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To cite this article: A Maulana 2021 *IOP Conf. Ser.: Mater. Sci. Eng.* **1073** 012055

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Prediction of student graduation accuracy using decision tree with application of genetic algorithms

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Abstract. Many of students who can't complete the study promptly is a problem that needs to be faced with a fast and effective way. In the student's education system is an important asset to the note the graduation rate of students promptly. Predicting graduation is very important for the institution to determine the strategic policies for the institution. The scope of the study is limited in performing accurate comparison between studies that only use Genetic Algorithm method and the research-based Genetic Algorithm using forward selection. Here we can conclude that the value of the highest accuracy is there in the Genetic Algorithm-based method Forward selection. Thus the Genetic Algorithm method with the selection of attribute-based Forward Selection is the best method for solving a problem in the prediction accuracy of graduation.

1. Introduction

The Graduation is one of the assessment items in the college accreditation process. The assessment elements for graduates in a university will refer to the national standard SNPT for higher education PERMEN DIKBUT number 3 of 2020. So that if students graduate academically on time it will help assess the accreditation of a college. Graduating on time is very important and this is a priority policy issue, even the passing rate is considered one of the institutional effectiveness [1].

The value of graduate accreditation plays an important role in accreditation, so every university tries to make various efforts so that its students can graduate on time.

The Diploma (D3) education level is included in the scope of higher education, which is one of the basic requirements in finding a job, where universities will prepare qualified and skilled undergraduate candidates who have skills in their fields. Of course, in achieving the degree in the Associate Expert (AMD) field, it takes a normal time for 3 years [2].

2. Literature review

Verry Riyanto, Abdul Hamid, Ridwansyah 2019 "*Prediction of Student Graduation Time Using the Best Algorithm*" The results were obtained from the study of academic achievement during the study period, architecture, and appropriate weights of the NN, DT, and SVM methods [3]. Of the three models tested and experimented with, the highest value was SVM 85.18% to occupy the second position with a value of 84.96% occupied by DT, and the smallest accuracy value was NN with a value of 84.68%.

Joseph Stephen Bassi, Emmanuel Gbenga Dada, Alkali Abdulkadir Hamidu and Mshelia Dauda Elijah 2019 "Students Graduation on Time Prediction Model Using Artificial Neural Network" The results showed that artificial neural networks are a promising tool [4].



Agus Romadhona, Suprapedi, H. Himawan, 2017 “Timely student graduation prediction by age, gender, and achievement index using decision tree algorithm” From this research, it was found that the prediction of students who entered the study period of students who entered was influenced by age, gender, GPA semester 1 to GPA 4 semesters, and the most influential was the 4th-semester student GPA on time with a gain value of 0.340 from all attributes [5].

Susi Mashlahah 2013 “Prediction of student graduation uses the decision tree method with the application of the C4.5 algorithm” The more sample data used, the greater the correctness of the prediction [6].

Eko Prasetyo Rohmawan, 2018 “Predicting student graduation on time uses the decision tree and artificial neural network methods” The use of data mining with the Decision Tree method has an accuracy of 74.51% and an Artificial Neural Network has a higher accuracy of 79.74% which can be applied in predicting student graduation on time [7].

3. Research methods

3.1. Research purposes

In this study, the data used were data from students of the D-3 Computer Engineering Study Program, Harapan Bersama Polytechnic of Tegal, the purpose of this study was to find and find the best algorithm patterns with student data objects based on several determining variables to get the level of accuracy in predicting graduate accuracy students using the Decision Tree method and research that will be carried out with the Application of Genetic Algorithms.

The data in this study were taken from graduation data in 2019 as many as 306 students with initial Nim attributes, gender, marital status, occupational status, social studies scores 1 to 4 occupation, and parents' income. The research stages are as follows:

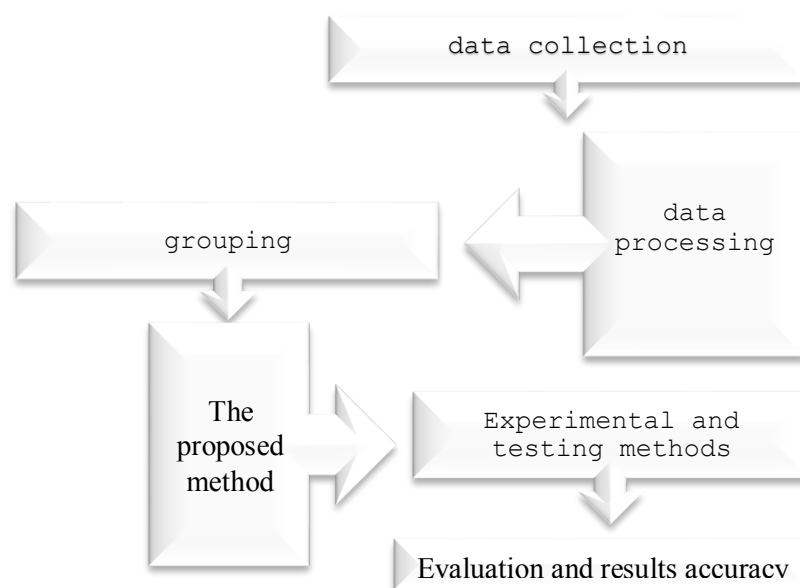


Figure 1. Research stages.

3.2. Testing phase

The research was conducted using the decision tree method with the application of genetic algorithms, the object of research taken from students of the D-3 Computer Engineering Study Program at the

Harapan Bersama Polytechnic Year 2016 in the form of data from Microsoft Excel then transformed into the Rapid Miner tool by doing 10 fold cross-validation to get one prediction about the student's on-time graduation to get the best accuracy rate results. As shown in the table below:

Table 1. Table of Attributes of data for graduates of the Harapan Bersama Tegal Polytechnic.

Atribut	Information
NIM	Student ID Number
Gender	Gender
Marital status	Marital status
Job Status	Students or parents with Working or not working status
Income	Total rupiah
IPS1	Semester Achievement Index 1
IPS2	Semester Achievement Index 2
IPS3	Semester Achievement Index 3
IPS4	Semester Achievement Index 4
Label	Be on time Not on time

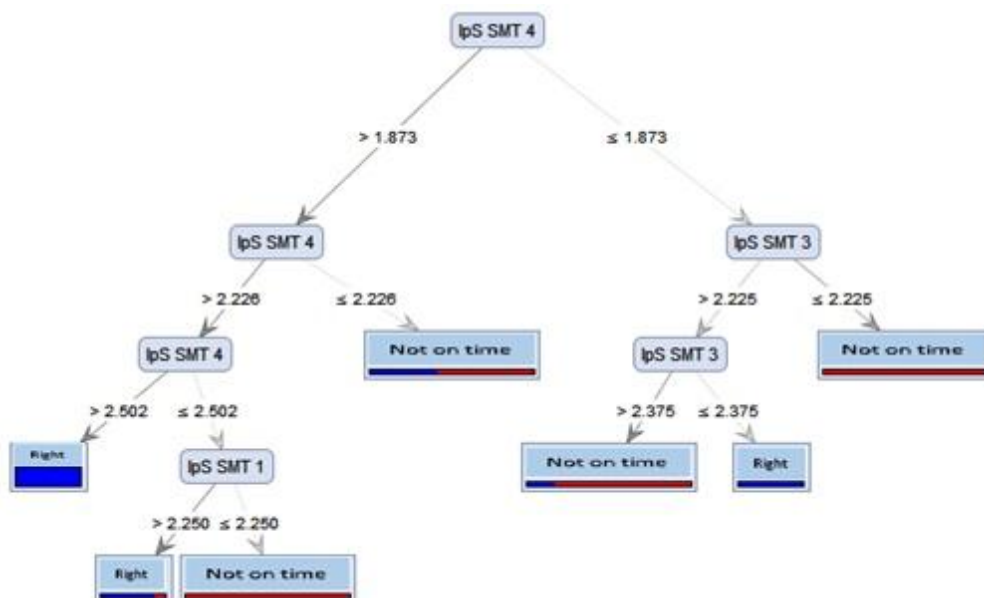


Figure 2. Decision Tree Model of student graduation data.

From the Decision Tree in Figure 2. obtained rules for predicting student graduation data on time or not on time. By using the Decision Tree Algorithm, so that you get a rule that will be used for decision making on new data.

In conducting classification, this method can be evaluated based on criteria such as the level of accuracy, speed, reliability, scalability, and interpretability. Then after the data is processed, the level of accuracy can be tested to see the performance of the Decision Tree algorithm

From the results of testing the data for graduate students in 2019 above, it is evident that the test results of the Decision Tree Algorithm method have a high accuracy value.

4. Conclusion

Based on the results of the data accuracy analysis, the graduation data of the students of the Harapan Bersama Tegal Polytechnic using the Decision Tree with the Genetic Algorithm Application to predict student graduation. The resulting model can determine the best method in predicting student graduation.

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