<tr><td>A47</td><td>B</td><td>B</td><td>SB</td><td>SB</td><td>B</td><td>Good</td><td>0,0508</td><td>0,0007</td><td>Good</td></tr>
<tr><td>A48</td><td>B</td><td>B</td><td>B</td><td>SB</td><td>SB</td><td>Good</td><td>0,0299</td><td>0,0003</td><td>Good</td></tr>
<tr><td>A49</td><td>B</td><td>B</td><td>B</td><td>C</td><td>C</td><td>Bad</td><td>0,0008</td><td>0,0121</td><td>Bad</td></tr>
<tr><td>A50</td><td>B</td><td>B</td><td>C</td><td>C</td><td>B</td><td>Bad</td><td>0,0002</td><td>0,0362</td><td>Bad</td></tr>
</table>

Accuracy is the result of how good the model correlates the results with the attributes in the data provided.

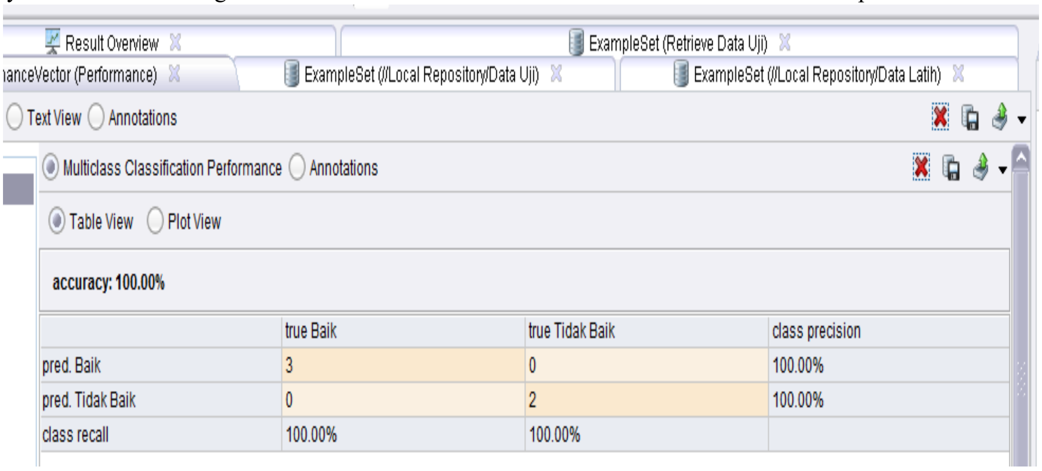

Figure 4 : Accuracy Performance Value

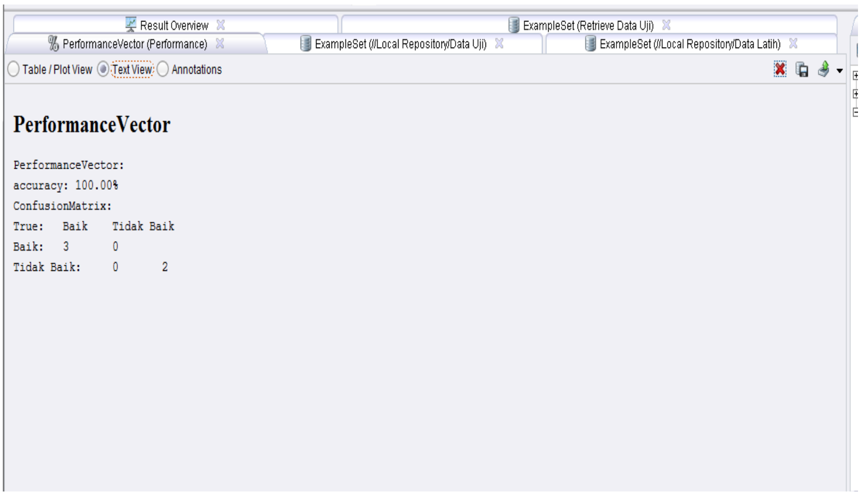

Figure 5: Details of Performance Vector

Based on the image that has been applied above, it can be seen that the data testing was carried out using the apply model and the % performance obtained 100% accuracy results can be categorized as a suitable method in solving security performance evaluation problems using the Naïve Bayes method.

3. Conclusion

Application of the Naive Bayes algorithm for evaluating security performance at PT. Sei Mangke Nusantara Tiga. The source of data used in this study is data obtained directly from danton security PT. Sei Mangke Nusantara Tiga. The number of data tested is 5 security by using two classes. From the results of the calculation of the Naive Bayes algorithm, it is obtained that there are 3 security classes in Good class and 2 security classes in Bad class. Testing data on RapidMiner 5.3 using naive bayes can display two classes of classification results with an accuracy rate of 100.00% and can be categorized as an appropriate method in solving problems.

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