



## Implementation of Decision Tree Algorithm for Student Interest Analysis Based on Subjects at MTs Aisyiyah Binjai

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### Abstract

Education plays a vital role in improving the quality of human resources, where students' interest in learning subjects is one of the key factors influencing academic achievement. However, not all students show the same level of interest in every subject, which affects their motivation and performance. This study aims to analyze students' subject preferences at MTs Aisyiyah Binjai using the Decision Tree algorithm. The method was chosen for its ability to process complex academic data, discover hidden patterns, and identify influential factors in determining students' interests. The results are implemented into a web-based system that allows schools to flexibly monitor and evaluate students' learning interests. This research is expected to assist schools in developing more effective learning strategies, enhancing students' motivation, and supporting better academic achievement.

**Keywords:** Learning Interest, MTs Aisyiyah Binjai, Decision Tree, Data Analysis, Web-based System

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### 1. Introduction

Education is one of the main factors in improving the quality of human resources. The success of education is not only determined by the curriculum and teachers, but also by students' interest in learning subjects. Learning interest plays a crucial role in fostering motivation, enhancing comprehension, and supporting academic achievement. Students who show high interest in a subject tend to be more active, easily grasp the material, and achieve better academic results. Conversely, students with low interest often struggle to understand lessons, lack motivation, and experience a decline in performance.

At the junior high school level (MTs or SMP), each subject contributes significantly to developing students' academic abilities and potential. However, in practice, students' interest in each subject is not always evident. For example, in mathematics, students are expected to be active, creative, independent, and collaborative. In reality, many perceive mathematics as a difficult subject, leading them to become passive and less interested in learning [1]. Therefore, it is necessary to conduct an analysis that can predict students' subject preferences based on their academic data.

Learning interest is essential in the learning process, as it serves as one of the key aspects for achieving optimal learning outcomes. When students are interested, they tend to engage in learning activities with enthusiasm and positive attitudes, especially in subjects they truly enjoy [2]. Analyzing students' interests is also important for schools, since the success of teaching and learning depends greatly on students' motivation. When students are genuinely interested, they are more likely to follow lessons attentively and participate actively [1]. MTs Aisyiyah Binjai was chosen as the research site because the school faces similar challenges, where many students' learning interests are not clearly visible. An analysis of subject preferences can help the school identify the most suitable subjects for each student. With this knowledge, the school can take strategic measures, such as improving learning processes for less-preferred subjects or optimizing teaching methods in subjects that require greater focus, such as mathematics.

The Decision Tree algorithm was selected due to its ability to process complex and diverse data without requiring normalization or complicated transformations. Moreover, it can reveal the most influential factors in decision-making [3]. Decision Tree is also effective in exploring data, uncovering hidden patterns, and supporting data-driven decision-making [4]. Another strength of this method lies in its ability to filter and ignore irrelevant information, since samples are generally tested based on specific criteria or classes [5]. This study applies Decision Tree analysis within a web-based system. A website platform was chosen for its accessibility and flexibility, as it allows the school to access the system without special installation while enabling administrators to monitor and evaluate students' learning interests more quickly and efficiently.

The purpose of this research is to provide predictions of students' subject preferences, helping the school to identify which subjects align with each student's interests. The findings are expected to serve as valuable input for schools in designing more effective learning strategies, addressing less-preferred subjects, enhancing student motivation, and ultimately improving academic achievement.

## 2. Literature Review

### 2.1. Data Mining

Data mining is the process of obtaining useful information from large databases [6]. It is a series of processes aimed at generating valuable insights by extracting and identifying patterns contained within a database. Data mining is the process of extracting information or knowledge contained within Knowledge Discovery in Databases (KDD). There are several stages involved in analyzing data, which include Database, Data Cleaning, Data Integration, Task-relevant Data, Data Transformation, Data Mining, Pattern Evaluation, and Knowledge [7].

### 2.2. Knowledge Discovery in Databases (KDD)

Knowledge Discovery in Databases (KDD) is a process of uncovering hidden, potential, and previously unknown information from a collection of data. This process includes the data mining stage, which involves identifying patterns or trends within the data and processing the results appropriately so that they can be transformed into easily understandable information.

The terms *data mining* and *knowledge discovery in databases* (KDD) are often used interchangeably to describe the process of uncovering hidden information within large databases. Although the two have different conceptual meanings, they remain closely related and complement one another [8].

### 2.3. Decision Tree

Decision Tree is a classification method used in data mining to categorize data and solve problems based on existing datasets. It is considered highly effective in addressing classification tasks, as the method is represented in the form of a tree structure consisting of internal nodes, test nodes, leaf nodes, and decision nodes [9].

## 3. Research Methodology

The research methodology applied in this study is as follows:

### 3.1. Research Type

This study employs the Decision Tree C4.5 algorithm with a quantitative research approach, in which the data collected is numerical, derived from students' academic scores. Quantitative research is a type of study that produces findings by applying statistical procedures or analytical techniques. The process begins with the formulation of a theory, followed by research design, subject selection, data collection, data processing, data analysis, and finally drawing conclusions [10].

### 3.2. Research Flow

The research flow is a flowchart that illustrates the steps taken by the researcher to conduct the study, starting from problem identification to report preparation.

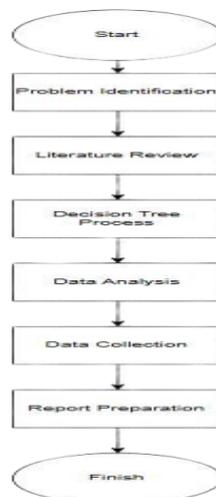


Fig. 1: Research Flowchart

### 3.3. Problem Identification

The research begins with identifying problems related to students' interests based on school subjects.

### 3.4. Literature Review

Conducting a literature review to obtain knowledge and information by collecting references relevant to the research.

### 3.5. Decision Tree Process

Then, the Decision Tree algorithm is applied to the collected data for analysis and calculation.

### 3.6. Data Analysis

Analyzing the data obtained from the Decision Tree by organizing the resulting variables.

### 3.7. Data Collection

Collecting the data generated from the Decision Tree using information obtained from relevant sources.

### 3.8. Report Preparation

Preparing a report based on the findings obtained from the series of research activities conducted.

## 4. Result and Discussion

The following is the result of the implementation in the form of a web-based system, based on student score data obtained from MTs Aisyiyah Binjai.

### 1. Login Form

The form in the image below represents the login interface of the website, where users are required to enter a username and password to access the system.



The image shows a web-based login interface. At the top center is a circular logo with a green border and a yellow sun-like symbol in the center, surrounded by the text 'MTs MA AISYIYAH KOTA BINJAI'. Below the logo, the title 'LOGIN SISTEM' is displayed in a large, bold, black font. Underneath the title, the subtitle 'Analisis Minat Siswa MTs Aisyiyah Binjai' is shown in a smaller, grey font. The form consists of two input fields: 'Username' and 'Password'. The 'Username' field has a placeholder text 'Masukkan username' and a small user icon on the left. The 'Password' field has a placeholder text 'Masukkan password', a small lock icon on the left, and a small eye icon on the right to toggle visibility. Below these fields is a large, grey 'Login' button.

Fig. 2: Login Form

### 2. Dashboard Page

The dashboard page serves as the main interface of the student interest analysis website. On this page, the total number of students, classes, and subjects to be analyzed are displayed. The image below shows the appearance of the dashboard page.

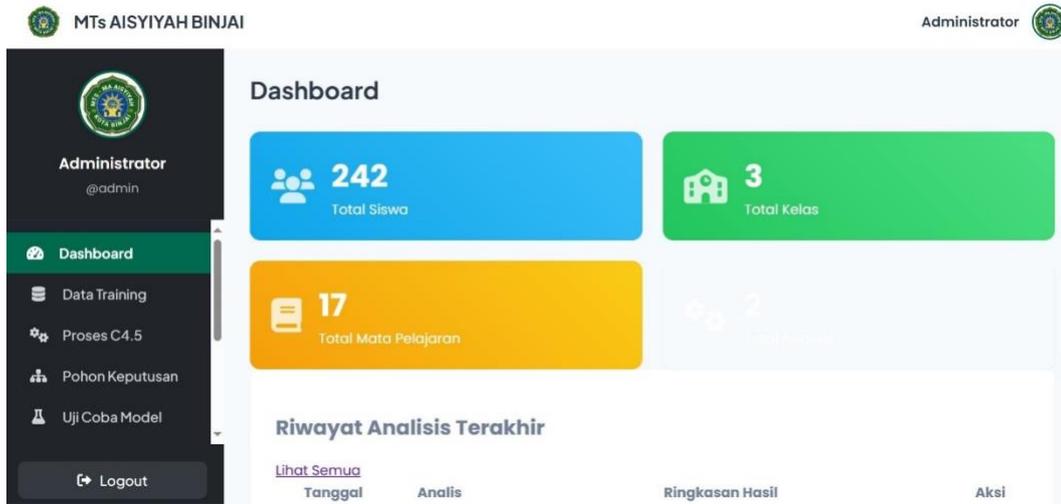


Fig. 3: Interface of Dashboard Page

3. Training Data Form

The training data form contains student information and functions as a platform to add new student records, as well as to edit, view, and delete existing data. The image below shows the interface of the training data form.

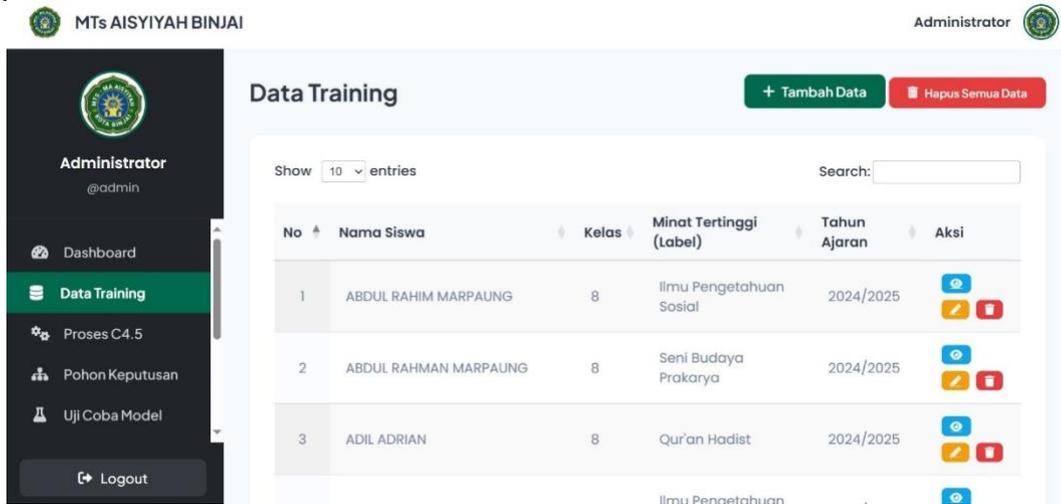


Fig. 4: Interface of Training Data Form

When clicking the "Tambah Data" button, the user is directed to two options: importing data from a file or entering it manually. In the training data import option, data can be uploaded using an Excel file. The image below shows the interface of the training data import form.

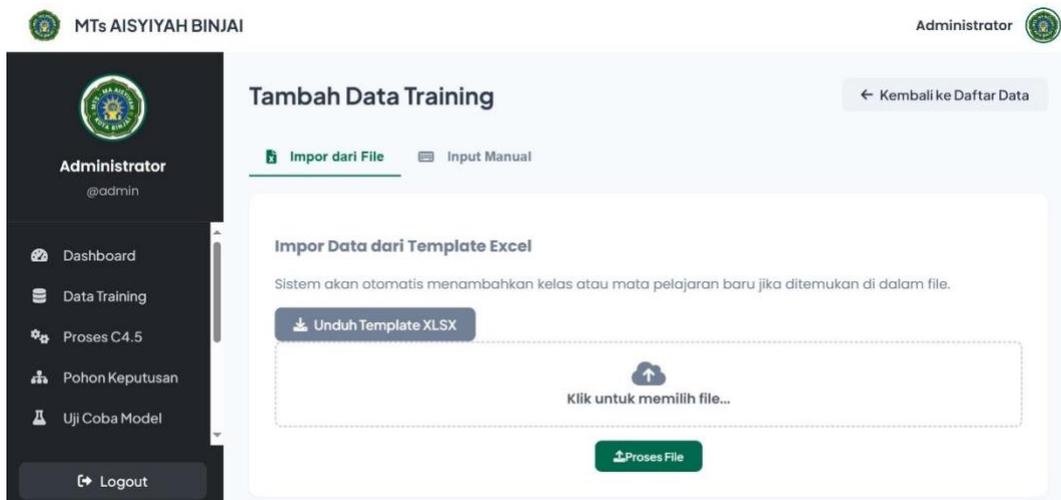


Fig. 5: Interface of Training Data Import from File

When clicking the "Tambah Data" button, the user is directed to two options: importing data from a file or entering it manually. In the manual training data input form, users can enter the student's name, gender, class, subject scores, academic year, and the highest interest score. The image below shows the interface of the manual training data input form

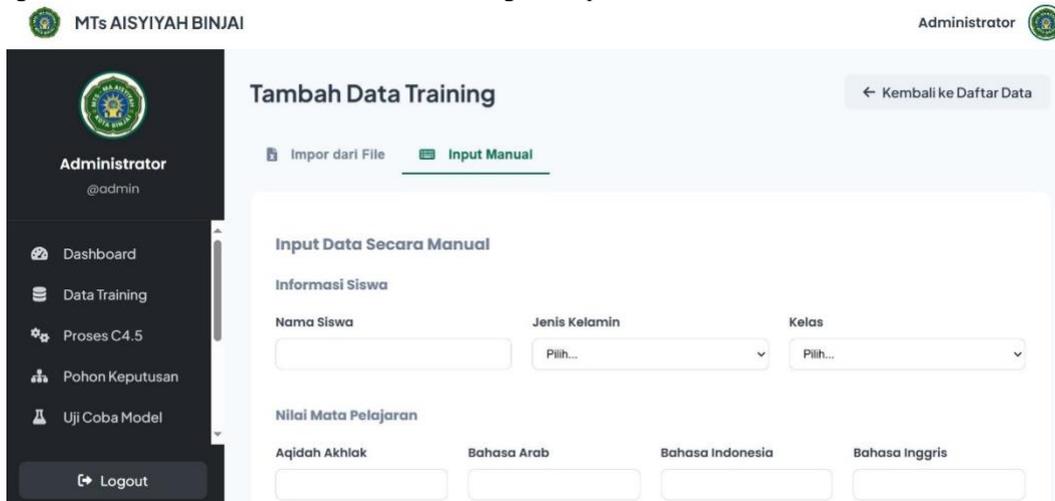


Fig. 6: Interface of Manual Training Data Input

4. Decision Tree C4.5 Process Form

In the C4.5 process form, preprocessing is carried out to select the attributes, which consist of the subjects to be processed using the Decision Tree C4.5 algorithm. The image below shows the interface of the C4.5 process form.

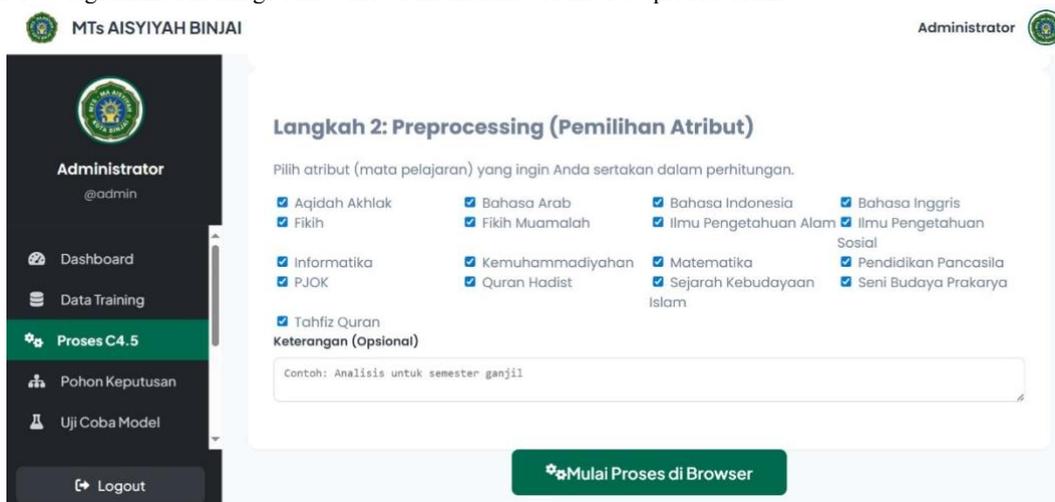


Fig. 7: Interface of the Decision Tree C4.5 Process Form

5. Decision Tree Form

In the decision tree form, users can create a new analysis, as well as view and delete previously conducted analyses. The decision tree is generated from the earlier C4.5 process form. The image below shows the interface of the decision tree form.

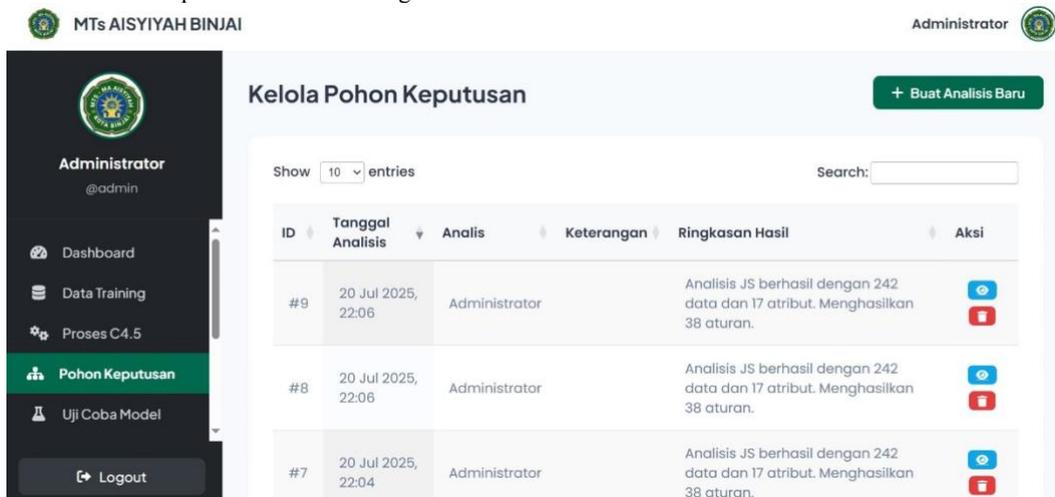


Fig. 8: Interface of the Decision Tree Management Form

6. Model Trial Form

In the model trial form, the results of the previous testing stage are displayed to evaluate and compare the alignment of students' interests based on their highest scores with the results generated by the system. Users can test either a single data entry or the entire dataset. The image below shows the prediction result from testing a single data entry.

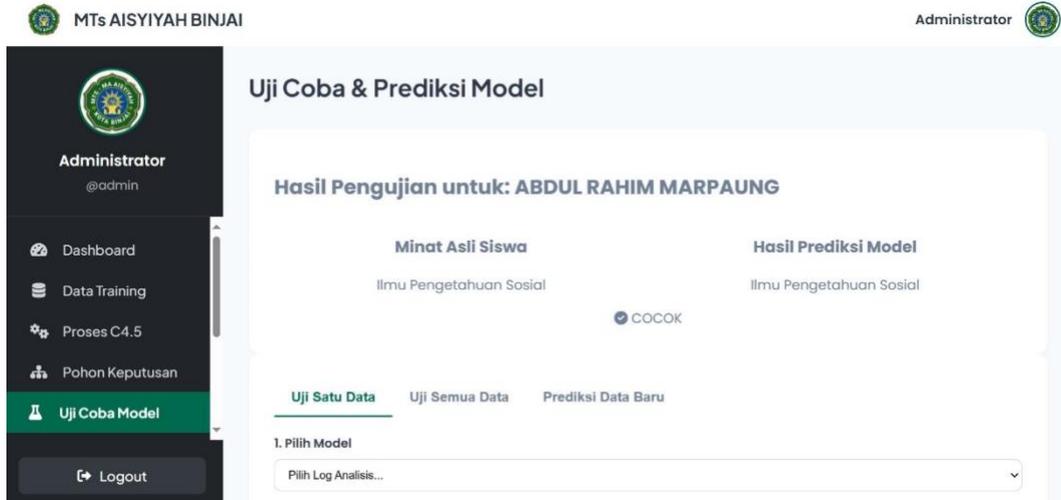


Fig. 9: Interface of Single Data Testing and Model Prediction

The image below shows the trial of the entire dataset, which includes a summary of the results and the accuracy percentage based on the data that has been entered.

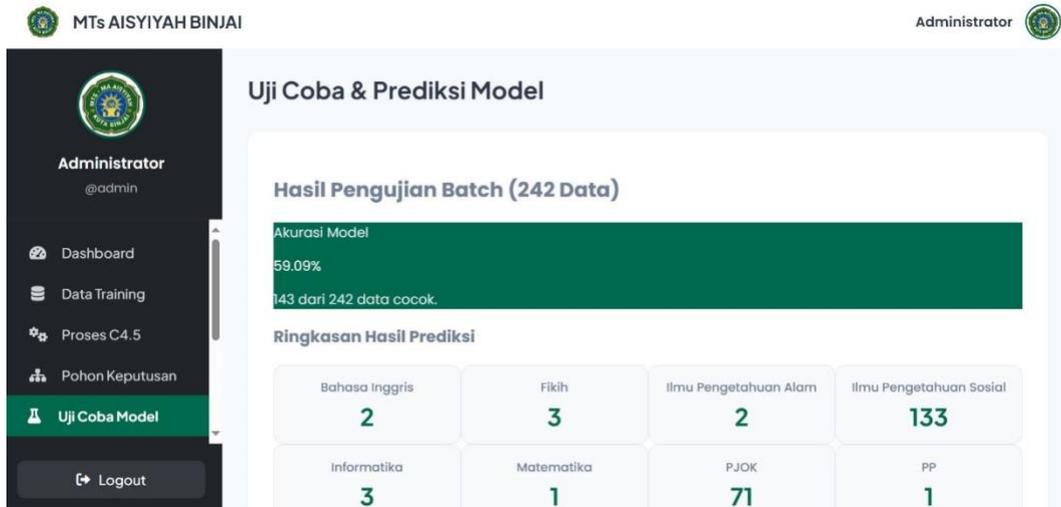


Fig. 10: Interface of All Data Testing Results and Model Prediction 1

The image below presents the results of the alignment between students' interests, based on their highest scores, and the predictions generated by the Decision Tree C4.5 system.

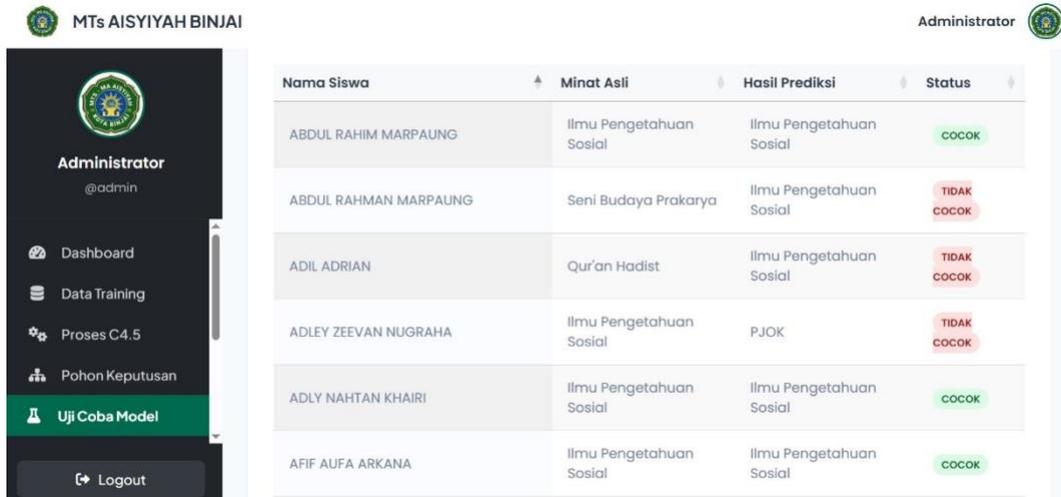


Fig. 11: Interface of All Data Testing Results and Model Prediction 2

## 5. Conclusion

The results of this study demonstrate the compatibility of each student's interest with the subjects analyzed. The developed website presents these outcomes in the form of a model that predicts students' subject preferences based on their academic performance. While the system provides useful insights, it would benefit from using more accurate target attributes to produce improved results. Furthermore, the overall structure of the system should be designed to be more intuitive and easier to understand, ensuring that it can be effectively utilized by both educators and students.

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## References

- [1] Y. Hulu and Y. N. Telaumbanua, "Analisis Minat Dan Hasil Belajar Siswa Menggunakan Model Pembelajaran Discovery Learning," *Educ J Pendidik*, vol. 1, no. 1, pp. 283–290, 2022, doi: 10.56248/educativo.v1i1.39.
- [2] S. Pada, M. Pelajaran, N. Hikmah, M. I. Haliq, and E. Ekasari, "Pengaruh Minat Belajar Dan Teman Sebaya Terhadap Hasil Belajar," vol. 6, no. 1, pp. 1248–1254, 2022.
- [3] Z. Nurizati, A. Hidayat, D. Vernanda, and T. Hendriawan, "Analisis Kelayakan Penurunan UKT Pada Mahasiswa dengan Menggunakan Metode Decision Tree," *J Tekno Kompak*, vol. 18, no. 1, p. 90, 2024, doi: 10.33365/jtk.v18i1.3419.
- [4] R. Robianto, S. H. Sitorus, and U. Ristian, "Penerapan Metode Decision Tree Untuk Mengklasifikasikan Mutu Buah Jeruk Berdasarkan Fitur Warna Dan Ukuran," *Coding J Komput dan Apl*, vol. 9, no. 01, p. 76, 2021, doi: 10.26418/coding.v9i01.45907.
- [5] A. I. Rizmayanti, N. Hidayati, F. S. Nugraha, and W. Gata, "Penerapan Data Mining Untuk Memprediksi Kompetensi Siswa Menggunakan Metode Decision Tree ( Studi Kasus Smk Multicomp Depok )," *Swabumi*, vol. 9, no. 1, pp. 9–18, 2021, doi: 10.31294/swabumi.v9i1.8363.
- [6] R. Rahmadini, Enjel Erika LorencisLubis, Aji Priansyah, Yolanda R.W.N, and Tuti Meutia, "Penerapan Data Mining Untuk Memprediksi Harga Bahan Pangan Di Indonesia Menggunakan Algoritma K-Nearest Neighbor," *J Mhs Akunt Samudra*, vol. 4, no. 4, pp. 223–235, 2023, doi: 10.33059/jmas.v4i4.7074.
- [7] M. A. Abdillah, A. Setyanto, and S. Sudarmawan, "Implementasi Decision Tree Algoritma C4.5 Untuk Memprediksi Kesuksesan Pendidikan Karakter," *Respati*, vol. 15, no. 2, p. 59, 2020, doi: 10.35842/jtir.v15i2.349.
- [8] I. Y. Yudo Bismo Utomo, Iin Kurniasari, "Penerapan Knowledge Discovery in Database," *J Tek Inform Kaputama*, vol. 7, no. 1, 2023.
- [9] M. A. R. Siregar, *Implementasi machine learning dengan metode algoritma decision tree c4. 5 untuk pemilihan bandwidth internet wifi rumahan*. 2022. [Online]. Available: [https://repository.uinjkt.ac.id/dspace/handle/123456789/65304%0Ahttps://repository.uinjkt.ac.id/dspace/bitstream/123456789/65304/1/MUHAMMAD AMMARIDHO R. S.-FST.pdf](https://repository.uinjkt.ac.id/dspace/handle/123456789/65304%0Ahttps://repository.uinjkt.ac.id/dspace/bitstream/123456789/65304/1/MUHAMMAD%20AMMARIDHO%20R.%20S.-FST.pdf)
- [10] M. M. Ali, T. Hariyati, M. Y. Pratiwi, and S. Afifah, "Metodologi Penelitian Kuantitatif Dan Penerapan Nya Dalam Penelitian," vol. 2, no. 2, 2022.