Application of Data Mining in Analyzing the Effect of Parent's Employment and Education Level on Student Behavior Using the A PRIORI Method (Case Study: SDN 024769 Binjai)

Suha Baby Mayaza[1], Relita Buaton[2], Suci Ramadani[3]

[1,2,3] *Sistem Informasi, STMIK Kaputama*
mayazasuha6@gmail.com[1]; bbcbuaton@gmail.com[2]; suci.ramadani23@gmail.com[3]

Abstract

Behavior is a person's reaction to a stimulus that comes from the external environment. Parents are one of the main factors in the formation of children's behavior. This study aims to find out the effect of parents' work and education on student behavior. By using RapidMiner in testing 234 SDN 024769 Binjai student data, using the Apriori method and setting a minimum support value of 8% and 70% confidence, 1207 rules were obtained in the entire set and 2 rules in 9 itemsets. And the best rule with the highest value is obtained, if the father's job is self-employed, the mother's job is self-employed, the father's last education is high school, the mother's last education is high school, the time the father spends working is more than 8 hours per day, the time the mother spends working is more than 8 hours per day, the time the father spends on family is every day, and the time the mother spends on family is every day then the student has good behavior at school, with a support value of 8.5% and a certainty value of 95.2%.

Keywords: *Apriori; Behaviour; Data Mining; Education; Job*

1. Introduction

Human behavior is all human activities or activities, both those that can be observed directly and those that cannot be observed from the outside. According to Skinner, behavior is a person's response or reaction to an external stimulus. [1]. Parents are the main factor in shaping children's behavior, because parents are the main and first teachers or educators for their children in growing and developing children's behavior. The higher the attention given, the higher the child's character education. [2]. Nowadays, busy working parents have less time with their children, and parents have difficulty in balancing the demands of work and family, which has an impact on their relationship with their family. Parents are the first educators because the education provided by parents is basic and determines the child's further development. The higher the education possessed by parents, the more it will expand and complement their thinking patterns in educating children.[3]. Based on the description above, it is necessary to conduct research on the effect of employment and parents' education level on the behavior of students at SDN 024769 Binjai. This is based on observations that have been made that some students appear to have poor behavior towards teachers and friends, thus making several teachers complain about this. In addition, it can be seen that in the community there are often many who say that parents can influence the behavior of the child because they think that parents are responsible for their children's behavior. By knowing the influence between parents' occupation and education level on student behavior, it is hoped that it can help schools and teachers to find the right treatment in dealing with children's behavior.

2. Research Methods

2.1. Data Mining

Data mining is the step of analyzing a set of data that is generally large in size to get the relationship between the data and summarize it in a form that is easy to understand and use[4]. The resulting relationships and summaries are generally in the form of models or patterns. The process in data mining uses statistical, mathematical, artificial intelligence and machine learning techniques to extract and identify useful information and related knowledge from various related databases[5]. So the main purpose of data mining is to find and explore knowledge and existing data or information.

2.2. Apriori Algorithm

The apriori algorithm is used to find frequent Itemset that meets the minimum support then get a rule that meets the minimum Confidence of the frequent Itemset. The apriori algorithm determines candidates that may appear by paying attention to the minimum support and minimum Confidence. [6].

The Support value is the percentage of combinations of these items in the database and the Confidence value is the strength of the relationship between items in the associative rules formed by the association method in data mining [7]. The formula for finding the support value is as follows:

$$Support\ (\ A,\ B\ ) = P\ (\ A \cap B\ ) = \frac{\sum \text{Transaction contains A and B}}{\sum Total\ Transactions} \times 100\% \tag{1}$$

The formula for finding the confidence value is as follows:

$$Confidence = P\ (\ B\ |\ A\ ) = \frac{\sum \text{Transaction contains A and B}}{\sum Total\ Transaction\ contain\ A} \times 100\%. \tag{2}$$

2.3. Stage of the Apriori Method

1. Forming itemset candidates, k-itemset candidates are formed from a combination of (k-1)- Itemsets obtained from the previous iteration. One feature of the Apriori algorithm is the pruning of k-itemset candidates whose subsets contain k-1 items not included in high-frequency patterns of length
2. Calculate the support of each candidate k-itemset. The support of each candidate k-itemset is obtained by scanning the database to count the number of transactions that contain all items in the candidate k-itemset. This is also a feature of the a priori algorithm where it is necessary to scan the entire database for the longest k-itemset
3. Assigning high-frequency patterns. A high-frequency pattern containing k items or k-itemset is assigned from the k-itemset candidates whose support is greater than the minimum support.
4. If there is no new high-frequency pattern, the whole process is stopped. Otherwise, k is increased by one and we return to part one. [8].

3. Results And Discussion

3.1. Research Methodology

Research Methodology is part of a research report that explains the approaches and methods used in carrying out research.
The research methodology used in this study is:

1. Research Preparation
    At this stage the author determines the background of the problem, creates problem boundaries so that this research remains focused on research that will help the author in the next stage.
2. Formulate Problem and Objectives
    The author will formulate what problems and objectives are in accordance with the background in order to produce results that are in accordance with what is expected and can be useful for users.
3. Data Collecting
    Data collection carried out in this study is by direct observation, literature study, namely understanding the literature in the form of books, journals, and other references related to related issues, as well as by distributing questionnaires to teachers and parents of grade I to grade VI students at SDN 024769 Binjai about work and parental education and student behavior at school.
4. Data Processing
    At this stage, the data that has been collected will be processed to find correlations using the apriori algorithm using Rapid Miner software.
5. Conclusion
    At the final stage, a conclusion will be obtained in the form of a statement containing the results of this research.

3.2. Supporting Research Data

Supporting data for the research used are data on employment and parental education on student behavior obtained from students of SDN 024769 Binjai by distributing questionnaires. The data obtained can be seen as in table 1 below.

Table 1: Student's Data

NO	Father's job	Mother's Job	Father's Education	Mother's Education	Father's Working Time	Mother's Working Time	Father's Time with Family	Mother's Time with Family	Student's Behavior
1	Employee	Housewife	Higher Education (Diploma, Bachelor, Master, Doctorate)	Senior High School/Vocational School	>8hours	0	Everyday	Everyday	Excellent
2	Self-employed	Housewife	Senior High School/Vocational School	Senior High School/Vocational School	>8hours	0	Everyday	Everyday	Excellent
3	TNI	Housewife	Senior High School/Vocational School	Higher Education (Diploma, Bachelor, Master, Doctorate)	>8hours	0	Everyday	Everyday	Excellent
4	Employee	Employee	Higher Education (Diploma, Bachelor, Master, Doctorate)	Higher Education (Diploma, Bachelor, Master, Doctorate)	8 Hours	8 Hours	4x/week	Everyday	Excellent
5	Self-employed	Self-employed	Senior High School/Vocational School	Senior High School/Vocational School	8 Hours	8 Hours	4x/week	Everyday	Good
6	Self-employed	Self-employed	Senior High School/Vocational School	Senior High School/Vocational School	8 Hours	8 Hours	4x/week	4x/week	Good Enough
7	Self-employed	Teacher	Senior High School/Vocational School	Higher Education (Diploma, Bachelor, Master, Doctorate)	>8 Hours	8 Hours	2x/week	Everyday	Excellent
8	Employee	Housewife	Higher Education (Diploma, Bachelor, Master, Doctorate)	Senior High School/Vocational School	>8hours	0	Everyday	Everyday	Excellent
9	Employee	Self-employed	Senior High School/Vocational School	Senior High School/Vocational School	>8 Hours	8 Hours	2x/week	Everyday	Good
10	Self-employed	Self-employed	Senior High School/Vocational School	Senior High School/Vocational School	8 Hours	6 Hours	Everyday	Everyday	Good Enough
11	Labor	Housewife	Junior High School	Senior High School/Vocational School	6 Hours	0	4x/week	Everyday	Excellent
12	Self-employed	Self-employed	Senior High School/Vocational School	Senior High School/Vocational School	8 Hours	8 Hours	4x/week	Everyday	Good
13	Self-employed	Housewife	Senior High School/Vocational School	Higher Education (Diploma, Bachelor, Master, Doctorate)	>8 Hours	0	4x/week	Everyday	Good
14	CIVIL SERVANT	Housewife	Higher Education (Diploma,	Higher Education (Diploma,	8 Hours	0	Everyday	Everyday	Good Enough

15	Self-employed	Housewife	Bachelor, Master, Doctorate) Senior High School/ Vocational School	Bachelor, Master, Doctorate) Junior High School	8 Hours	0	Everyday	Everyday	Good Enough
16	Self-employed	Self-employed	Senior High School/ Vocational School	Senior High School/ Vocational School	8 Hours	8 Hours	4x/week	Everyday	Good Enough
17	Self-employed	Housewife	Senior High School/ Vocational School	Primary School	>8 Hours	0	Everyday	Everyday	Excellent
18	CIVIL SERVANT	Housewife	Higher Education (Diploma, Bachelor, Master, Doctorate)	Senior High School/ Vocational School	8 Hours	0	Everyday	Everyday	Good Enough
19	Labor	Housewife	Senior High School/ Vocational School	Senior High School/ Vocational School	>8 Hours	0	Everyday	Everyday	Good
20	Employee	Housewife	Higher Education (Diploma, Bachelor, Master, Doctorate)	Senior High School/ Vocational School	>8hours	0	Everyday	Everyday	Good

3.3. Method Implementation

This research uses the a priori method as a problem solving method, namely to analyze the effect of parental employment and education on student behavior at SDN 024769 Binjai. The process of the associative method with the apriori algorithm is as in the figure 1 below:
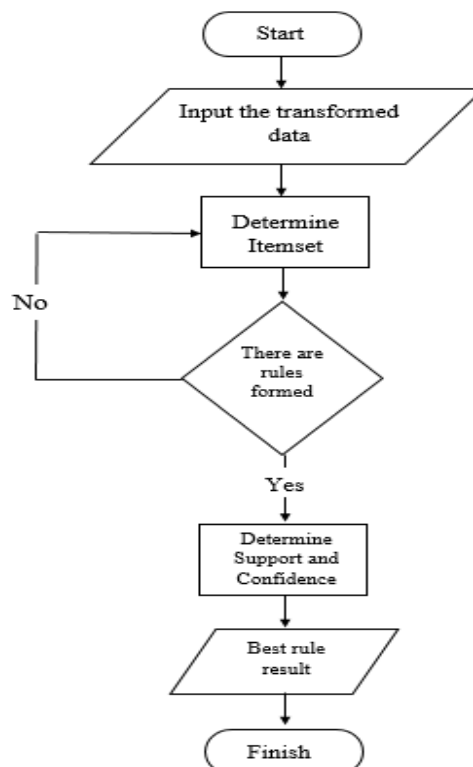
Figure 1: A Priori's Flowchart

Description as follows:
1. Start
2. Data input is entering data that has been transformed.
3. Determine the itemsets that may be formed.
4. If there is a rule formed, then calculate and determine the support and Confidence values, otherwise determine the Itemset again.
5. After getting the best rule results, then finish.

For manual calculations there are several steps of the a priori method, namely as follows:
1. High Frequency Pattern Analysis
   At this stage look for combinations of items that meet the minimum requirements of the support value in the database.
2. Establishment of Association Rules
   After all the high frequencies are found, then look for association rules that meet Confidence by calculating associative rules.
   To analyze the effect of employment and parents' education level on student behavior at SD Negeri 024769 Binjai, the author took 20 student data, which will be described as in table 2 below:

Table 2: Representation of Data

No	Variable	Sub Variable	Code
1.	Father's Job	1. Civil Servants / Military	P
		2. Teacher	G
		3. Self-employed	W
		4. Employee	K
		5. Laborer	B
		6. Not Employed	TB
2.	Mother's Job	1. Civil Servants / Military	P1
		2. Teacher	G1
		3. Self-employed	W1
		4. Employee	K1
		5. Laborer	B1
		6. Housewife	I
3.	Father's Education	1. Primary School	G0
		2. Junior High School	G2
		3. Senior High School/ Vocational School	G3
		4. Higher Education (Diploma, Bachelor, Master, Doctorate)	G4
4.	Mother's Education	1. Primary School	G5
		2. Junior High School	G6
		3. Senior High School/ Vocational School	G7
		4. Higher Education (Diploma, Bachelor, Master, Doctorate)	G8
5.	Father's Working Time	1. 6 Hours	6J
		2. 7 Hours	7J
		3. 8 Hours	8J
		4. >8 Hours	9J
		5. 0	N1
6.	Mother's Working Time	1. 6 Hours	J6
		2. 7 Hours	J7
		3. 8 Hours	J8
		4. >8 Hours	J9
		5. 0	N
7.	Father's Time with Family	1. 2x / week	2M
		2. 4x / week	4M
		3. Everyday	SH
8.	Mother's Time with Family	1. 2x / week	M2
		2. 4x / week	M4
		3. Everyday	S
9.	Student's Behavior	1. Excellent	SB
		2. Good	BK
		3. Good Enough	C
		4. Not Good	KB

From the data above, data transformation is carried out and a data matrix is formed to determine the number of items that appear in the data. The matrix form of the data above is as in the table 3 below:

Table 3: Transformation of Student Data

No	Father's Job						Mother's Job						Father's Education				Mother's Education				Father's Working Time					Mother's Working Time					Father's Time with Family			Mother's Time with Family			Student's Behaviour			
	P	G	W	K	B	TB	P1	G1	W1	K1	B1	I	G0	G2	G3	G4	G5	G6	G7	G8	6J	7J	8J	9J	N1	J6	J7	J8	J9	N	2M	4M	SH	M2	M4	S	SB	BK	C	K
1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0
2	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0
3	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0
4	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	1	0	0	0
5	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0
6	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0
7	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0
8	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0
9	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0
10	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1	0
11	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0
12	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0
13	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0
14	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0
15	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0
16	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0
17	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0
18	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0
19	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0
20	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0
=	3	0	10	5	2	0	0	1	6	1	0	12	0	1	13	6	1	1	12	6	1	0	9	10	0	1	0	7	0	12	2	7	11	0	1	19	8	6	6	0

3. Determine θ (Frequent)
   Suppose we determine θ = 2, then we can determine the frequent Itemset. From the table above, it is known that the total θ for data k > 1, there are some that are greater than θ.
4. Determine the *Item* Set
   Then F1 for the student data table whose value is greater than θ is P, W, K, B, W1, I, G3, G4, G7, G8, 8J, 9J, J8, N, 2M, 4M, SH, S, SB, BK, C while items such as G, TB, P1, G1, K1, B1, G0, G2, G5, G6, 6J, 7J, N1, J6, J7, J9, M2, M4 and K are not included because they only appear <2 data.
5. Test Set θ
   To determine the relationship or correlation between items, it is determined by 2 factors, namely support and Confidence, which are obtained by the following formula:

   Support = Support Value

$$Support = \frac{\sum items\ used}{\sum sum\ of\ all\ transactions} \times 100\%$$ (3)

   Confidence = Certainty Value

$$Confidence = \frac{\sum items\ used\ at\ once}{\sum Number\ of\ transactions\ in\ the\ antecent\ section} \times 100\%$$ (4)

Rule for 9 Itemset consists of 2 rules which are implemented in the table 4 below:

Table 4: Association Rule 9 Itemset

If antecendent then consequent	Support	Confidence
If data W W1 G3 G7 8J J8 4M S → BK	2/20 * 100% = 10%	2/2 * 100% = 100%
If data K I G4 G7 9J N SH S → SB	2/20 * 100% = 10%	2/3 * 100% = 66,7%

And after obtaining the Support and Confidence values, multiplication between Support and Confidence is carried out, which are implemented in the table 5 below:

Table 5: Association Rule 9 Itemset S*C value

If antecendent then consequent	Support	Confidence	S*C
If data W W1 G3 G7 8J J8 4M S → BK	10%	100%	10%
If data K I G4 G7 9J N SH S → SB	10%	66,7%	6,67%

And after multiplying between Support and Confidence, the Best Rule for 9 Itemset is obtained as in the table 6 below:

Table 6: Best Rule

If antecendent then consequent	Support	Confidence	S*C
If data W W1 G3 G7 8J J8 4M S ➔ BK	10%	100%	10%

If the father's occupation is self-employed, the mother's occupation is self-employed, the father's last education is high school, the mother's last education is high school, the time the father spends working is 8 hours per day, the time the mother spends working is 8 hours per day, the time the father spends with family is 4 times a week, and the time the mother spends with family is every day then the student has good behavior at school with a support value of 10% and a certainty value of 100%.

4. Testing

At the testing stage, researchers did tests on the entire data using the RapidMiner application using a minimum support value of 8% and a minimum confidence value of 70%. The test results can be seen in the figure 2 and figure 3 below:

S...	Support	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9
8	0.085	S	SH	9J	G7	G3	BK	W	W1	
8	0.085	S	SH	9J	G7	G3	BK	W	J9	
8	0.085	S	SH	9J	G7	G3	BK	W1	J9	
8	0.090	S	SH	9J	G7	G3	W	W1	J9	
8	0.132	S	SH	9J	G7	I	N	BK	W	
8	0.085	S	SH	9J	G7	BK	W	W1	J9	
8	0.120	S	SH	9J	G3	I	N	BK	W	
8	0.085	S	SH	9J	G3	BK	W	W1	J9	
8	0.128	S	SH	G7	G3	I	N	BK	W	
8	0.085	S	SH	G7	G3	BK	W	W1	J9	
8	0.124	S	9J	G7	G3	I	N	BK	W	
8	0.085	S	9J	G7	G3	BK	W	W1	J9	
8	0.120	SH	9J	G7	G3	I	N	BK	W	
8	0.085	SH	9J	G7	G3	BK	W	W1	J9	
9	0.120	S	SH	9J	G7	G3	I	N	BK	W
9	0.085	S	SH	9J	G7	G3	BK	W	W1	J9

No. of Sets: 1207
Total Max. Size: 9
Min. Size: 1
Max. Size: 9
Contains Item:
Update View

Figure 2: Test results on rapidminer

No.	Premises ↓	Conclusion	Support	Confidence
9884	S, SH, G7, I	N	0.278	0.985
8246	S, SH, G7, G3, W1, J9	BK	0.085	0.952
8606	S, SH, G7, G3, W1, J9	9J, BK	0.085	0.952
8698	S, SH, G7, G3, W1, J9	BK, W	0.085	0.952
8874	S, SH, G7, G3, W1, J9	9J, BK, W	0.085	0.952
11893	S, SH, G7, G3, W1, J9	9J	0.090	1
12101	S, SH, G7, G3, W1, J9	W	0.090	1
12613	S, SH, G7, G3, W1, J9	9J, W	0.090	1
3299	S, SH, G7, G3, W1	BK, W	0.107	0.806
4266	S, SH, G7, G3, W1	BK	0.111	0.839
6186	S, SH, G7, G3, W1	W	0.120	0.903

Figure 3: Test results with support and confidence values

From this figure, the formation of association rules or rules generated with the provisions of a minimum support value of 8% and a minimum confidence value of 70% is 1207 rules. One of the rules that has the highest confidence value is, if the data is W, W1, G3, G7, 9J, J9, SH, S then BK. Which means if the father's job is self-employed, the mother's job is self-employed, the father's last education is high school, the mother's last education is high school, the time the father spends working is more than 8 hours per day, the time the mother spends working is more than 8 hours per day, the time the father spends on family is every day, and the time the mother spends on family is every day then the student has good behavior at school.

5. Conclusions

As for some conclusions that the author can provide from writing this thesis research, among others, are as follows.
1. The a priori algorithm method can be used to analyze the influence between the occupation and education level of parents on student behavior.
2. From the results of tests conducted using the RapidMiner application with data on 234 SDN 024769 Binjai student data, with the provisions of a minimum support value of 8% and a minimum confidence of 70% resulting in 2 association rules of 9 itemsets.
3. From the results of tests carried out using the RapidMiner application with data 234 SDN 024769 Binjai student data, producing the best rule if the data is W, W1, G3, G7, 9J, J9, SH, S then BK. That is, if the father's occupation is self-employed, the mother's occupation is self-employed, the father's last education is high school, the mother's last education is high school, the time the father spends working is more than 8 hours per day, the time the mother spends working is more than 8 hours per day, the time the father spends on the family is every day, and the time the mother spends on the family is every day then the student has good behavior at school, with a support value of 8.5% and a certainty value of 95.2%.
4. The less frequent value is set, the more data can be processed, and the less the minimum support and confidence values are determined, the more rule results will be obtained.

References

[1] W. C. Rachmawati, "Promosi kesehatan dan ilmu perilaku," *Wineka media*, 2019.
[2] L. Suryani and F. A. Setiawati, "Peran dan kualitas perkawinan orang tua terhadap perilaku anak usia dini," *J. Obs. J. Pendidik. Anak Usia Dini*, vol. 6, no. 2, pp. 977–988, 2021.
[3] F. A. Alam, "Pengaruh Tingkat Pendidikan Dan Perhatian Orang Tua Terhadap Kedisiplinan Belajar Siswa Di SMP Negeri 3 Barru," *J. Bimbing. Dan Konseling*, vol. 7, no. 1, pp. 1–11, 2020.
[4] N. N. Nurliani, "DATA MINING KORELASI PENGGUNA NARKOBA DENGAN JENIS NARKOBA YANG DI GUNAKAN DENGAN METODE APRIORI PADA BNN KOTA BINJAI," in *Seminar Nasional Informatika (SENATIKA)*, 2022, vol. 6, no. 3, pp. 416–426.
[5] Y. Mardi, "Data Mining: Klasifikasi Menggunakan Algoritma C4. 5," *J. Edik Inform. Penelit. Bid. Komput. Sains dan Pendidik. Inform.*, vol. 2, no. 2, pp. 213–219, 2017.
[6] N. Adha, L. T. Sianturi, and E. R. Siagian, "Implementasi Data Mining Penjualan Sabun Dengan Menggunakan Metode Apriori (Studi Kasus: PT. Unilever)," *Inf. dan Teknol. Ilm.*, vol. 4, no. 3, 2017.
[7] A. W. O. Gama, I. K. G. D. Putra, and I. P. A. Bayupati, "Implementasi Algoritma Apriori Untuk Menemukan Frequent Itemset Dalam Keranjang Belanja," *Maj. Ilm. Teknol. Elektro*, vol. 15, no. 2, pp. 21–26, 2016.
[8] A. Wijayanti, "Analisis Hasil Implementasi Data Mining Menggunakan Algoritma Apriori pada Apotek," *J. Edukasi dan Penelit. Inform.*, vol. 3, no. 1, 2017.