Election model classifications of problem-based learning using a machine learning technique

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Abstract: Strategy learning based problem involve all college students to active in working class and find the solution of problems being discussed. The active involvement of all students in learning and the capability of think critically students hoped would improve learning outcomes especially cognitive students study results. This study aims to choose model classification and evaluate how much of accuracy and precision from the learning problem learning based using a technique machine learning. Classification problems based learning treatment based on student learning outcomes and creativity. Optimize parameters applied at an election algorithms applied with both operators select sub proses. By applying some algorithms so operator select sub proses will vote in the best automatic algorithms. The algorithms Decision Tree, Naïve Bayes, and Random Forest are acquired automatic algorithms Naive Bayes have the accuracy of 75 % of the kappa 2,3%.

1. Introduction

Several steps learning currently implemented seem to have not capable of facilitate students will improve the capacity to think critical. Learning activities are still dominated by lecturer, so the active involvement of students in learning is weak. Thus, opportunities to improve the ability think critically students are still low. Empowerment developed the capacity to think critically important for college students, and think critically can improved the skills and analytic verbal[1][2]. To increase the capacity to think critical way of expressing ideas, who will be useful to improve understanding. In addition, the capacity to think critical reflection, also important to give meaning in life and seek the truth, reflection value and decisions yourself.[3][4] .

The alternatives of learning which he can improve the ability to think critically is by applying a system heavily the problem of learning. Problem based learning involve all students active in the class in work together and looking for a solution of the problems that are being studied.[5][6] In learning the active involvement of all students in classes and the capability of think critically students hoped would improve learning outcomes especially cognitive students study results. In the process, problem based learning based possible capacity building college students to the independent study without that a limit the distance and time.[5][7] And done classification problems based learning predictor based on the study results and creativity of the students. Learning outcomes and creativity students were carried out as many as 2 (two) cycle that is the first and the second for a lecture in the first semester[3][8][9]. With using a technique machine learning can the election from the problem by applying some algorithms learning based [10][11]. Some implementation algorithm in engineering machine learning the to determine model machine learning with accuracy excellent [12]. The approach used a technique of machine learning it can be used to predict classifications problem based learning evaluating the
performance of the classifications formed [13]. In this research will be implemented algorithm Decision Tree, algorithms Naive Bayes, and algorithms Random Forest [14]. By using the method optimize parameter sub process election, algorithm then as automatic chosen one algorithm having best accuracy. Through the application of these algorithms will receive a classification problem based learning the accuracy of very good. In some research done using a technique many classifications machine learning by applying algorithms Decision Tree, Naive Bayes Random Forest, K-NN, Neural Network. But in this research will be applied algorithms Decision Tree, Naive Bayes and Random Forest in the classification problem based learning in lecture basic algorithmic and programming for a semester[15].

From the above information, then the researcher conducted a study of The Model Classification Problems Based Learning Uses the Technique Machine Learning in STMIK IKMI Cirebon Indonesia.

2. Methodology

2.1 Object and Dataset

Objects in the research model classification problems based learning in Indonesia consisting of 3 course of study with the amount of data about 137 a unique dataset. A unique dataset that used with regard to the selection of a model based learning is a unique dataset of classification the year 2019, with value attribute KKM and value of creativity and the third stage one KKM creativity and the second round, as shown in table 1.

| No | NIM          | Value KKM1 | Creativity 1 | Value KKM2 | Creativity 2 | Average | PBL  |
|----|--------------|------------|--------------|------------|--------------|---------|------|
| 1  | 41190001     | 70         | 67           | 76         | 65           | 69.50   | Quite|
| 2  | 41190002     | 67         | 71           | 76         | 72           | 71.50   | Quite|
| 3  | 41190003     | 76         | 72           | 89         | 68           | 76.25   | Good |
| ...|              |            |              |            |              |         |      |
| 136| 411900136    | 76         | 70           | 71         | 76           | 73.25   | Quite|
| 137| 411900137    | 70         | 72           | 69         | 74           | 71.25   | Quite|

2.2 The Concept of Problem Based Learning

A model of learning problem based learning it helps college students to solve or find a solution on their own or in groups of story please be the real world [16]. For classifying, learning based problem based on value average attributes studies and creativity of the first and second as in table the following:

| No | Range  | Class PBL |
|----|--------|-----------|
| 1  | 87.5<X<=100 | Excellent |
| 2  | 75<X<=87.5  | Good      |
| 3  | 62.5<X<=75  | Quite     |
| 4  | 50<X<=62.5  | Less      |

2.3 Research Method

The technique used in a system of mining knowledge has been used in research of algorithms decision tree, Naïve Bayes, random forest where done the process of preprocessing by changing the representation of data, data normalization and transformation. The purpose of select sub process is to elect one algorithm to value best accuracy in automatic from some of the algorithm applied. Tools employed to do classifications problem based learning using a technique machine learning this is rapid miner 9.8.
a. Optimize Parameters

![Figure 1. Optimize Parameter](image)

Setting parameters in optimize use select sub proses, scales linear is 1, a minimum 3, a maximum score is 3 step. Handling error value that is to choose a method of parameters allow mistakes during the execution process walk set files_on_error and if there are errors, execution account the process will fail by displaying a message error.

b. Select Sub proses

To optimize parameter to be implemented at an election model classification the problem based learning is used operator select sub process. Operator select sub process this as a technique in automation election best algorithm in engineering machine learning to be applied, as shown in figure 2 in processing

![Figure 2. Cross Validation from Each Algorithms](image)

c. Algorithm

1) Naïve Bayes

A calculation for posterior probability is used in the Bayesian theorem \( P(c|x) \) from \( P(c) \), \( P(x) \) and \( P(x|c) \):

\[
P(c|x) = \frac{P(x|c)p(c)}{P(c)}
\]

- \( P(c|x) \): The resulting class probability was \((c, target)\) given predictor \((x, attributes)\).
- \( P(c) \): The before class chance of.
- \( P(x|c) \): The chances, the likelihood of class deciding prediction in the range.
- \( P(x) \): The previous chance of predictor

2) Decision Tree

For this method, Divide and overcome is a standard call as it makes use of the values of the capabilities to divide the statistics into smaller subsets of the equal class. In addition, C45 will deal after creation with discrete and non-stop facts, lacking values, noise facts and pruning tree. In order to pick the great characteristic as a root after which cross on extra splitting functionality, C45 is predicated on entropy and advantage ration[12].

3) Random Forest

The Random Forest algorithm was developed by Breiman; by Random Forest both the classification and regression can be performed. A number of decision trees can be generated by Random Forest to improve classification levels and solve the overfitting question. A further element in a file system was chosen every time to make \( K \) number of non-pruned trees by Random Forest. Test details about all of the trees built in a Random Forest and the most frequent yield shall, when registered, be added as name to the inspected data. In fact, As the wooded area of trees have increased in the forest, the better exactness will be achieved in the forest.

3. Result and Discussion

3.1 Evaluation

The utility of a tree scheme can, accordingly, be checked by naive bay algorithm and the occurring forest as until specifics are inferred. The detail of the study was accomplished by the detail of the uncertainty model in Figure 3.
To know accuracy, hence applied optimize parameters at an election algorithms are in use sub processes select operator. From of the figure 4 obtained the accuracy is Decision Tree 0.979, Random Forest 0.978, and Naïve Bayes 0.949. Most high a value its accuracy is by using the algorithms Decision Tree 0.979%.

By applying algorithms Decision Tree, Naïve Bayes, and Random Forest, automatically select operator sub process would choose the algorithm 97.86% accuracy with the kappa 0.955 as seen in figure 5.

3.2 Knowledge Presentation

A grouping of data by using an algorithm decision tree with attribute Complete at Least Criteria (KKM) and creativity in 1 round and round 2 can be seen with hierarchical clustering shown in figure 6. Clustering hierarchical form clusters a root node as any data on clusters of. While cluster on it formed by the closeness between the data under it.
The results of each figure 7 showing graphically every possible the attributes show owned by the class predicted based on values of attributes predictor who include the value of at least Complete at Least Criteria (KKM) round 1, creativity round 1, Complete at Least Criteria (KKM) round 2 and creativity round 2. A frequency and based on the value of an attribute predictor problem learning based indicated in figure 8.

![Figure 8. A Graph of Frequency Attributes PBL Predictor](image1)

![Figure 9. A Graph Predictions PBL According To KKM 1](image2)

Statistical prediction Problem Based Learning based on Complete at Least Criteria (KKM) the 1 in figure 9 can be seen that these predictions 58.39 %, quite as much as a prediction good 38.69 %, as many as while a prediction of less and very well is 1.46 %. There are also absences of work carried out where the trainer's number is limited, with particular attributes of predictor knowledge, so that the essence of the option trees generated as baselines for the collection of model categories is effect on it and it evaluates how significant the accuracy or accuracy of classification of information data mining learning issues are because not all the algorithms utilized. Algorithm By as, in order to evaluate the most precise algorithm, it is simply necessary to compare an algorithm.

4. Conclusion
In this paper, the model election algorithm in automated from problems using a machine learning methodology. On many machine learning algorithms to be applied optimize the operator pick sub process by the function parameter so you obtain one algorithm with the highest value accuracy. The effects of implementing a parameter method in operator choice optimize

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