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Teacher Performance Assesment Application using Naive Bayes Classifier Method

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Abstract. In this study to determine the classification of teacher performance feasibility is by using naive bayes Classifier method. The input data comes from teacher data SMPN 1 Jabon Sidoarjo. The teacher data sample will be used as training data and data testing. The Naive Bayes classifier is a simple probability classifier that applies Bayes's theorem. In this study, the feasibility assessment of teacher performance there are 8 criteria there are Service Orientation, Integrity, Commitment, Discipline, Cooperation, Teaching, Certification and Diploma. The output classification is the feasibility of teacher performance. The system is developed using under the programming language PHP and MySQL. Data used is 46 data which divided in two data that is training data as much 36 data and 10 data as test data. Tests on sample data with real data indicate the suitability of 90%.

1. Introduction

Teachers are an important element in the quality of education. To improve the quality of education required qualified and professional teachers. It is therefore necessary to assess the feasibility of teacher performance as an effort to improve the quality of education.

Teachers are an important element in school education. Teachers as professionals have a very important in achieving the educational vision of creating smart and competitive Indonesian people [3]. To be able to participate in the provision of quality education, then a teacher must meet the qualifications as stated in Law RI Number. 20/2003 on National Education System. Law Number 14/2005 on Teachers and Lecturers, and Government Regulation Number 19/2005 on National Education Standards stating that teachers are professional educators.

With the development of junior high school students from year to year continues to increase of course also encourages the development and improvement of educators needed. Improving the quality of educators is needed in the development of quality learning and teaching students. In achieving the quality of good education is strongly influenced by the performance of teachers in performing their duties so that teacher performance becomes an important demands to achieve educational success. The act of assessing teacher performance is one way of improving the quality of education.

In the study Sandi Fajar Rodiyansyah and Edi Winarko in 2013 with title Post Classification of Twitter Traffic Congestion Bandung Using Naive Bayesian Classification of the test results, the



application shows that the smallest accuracy value of 78% produced on the test with a sample of 100 and produce a high accuracy value 91.60% in the test with 13106 samples [7].

In the study Sri Kusuma Dewi in 2009 with the title of classification of nutritional status using naive bayes classification resulted that in this research, the NBC algorithm will be applied for measuring the human nutrient status by using anthropometry data as input system. The result of this research shows that NBC can solve this problem adequately. Research results shows total performance of this system as 93.2% [2].

Assessment of teacher performance feasibility there are 8 criteria that is Service Orientation, Integrity, Commitment, Discipline, Cooperation, Teaching Hours, Certification and Diploma. The performance appraisal will use the naive bayes classifier method which is a simple probabilistic based prediction technique with a strong independence assumption [5]. The case study of the feasibility assessment of the performance of this teacher is from SMP Negeri Jabon Sidoarjo addressed at Jalan Dukuh Sari 01 Jabon village / District Jabon, District / Sidoarjo, East Java Province. The system is developed using the programming language PHP and MySQL. Data used as many as 46 data that is training data as much 36 data and 10 data as test data. The formulation of the problem based on the above background is How to develop teacher performance appraisal apps using the web based Naive Bayes Classifier method.

2. Experimental Method

Data mining is the mining or discovery of new information by searching for patterns or rules of some very large data [1]. Data mining is also referred to as a series of processes to explore the added value of knowledge that has been unknown manually from a data set [6]. Data mining, often referred to as knowledge discovery in database (KDD). KDD is an activity that includes the collection, use of data, history to find regularities, patterns or relationships in large data sets [8].

Naive Bayes Classifier is one of the algorithms in data mining techniques that apply bayes theory in classification. Bayes's decision theorem is a fundamental statistical approach to pattern recognition. Naive Bayes is based on the simplifying assumption that attribute values are conditionally independent when given an output value. In other words, given the value of output, the probability of observing collectively is the product of the individual probability. By entering equation 1 to equation 2 we will find the approach used in NBC.

$$P(a_1, a_2, a_3, \dots, a_n | V_j) = \prod_i P(a_i | v_j) \quad (1)$$

$$V_{NB} = \arg \max_{v_j \in V} P(V_j) \prod_i P(a_i | v_j) \quad (2)$$

V_{NB} : the output value of naive bayes classification results

$P(a_i | v_j)$: the ratio between n_c / n , where n_c is the amount of training data for $v = v_j$ and $a = a_i$; and n is the total possible output.

3. Results and Discussion

In this research will be used Data training and data testing. Data will be used as mining and testing process, in the form of parent data sample and teacher data SMPN 1 Jabon. This data has attributes of Service Orientation, Integrity, Commitment, Discipline, Cooperation, Teaching, Certification and Diploma. The research stages from finding literature studies about naive bayes and teacher performance assessments, after which identify problems and collect teacher performance data. Then performed data cleaning by eliminating noise and inconsistent and irrelevant data which continued the selection of data used which then combined into data with the appropriate format and select the data set to be used for research. Then proceeded to analyze the case study using the naive bayes method.

The test is done on 37 data. Position = teacher; service orientation = good enough; integrity = good enough; commitment = good; discipline = good; cooperation = good; hours of teaching = excellent; certification = yes; employment status = pns, then how are predictions for teacher performance feasibility?

The calculation steps are as follows:

$$P(\text{Performance} = \text{Yes}) = 0.75$$

$$P(\text{Performance} = \text{no}) = 0.25$$

Complete P (X | H):

$$p(\text{orientation} = \text{good enough} | \text{Feasibility} = \text{Yes}) = 5 = 0.1851$$

$$P(\text{Orientation} = \text{good enough} | \text{Feasibility} = \text{No}) = 6 = 0.6667$$

Complete P (X | H):

$$p(\text{integrity} = \text{good enough} | \text{Feasibility} = \text{Yes}) = 2 = 0.07407$$

$$P(\text{integrity} = \text{good enough} | \text{Feasibility} = \text{No}) = 3 = 0.33333$$

Complete P (X | H):

$$p(\text{Commitment} = \text{good} | \text{Feasibility} = \text{Yes}) = 17 = 0.6296$$

$$P(\text{Commitment} = \text{good} | \text{Feasibility} = \text{No}) = 5 = 0.55556$$

Complete P (X | H):

$$p(\text{Discipline} = \text{good} | \text{Feasibility} = \text{Yes}) = 9 = 0.33333$$

$$P(\text{Discipline} = \text{good} | \text{Feasibility} = \text{No}) = 2 = 0.22222$$

Complete P (X | H):

$$p(\text{Cooperation} = \text{good} | \text{Feasibility} = \text{Yes}) = 19 = 0.70374$$

$$P(\text{Cooperation} = \text{good} | \text{Feasibility} = \text{No}) = 9 = 1$$

Complete P (X | H):

$$p(\text{teaching hours} = \text{Very good} | \text{Feasibility} = \text{Yes}) = 19 = 0.70$$

$$P(\text{teaching hours} = \text{Very good} | \text{Feasibility} = \text{No}) = 9 = 1$$

Complete P (X | H):

$$p(\text{Certificate} = \text{yes} | \text{Feasibility} = \text{Yes}) = 27 = 1$$

$$P(\text{Certificate} = \text{yes} | \text{Feasibility} = \text{No}) = 8 = 0.8889$$

Complete P (X | H):

$$p(\text{Status} = \text{pns} | \text{Feasibility} = \text{Yes}) = 27 = 0.931$$

$$P(\text{Status} = \text{pns} | \text{Feasibility} = \text{No}) = 9 = 1$$

$$p(X | \text{Feasibility} = \text{Yes}) = 0,0015$$

$$p(X | \text{Feasibility} = \text{No}) = 0,0216$$

$$p(X | \text{Feasibility} = \text{Yes}) P(\text{Feasibility} = \text{Yes}) = 0.0011$$

$$p(X | \text{Feasibility} = \text{No}) P(\text{Feasibility} = \text{No}) = 0.0054$$

So the prediction of feasibility from teacher with criteria service orientation = good enough, integrity = good enough, commitment = good, discipline = good, cooperation = good, hours of teaching = excellent, certification = yes, employment status = pns is not feasible.

Implementation of the application can be seen in the following forms. Figure 1 shows Login Form. Login administrator is a process to access data mining application determines the best teacher performance by entering User Admin username and password.

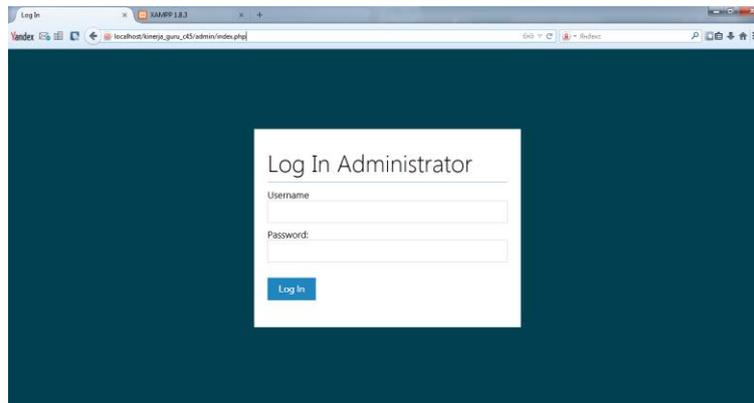


Figure 1. Login Form.

Figure 2 shows Form Manage Teacher data. In this form the user can input teacher data as desired. The system will be automatically input as training data. The system is also directly inputted with the decision.

Penentu Keputusan

Home / Penentu Keputusan

Input Data

Nama Guru	: Agus Pujiono, S.Pd.M.Si. - 196910221990011002
jabatan	: Guru
orientasi pelayanan	: 82-91
integritas	: 82-91
komitmen	: 82-91
disiplin	: 82-91
kerjasama	: 82-91
jam mengajar	: >=6
sertifikasi	: Belum
status kepegawaian	: GTT
ijazah	: S1

Figure 2. Form Manage teacher data.

Figure 3 shows Homepage that contains the menus that will run on the data mining process from the teacher data input to the teacher performance feasibility calculation.



Figure 3. Homepage.

Figure 4 shows Calculation form. On this calculation menu page, the system automatically calculates the existing training data input and the system also calculated in accordance with the naive Bayes algorithm.

NO	NAMA	JABATAN	ORIENTASI PELAYANAN	INTEGRITAS	KOMITMEN	DISIPLIN	KERJABAMA	JAM MENGAJAR	SERTIFIKASI	STATUS KEPEGAWAIAN	KELAYAKAN
1	Hadi Utomo, S.Pd	Guru	Cukup Baik	Cukup Baik	Sangat Baik	Baik	Baik	Sangat Baik	Belum	PNS	YA
2	Muhammad Fauz	Guru	sangat Baik	Baik	Baik	Cukup Baik	Baik	Sangat Baik	Belum	PNS	YA
3	Hani Dwi Susilo,	Guru	Baik	Sangat Baik	Baik	Cukup Baik	Baik	Sangat Baik	Belum	PNS	YA
4	Dwi Ledestingrus	Guru	sangat Baik	Baik	Baik	Cukup Baik	Baik	Sangat Baik	Belum	PNS	YA
5	Sarya Indah Parta	Guru	Cukup Baik	Cukup Baik	Cukup Baik	Baik	Sangat Baik	Baik	Belum	PNS	YA
6	Ismahli Mahfud	Guru	Cukup Baik	Cukup Baik	Cukup Baik	Baik	Baik	Sangat Baik	Belum	PNS	YA
7	Tia Rizki Siromano	Guru	Baik	Sangat Baik	Baik	Cukup Baik	Baik	Baik	Belum	PNS	YA
8	Dwi Pujiastari, S	Guru	sangat Baik	Sangat Baik	Baik	Cukup Baik	Sangat Baik	Sangat Baik	Belum	PNS	YA
9	Aadya Susanto, S	Guru	Cukup baik	Baik	Baik	Cukup Baik	Baik	Sangat Baik	Belum	GT7	TIDAK
10	Nurul Khoifah, S	Guru	Cukup baik	Sangat Baik	Sangat Baik	Cukup Baik	Baik	Baik	Belum	GT7	TIDAK

Figure 4. Calculation form.

To know the performance of the application, then testing the system. And the result can be seen in table 1.

Table 1. testing results.

Data	Results		Conformity
	Real Data	NBC Results	
1	feasible	feasible	suitable
2	feasible	feasible	suitable
3	Not feasible	Not feasible	suitable
4	feasible	feasible	suitable
5	feasible	feasible	suitable
6	feasible	feasible	suitable
7	feasible	feasible	suitable
8	feasible	Not feasible	Not Suitable
9	feasible	feasible	suitable
10	feasible	feasible	suitable

Based on the above test results then obtained the data test data with the data rill is 90%.

4. Conclusions

Based on the results of research and discussion that has been done, it can be concluded that the method of naive bayes classifier can be used as an assessment of teacher performance based on the criteria of Service Orientation, Integrity, Commitment, Discipline, Cooperation, Teaching, Certification and Diploma. Based on the test results then obtained the data test data with the data rill is 90%

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