



Application of the Apriori Algorithm to Analyze the Correlation of Underage Marriage Factors

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Abstract

This study aims to analyze the correlation between various factors contributing to underage marriage in Kota Binjai. The primary variables influencing underage marriage include economic, social, cultural, parental, and educational factors. These five variables are considered significant in the prevalence of underage marriage within the Kota Binjai community. The methodology employed involves data mining techniques using the Apriori algorithm to identify the most frequently occurring data correlations. The analysis reveals that the best rule with 2 itemsets has a support of 42.7% and a confidence of 69.6%, while the best rule with 3 itemsets has a support of 26.7% and a confidence of 71.4%. For 4 itemsets, the support is 12% with a confidence of 50%. These findings indicate that economic factors are the most frequently appearing and consistently influential in the decision of Kota Binjai residents to engage in underage marriage, both independently and in combination with social, cultural, and parental influence factors.

Keywords: Data Mining, Apriori Algorithm, Underage Marriage, Association Rules, Correlation Analysis.

1. Introduction

Underage marriage is a complex issue affecting many countries around the world. Although the factors contributing to it vary, its negative impacts on individual and societal well-being necessitate global attention. By adopting a holistic approach and employing analytical tools such as the Apriori method, progress can be made in reducing the detrimental effects of early marriage and in creating a safer and better environment for children globally. The age of marriage regulated by Law No. 16 of 2019 is set at 19 years for both men and women. As stipulated in Article 7, paragraph (1) of Law No. 16 of 2019, which amends Law No. 1 of 1974 concerning Marriage, "Marriage is only permitted if both parties have reached the age of 19 years." Thus, marriage is not merely a biological relationship but a lifelong commitment, necessitating maturity that encompasses both psychological and sociological development. The optimal marriage age is considered to be 19 or older. The provision allowing marriage at 16 years for females is in stark contrast to the rights of children as enshrined in the 1945 Constitution. According to census data from Binjai City, the percentage of marriages occurring at age 19 and older in 2020 was 54.02% for men and 53.82% for women. This is based on a total of 305 general marriages recorded (Statistics Indonesia, Binjai City, 2020).

In applying the Apriori method, concrete steps include collecting comprehensive data on the demographic, social, economic, and cultural characteristics of the target population, as well as processing the data to prepare it for analysis. Once the data is ready, the Apriori algorithm can be used to identify association patterns between various factors related to child marriage. Based on these results, the author has titled the study "Applying the Apriori Algorithm to Analyze Correlations of Factors Influencing Child Marriage."

2. Research Methods

2.1. Data Mining

Data mining is the process of analyzing large volumes of data to uncover patterns that can be used for decision-making (Buaton et al., 2019). Data mining is a branch of artificial intelligence that focuses on extracting valuable knowledge or information from large datasets. In practice, data mining involves various methods tailored to specific objectives, such as prediction, association, classification, clustering, and estimation. In the context of association methods, several techniques can be employed, one of which is the Apriori method (Ginting et al., 2021).

2.2. Apriori Algorithm

According to research by Lubis et al. (2022), the Apriori algorithm is one of the association rules used in data mining. Data mining analysis has gained popularity due to its application in analyzing shopping cart contents in supermarkets. Association analysis is also

commonly referred to as market basket analysis. The significance of an association rule can be assessed through two parameters: support, which represents the percentage of item combinations in the database, and confidence, which reflects the strength of the relationship between items in the associative rule. The relationship between these two parameters in association rules can be represented in the following syntax:

Syntax: Nody → Head [support, confidence]

The support value for 2 items is obtained using the formula:

$$\text{Support (a n b)} = \frac{\text{Number of transactions containing both } a \text{ and } b}{\text{Total number of transactions}} \times 100\%$$

The confidence value for 2 items is obtained using the formula:

$$\text{Confidence} = \frac{p(b | a)}{\text{Total number of transactions of } a} = \frac{\text{Number of transactions containing both } a \text{ and } b}{\text{Total number of transactions of } a} \times 100\%$$

According to Rahayu et al. (2024), the Apriori algorithm is divided into two stages, which are:

[4] Frequent Itemset Analysis

This stage involves finding item combinations that meet the minimum support value criteria in the database. The support value of an item is obtained using the following formula:

$$\text{Support (A)} = \frac{\sum \text{transaksi Mengandung A}}{\sum \text{transaksi}}$$

Meanwhile, the support value for 2 items is obtained using the following formula:

$$\text{Support (A,B)} = \frac{P(A \text{ and } B)}{P(A)} = \frac{\sum \text{transaksi Mengandung A dan B}}{\sum \text{transaksi}}$$

[5] Association Rule Formation

Once all frequent itemsets are identified, the next step is to find association rules that meet the minimum confidence criteria.

The confidence value of a rule $A \rightarrow B$ items is obtained using the following formula:

$$\text{Confidence} = \frac{P(B|A)}{P(A)} = \frac{\sum \text{transaksi Mengandung A dan B}}{\sum \text{transaksi mengandung A}}$$

3. Results And Discussion

3.1. Supporting Data

The following data is obtained from "Kantor Urusan Agama" in Binjai City :

Tabel 1: Underage Marriage Data

No	Name	Ages	Factors Influencing Underage Marriage	Scale
1	Widya Kartika	16 Years Old	Economics, Social, Parents, Culture	Has an impact
2	Reygal Rizky Sitepu	18 Years Old	Parents, Culture, Education	Has an impact
3	Eliza Hafni Rawi	18 Years Old	Economics, Social, Education	Has an impact
4	Nurica Putriyani	18 Years Old	Parents, Culture, Education	Has an impact
5	Nanang Erdiyanto	18 Years Old	Social, Economics, Culture, Parents	Has an impact
6	Wita Handari	18 Years Old	Education, Economics, Social	Has an impact
7	Intan Purnama Sari	18 Years Old	Education, Parents, Culture	Has an impact
8	Wahyu Hidayat	18 Years Old	Social, Culture, Economics	Has an impact
9	Bella Dwi Rahmika	18 Years Old	Economics, Parents, Culture, Education	Has an impact
10	Ratna Wulandari	17 Years Old	Parents, Social, Economics, Education	Has an impact
11	Ariya Mandala	18 Years Old	Economics, Social, Culture, Parents	Has an impact
12	Miftah Aulia Turah	18 Years Old	Social, Culture, Economics, Education	Has an impact
13	Riza Ananda	18 Years Old	Culture, Economics, Social, Education	Has an impact
14	Maharani Azahri	18 Years Old	Culture, Economics, Social, Education	Has an impact
15	Ari Ramadhan	18 Years Old	Economics, Social, Parents, Education	Has an impact
16	Shelvia Pratiwi	18 Years Old	Culture, Parents, Education	Has an impact
17	Fadiyah	18 Years Old	Economics, Social, Parents	Has an impact
18	M Rizky Ariandi	18 Years Old	Parents, Culture, Social	Has an impact
19	Eriya Wati Br Malau	17 Years Old	Social, Culture, Parents, Education	Has an impact
20	Anggi Amanda	18 Years Old	Economics, Social, Parents, Education	Has an impact
21	Desi Rahmadani	18 Years Old	Economics, Social, Parents	Has an impact
22	Echa Monica	18 Years Old	Economics, Culture, Social	Has an impact
23	Sri Agustina	18 Years Old	Economics, Parents, Education	Has an impact
24	Rafiana Safitri	18 Years Old	Economics, Education, Culture	Has an impact
25	Tasya Utami	17 Years Old	Social, Culture	Has an impact
26	Juliana Syahputri	17 Years Old	Social, Parents, Culture	Has an impact
27	Angga Fahreza	17 Years Old	Social, Education, Parents	Has an impact
28	Tri Susi Handayani	18 Years Old	Culture, Parents, Economics	Has an impact
29	Juliana Febri	18 Years Old	Culture, Education	Has an impact
30	Dika Wardani	18 Years Old	Parents, Education, Social	Has an impact
31	Alfina Adelia	17 Years Old	Economics, Social, Culture	Has an impact
32	Hastri Ningtyas	18 Years Old	Economics, Social, Parents	Has an impact
33	M. Renaldy	18 Years Old	Economics, Social, Education	Has an impact
34	Novi Aprilia	18 Years Old	Economics, Culture, Parents	Has an impact
35	Rizki Ibna Mulazi Lubis	17 Years Old	Social, Culture, Education	Has an impact
36	Cindy Amelia	18 Years Old	Social, Parents, Education	Has an impact
37	Fadhillah	17 Years Old	Culture, Parents, Education	Has an impact
38	Dwika Sari	17 Years Old	Social, Economics, Culture, Parents	Has an impact

No	Name	Ages	Factors Influencing Underage Marriage	Scale
39	Emy Erianda	17 Years Old	Economics, Education, Social, Culture	Has an impact
40	Rizka Amelia	16 Years Old	Social, Parents, Education, Economics	Has an impact
41	Siti Rahayu	18 Years Old	Economics, Culture, Parents, Education	Has an impact
42	Andini	17 Years Old	Social, Culture, Parents, Education	Has an impact
43	Astri Suharningsi	17 Years Old	Economics, Social, Culture, Parents, Education	Has an impact
44	Dina Novita Sari	17 Years Old	Economics, Social, Culture, Parents	Has an impact
45	Novianti	18 Years Old	Social, Economics, Culture	Has an impact
46	Nurdiana	17 Years Old	Culture, Social, Economics	Has an impact
47	Gita Mairani	18 Years Old	Parents, Economics,	Has an impact
48	Destia Ramadhani	18 Years Old	Social, Education, Parents	Has an impact
49	Putri Rahayu	18 Years Old	Economics, Parents, Social	Has an impact
50	Nela Ingkalistiya	18 Years Old	Culture, Parents, Economics	Has an impact
51	Rizka Meilani	18 Years Old	Social, Economics, Culture	Has an impact
52	Halimatussadiyah	18 Years Old	Parents, Social, Culture	Has an impact
53	Regina Utami	18 Years Old	Education, Culture, Parents	Has an impact
54	Sema Rosmalia	17 Years Old	Economics, Social, Culture, Education	Has an impact
55	Sri Mutiara	16 Years Old	Parents, Culture, Education	Has an impact
56	Meilana Br.Sembiring	18 Years Old	Economics, Education, Parents	Has an impact
57	Ade Ardana	18 Years Old	Culture, Education, Economics	Has an impact
58	Lili Halimah	18 Years Old	Economics, Education	Has an impact
59	Rohani Nabila	18 Years Old	Social, Culture, Parents, Economics	Has an impact
60	Anita Syahfitri	18 Years Old	Culture, Education	Has an impact
61	Anggita Rasalia	18 Years Old	Culture, Parents, Education	Has an impact
62	Halimah	17 Years Old	Economics, Parents, Education	Has an impact
63	Rafika	18 Years Old	Economics, Social, Parents	Has an impact
64	Mhd.Dio	17 Years Old	Social, Culture, Education	Has an impact
65	Yunita Amalia	18 Years Old	Culture, Parents, Education	Has an impact
66	Dewi	18 Years Old	Economics, Social, Culture, Education	Has an impact
67	Devika Putri	18 Years Old	Social, Parents	Has an impact
68	Piyah	18 Years Old	Economics, Culture, Parents	Has an impact
69	Epi	17 Years Old	Social, Parents, Education	Has an impact
70	Widya Fatika	18 Years Old	Education, Culture, Parents	Has an impact
71	Dea Rahayu	18 Years Old	Economics, Parents	Has an impact
72	Seli Albani	18 Years Old	Parents, Education	Has an impact
73	Ika Indriana	16 Years Old	Economics, Social, Culture, Parents, Education	Has an impact
74	Rizka Yani	16 Years Old	Culture, Parents, Education	Has an impact
75	Serly Ayu	16 Years Old	Economics, Social, Culture, Education	Has an impact

Table 2 : Marriege Factor

No	Factor	Code
1	Economics	A
2	Social	B
3	Culture	C
4	Parents	D
5	Education	E

And the data that has been formed in tabular form can be shown in Table 3

Table 3: Data Representation

No	A	B	C	D	E
1	1	1	1	1	0
2	0	0	1	1	1
3	1	1	0	0	1
4	0	0	1	1	1
5	1	1	1	1	0
6	1	1	0	0	1
7	0	0	1	1	1
8	1	1	1	0	0
9	1	0	1	1	1
10	1	1	0	1	1
11	1	1	1	1	0
12	1	1	1	0	1
13	1	1	1	0	1
14	1	1	1	0	1
15	1	1	0	1	1
16	0	0	1	1	1
17	1	1	0	1	0
18	0	1	1	1	0
19	0	1	1	1	1
20	1	1	0	1	1
21	1	1	0	1	0
22	1	1	1	0	0
23	1	0	0	1	1
24	1	0	1	0	1
25	0	1	1	0	0
26	0	1	1	1	0

No	A	B	C	D	E
27	0	1	0	1	1
28	1	0	1	1	0
29	0	0	1	0	1
30	0	1	0	1	1
31	1	1	1	0	0
32	1	1	0	1	0
33	1	1	0	0	1
34	1	0	1	1	0
35	0	1	1	0	1
36	0	1	0	1	1
37	0	0	1	1	1
38	1	1	1	1	0
39	1	1	1	0	1
40	1	1	0	1	1
41	1	0	1	1	1
42	0	1	1	1	1
43	1	1	1	1	1
44	1	1	1	1	0
45	1	1	1	0	0
46	1	1	1	0	0
47	1	0	0	1	0
48	0	1	0	1	1
49	1	1	0	1	0
50	1	0	1	1	0
51	1	1	1	1	0
52	0	1	1	1	0
53	0	0	1	1	1
54	1	1	1	0	1
55	0	0	1	1	1
56	1	0	0	1	1
57	1	0	0	0	1
58	1	0	1	0	1
59	1	1	1	1	0
60	0	0	1	0	1
61	0	0	1	1	1
62	1	0	0	1	1
63	1	1	0	1	0
64	0	1	0	0	1
65	0	0	1	1	1
66	1	1	1	0	1
67	0	1	0	1	0
68	1	0	1	1	0
69	0	1	0	1	1
70	0	0	1	1	1
71	1	0	0	1	0
72	0	0	0	1	1
73	1	1	1	1	1
74	0	0	1	1	1
75	0	1	1	0	1
Quantity	46	47	49	52	47

From the table above, **T** represents itemsets that are related to each other, while **F** indicates itemsets with no relationships between items. The frequency of itemsets must be greater than the frequency threshold (\emptyset). Based on the table, the frequent 4-item itemsets (f4) are: {A, B, C, D} {A, B, C, E} {A, B, D, E} {A, C, D, E} {B, C, D, E}

To understand the relationship or correlation between items, the strength of the relationship is determined by two factors: support and confidence, which are obtained from the following formulas:

Support = Nilai Pendukung

$$\text{Support} = \frac{\sum \text{item yang digunakan}}{\sum \text{Jumlah seluruh transaksi}} \times 100\%$$

Confidence = Nilai Kepastian

$$\text{Confidence} = \frac{\sum \text{item yang digunakan sekaligus}}{\sum \text{Jumlah seluruh transaksi pada bagian antecent}} \times 100\%$$

Rules for a 1-itemset consist of a single rule, which is implemented using the table below:

Table 4: Association Rules for 4-Itemsets

If antecedent then consequent	Support	Confidence
If A B C \rightarrow D	(9/75) x 100% = 12%	(9/19) x 100% = 47,4%
If A B E \rightarrow C	(7/75) x 100% = 9,3%	(7/14) x 100% = 50 %
If B D E \rightarrow A	(6/75) x 100% = 8%	(6/12) x 100% = 50 %
If A C D \rightarrow E	(4/75) x 100% = 5,3%	(4/13) x 100% = 30,7 %
If C D E \rightarrow B	(4/75) x 100% = 5,3%	(4/17) x 100% = 23,5 %

After obtaining the Support and Confidence values, a multiplication of Support and Confidence is performed

Table 5: Association Rules for 4-Itemsets

<i>If antecedent then consequent</i>	<i>Support</i>	<i>Confidence</i>	<i>S*C</i>
<i>If A B C \rightarrow D</i>	12%	47,4%	5,6%
<i>If A B E \rightarrow C</i>	9,3%	50%	4,6%
<i>If B D E \rightarrow A</i>	8%	50%	4%
<i>If A C D \rightarrow E</i>	5,3%	30,7%	1,6%
<i>If C D E \rightarrow B</i>	5,3%	23,5%	1,2%

After performing the multiplication of Support and Confidence, the result of this multiplication is 5.6% for the rule that will be considered the Best Rule.

Table 6: Best Rule

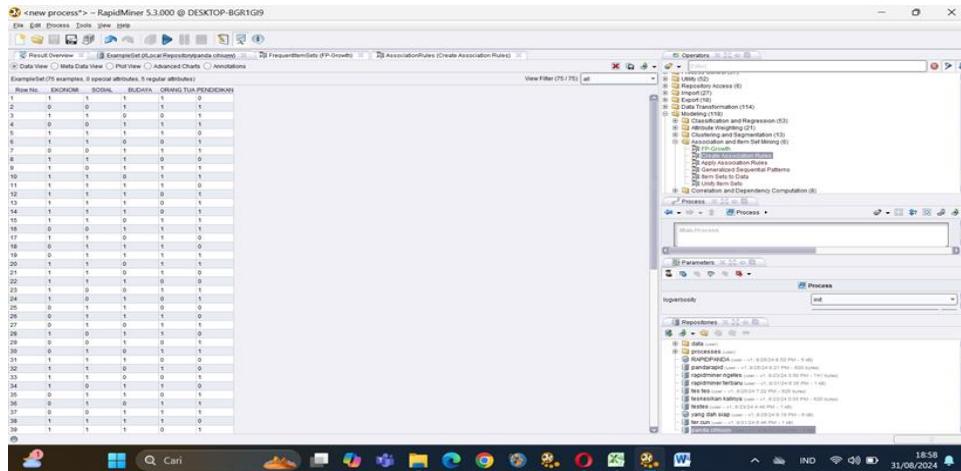
<i>If antecedent then consequent</i>	<i>Support</i>	<i>Cofidence</i>	<i>S*C</i>
<i>If A B C \rightarrow D</i>	12%	47,4%	5,6%

If A B C \rightarrow D With Support = 12% and Confidence = 47.4%, and *S*C* = 5.6%, if couples at the KUA (Office of Religious Affairs) in Binjai City choose to marry below the legal age due to economic, social, and cultural factors, then parental influence also plays a role.

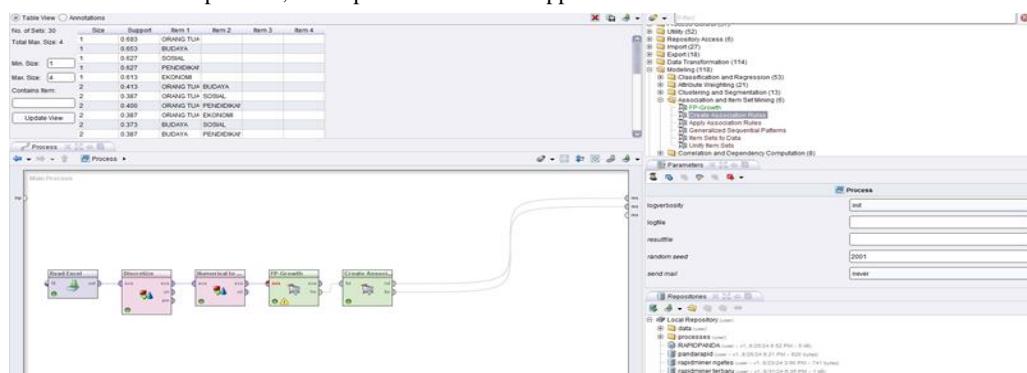
3.2. RapidMiner

At this stage, the process of using RapidMiner to discover correlation rules between factors influencing underage marriage will be discussed, with the data provided by the Office of Religious Affairs in Binjai City. The data is in Excel format, and the resulting information includes rules along with their support and confidence values. The following are the steps for implementing the Apriori method using RapidMiner:

1. In this stage, the task is to prepare the data for processing, which includes data cleaning. Specifically, this involves data on individuals who married underage. The data is created using Microsoft Excel and then imported from the Excel file into the local repository.
2. After launching the application, drag and drop the data table into the process. This action will cause the data operator to appear in the main process. Once the data has been imported, the ExampleSet view will display the contents of the imported data

**Fig. 1:** Example Set

3. Next, locate the "Discretize by Frequency" operator to convert numeric variables into discrete variables. Then, find the "Numerical to Binominal" operator to transform attribute values in the data into a binominal format. Connect the data table to the "Numerical to Binominal" operator. Subsequently, locate the "FP-Growth" operator to determine the support values and the "Create Association Rules" operator to find the confidence values. Finally, connect the "Numerical to Binominal" operator to both the "FP-Growth" and "Create Association Rules" operators, and input the minimum support and minimum confidence values.

**Fig. 2:** Operator sequence

Each operator used in the process has a specific function. The explanations for each operator are as follows:

- Discretize by Frequency Operator: Use this operator to convert numeric variables into discrete variables by defining intervals based on frequency.
- Numerical to Binomial Operator: Apply this operator to transform the discretized numeric attributes into binomial (binary) format.
- FP-Growth Operator: Utilize this operator to identify frequent itemsets and calculate the support values for the itemsets.
- Create Association Rules Operator: Employ this operator to generate association rules and calculate the confidence values based on the frequent itemsets identified by the FP-Growth operator.

2. From the data testing conducted using the RapidMiner application with data on underage marriages in Binjai City, totaling 138 records, the formation of rules providing information on the factors influencing underage marriage was achieved. The trial was conducted with a minimum support value of 5.3% (0.053) and a minimum confidence value of 23.5% (0.235), resulting in 112 rules, which include itemsets ranging from 2 items to 4 items.

No.	Premises	Conclusion	Support	Confidence	LaPlace	Gain	P-2	LR	Conviction
1	ORANG TUA, BUDAYA, PENDIDIKAN	SOSIAL, EKONOMI	0.053	0.235	0.859	-0.400	0.375	0.468	
2	ORANG TUA, BUDAYA, PENDIDIKAN	ORANG TUA, PENDIDIKAN	0.053	0.235	0.859	-0.400	0.375	0.384	0.506
3	EKONOMI	ORANG TUA, PENDIDIKAN	0.147	0.239	0.711	-1.080	0.099	0.598	0.799
4	SOSIAL, PENDIDIKAN	ORANG TUA, EKONOMI	0.080	0.240	0.810	-0.587	0.049	0.621	0.807
5	BUDAYA	SOSIAL, PENDIDIKAN	0.160	0.245	0.702	-1.147	0.058	0.735	0.883
6	BUDAYA	PENDIDIKAN, EKONOMI	0.160	0.245	0.702	-1.147	0.040	0.799	0.918
7	ORANG TUA	SOSIAL, PENDIDIKAN	0.173	0.250	0.693	-1.213	0.058	0.750	0.889
8	SOSIAL, EKONOMI	BUDAYA, PENDIDIKAN	0.107	0.250	0.776	-0.747	0.058	0.447	0.819
9	SOSIAL	BUDAYA, PENDIDIKAN	0.160	0.255	0.713	-1.093	0.082	0.660	0.824
10	PENDIDIKAN	BUDAYA, SOSIAL	0.160	0.255	0.713	-1.093	0.074	0.684	0.842
11	PENDIDIKAN	BUDAYA, EKONOMI	0.160	0.255	0.713	-1.093	0.074	0.684	0.842
12	EKONOMI	BUDAYA, PENDIDIKAN	0.160	0.261	0.719	-1.067	0.077	0.675	0.830
13	PENDIDIKAN, EKONOMI	ORANG TUA, SOSIAL	0.080	0.261	0.827	-0.533	0.039	0.675	0.830
14	ORANG TUA, BUDAYA, EKONOMI	PENDIDIKAN	0.053	0.267	0.878	-0.347	0.072	0.426	0.509
15	ORANG TUA	BUDAYA, SOSIAL	0.187	0.269	0.701	-1.204	0.072	0.721	0.858
16	BUDAYA, PENDIDIKAN	SOSIAL, EKONOMI	0.107	0.276	0.798	-0.667	0.058	0.447	0.792
17	SOSIAL	ORANG TUA, PENDIDIKAN	0.173	0.277	0.721	-1.080	0.077	0.691	0.829
18	PENDIDIKAN	ORANG TUA, SOSIAL	0.173	0.277	0.721	-1.080	0.069	0.715	0.848
19	SOSIAL, EKONOMI	ORANG TUA, BUDAYA	0.130	0.281	0.785	-0.733	0.055	0.680	0.816
20	BUDAYA	ORANG TUA, SOSIAL	0.187	0.286	0.718	-1.120	0.066	0.739	0.859
21	ORANG TUA, BUDAYA, SOSIAL	PENDIDIKAN	0.053	0.286	0.888	-0.320	0.064	0.456	0.523
22	BUDAYA, SOSIAL	PENDIDIKAN, EKONOMI	0.107	0.286	0.806	-0.640	0.008	0.932	0.971
23	BUDAYA, EKONOMI	SOSIAL, PENDIDIKAN	0.107	0.286	0.806	-0.640	0.018	0.857	0.933
24	ORANG TUA	BUDAYA, EKONOMI	0.200	0.288	0.769	-1.187	0.059	0.773	0.881
25	ORANG TUA, BUDAYA	SOSIAL, EKONOMI	0.120	0.290	0.792	-0.707	0.056	0.680	0.808
26	SOSIAL	ORANG TUA, BUDAYA	0.187	0.298	0.730	-1.067	0.072	0.721	0.836
27	BUDAYA	ORANG TUA, EKONOMI	0.200	0.306	0.726	-1.107	0.053	0.792	0.884
28	ORANG TUA, SOSIAL, PENDIDIKAN	BUDAYA	0.053	0.309	0.898	-0.293	0.060	0.471	0.501
29	ORANG TUA, SOSIAL	BUDAYA, EKONOMI	0.120	0.310	0.808	-0.653	0.024	0.831	0.909
30	ORANG TUA, EKONOMI	BUDAYA, SOSIAL	0.120	0.310	0.808	-0.653	0.024	0.831	0.909
31	SOSIAL	PENDIDIKAN, EKONOMI	0.200	0.319	0.738	-1.053	0.008	1.041	1.018
32	PENDIDIKAN	SOSIAL, EKONOMI	0.200	0.319	0.738	-1.053	0.067	0.748	0.842
33	SOSIAL, PENDIDIKAN	BUDAYA, EKONOMI	0.107	0.320	0.830	-0.560	0.018	0.857	0.922
34	BUDAYA, SOSIAL	ORANG TUA, EKONOMI	0.120	0.321	0.816	-0.627	0.024	0.831	0.904
35	BUDAYA, EKONOMI	ORANG TUA, SOSIAL	0.120	0.321	0.816	-0.627	0.024	0.831	0.904
36	EKONOMI	ORANG TUA, BUDAYA	0.200	0.326	0.744	-1.027	0.054	0.789	0.871
37	EKONOMI	SOSIAL, PENDIDIKAN	0.200	0.326	0.744	-1.027	0.004	0.978	0.989
38	ORANG TUA	BUDAYA, PENDIDIKAN	0.237	0.327	0.724	-1.160	0.041	0.845	0.911
39	BUDAYA, SOSIAL, PENDIDIKAN	ORANG TUA	0.053	0.333	0.920	-0.267	0.058	0.481	0.460
40	BUDAYA, PENDIDIKAN, EKONOMI	ORANG TUA	0.053	0.333	0.928	-0.267	0.058	0.481	0.460

Fig. 3: Table view from result

Additionally, associations can also be visualized in another format, specifically in the Graph section.

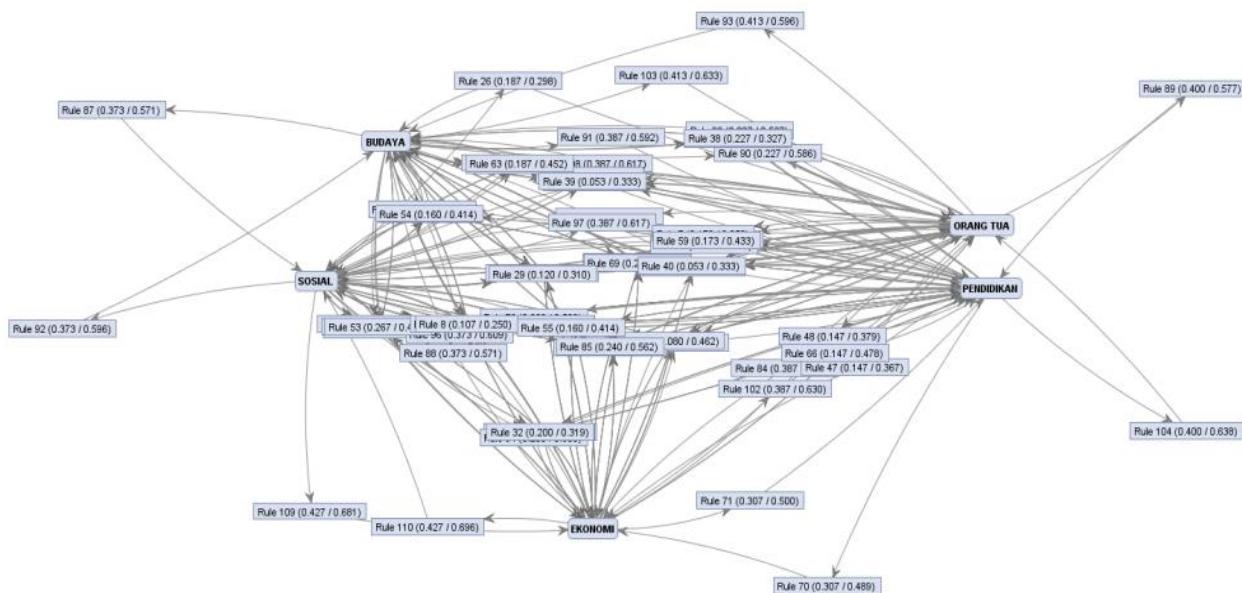


Fig. 4: Graph view

Additionally, the results can also be viewed in a descriptive format

AssociationRules

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Association Rules
[ORANG TUA, BUDAYA, PENDIDIKAN] --> [SOSIAL] (confidence: 0.235)
[ORANG TUA, BUDAYA, PENDIDIKAN] --> [EKONOMI] (confidence: 0.235)
[EKONOMI] --> [ORANG TUA, PENDIDIKAN] (confidence: 0.239)
[SOSIAL, PENDIDIKAN] --> [ORANG TUA, EKONOMI] (confidence: 0.240)
[BUDAYA] --> [SOSIAL, PENDIDIKAN] (confidence: 0.245)
[BUDAYA] --> [PENDIDIKAN, EKONOMI] (confidence: 0.245)
[ORANG TUA] --> [SOSIAL, PENDIDIKAN] (confidence: 0.250)
[SOSIAL, EKONOMI] --> [BUDAYA, PENDIDIKAN] (confidence: 0.250)
[SOSIAL] --> [BUDAYA, PENDIDIKAN] (confidence: 0.255)
[PENDIDIKAN] --> [BUDAYA, SOSIAL] (confidence: 0.255)
[EKONOMI] --> [BUDAYA, EKONOMI] (confidence: 0.255)
[PENDIDIKAN, EKONOMI] --> [ORANG TUA, SOSIAL] (confidence: 0.261)
[ORANG TUA, BUDAYA, EKONOMI] --> [PENDIDIKAN] (confidence: 0.267)
[ORANG TUA] --> [BUDAYA, SOSIAL] (confidence: 0.269)
[BUDAYA, PENDIDIKAN] --> [SOSIAL, EKONOMI] (confidence: 0.276)
[SOSIAL] --> [ORANG TUA, PENDIDIKAN] (confidence: 0.277)
[PENDIDIKAN] --> [ORANG TUA, SOSIAL] (confidence: 0.277)
[SOSIAL, EKONOMI] --> [ORANG TUA, BUDAYA] (confidence: 0.281)
[BUDAYA] --> [ORANG TUA, SOSIAL] (confidence: 0.286)
[ORANG TUA, BUDAYA, SOSIAL] --> [PENDIDIKAN] (confidence: 0.286)
[BUDAYA, SOSIAL] --> [PENDIDIKAN, EKONOMI] (confidence: 0.286)
[BUDAYA, EKONOMI] --> [SOSIAL, PENDIDIKAN] (confidence: 0.286)
[ORANG TUA] --> [BUDAYA, EKONOMI] (confidence: 0.288)
[ORANG TUA, BUDAYA] --> [SOSIAL, EKONOMI] (confidence: 0.290)
[SOSIAL] --> [ORANG TUA, BUDAYA] (confidence: 0.298)
[BUDAYA] --> [ORANG TUA, EKONOMI] (confidence: 0.306)
[ORANG TUA, SOSIAL, PENDIDIKAN] --> [BUDAYA] (confidence: 0.308)
[ORANG TUA, SOSIAL] --> [BUDAYA, EKONOMI] (confidence: 0.310)
[ORANG TUA, EKONOMI] --> [BUDAYA, SOSIAL] (confidence: 0.310)
[SOSIAL] --> [PENDIDIKAN, EKONOMI] (confidence: 0.319)
[PENDIDIKAN] --> [SOSIAL, EKONOMI] (confidence: 0.319)
[SOSIAL, PENDIDIKAN] --> [BUDAYA, EKONOMI] (confidence: 0.320)
[BUDAYA, SOSIAL] --> [ORANG TUA, EKONOMI] (confidence: 0.321)
[BUDAYA, EKONOMI] --> [ORANG TUA, SOSIAL] (confidence: 0.321)
[EKONOMI] --> [ORANG TUA, BUDAYA] (confidence: 0.326)
[EKONOMI] --> [SOSIAL, PENDIDIKAN] (confidence: 0.326)
[ORANG TUA] --> [BUDAYA, PENDIDIKAN] (confidence: 0.327)

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Fig. 5: Text View

Out of all the rules discovered, there are 4 rules that meet the minimum criteria for forming 4-itemset combinations (f4), with a minimum support of 5.3% and a minimum confidence of 23.5%.

Table 7: Best Rule

NO	Rule	Support	Confidence	S*C	Item Set
1	If the residents of Binjai City choose to marry underage due to the influence of social factors, then economic factors also play a role.	42,7%	69,6%	29,7%	C → A
2	If the residents of Binjai City choose to marry underage due to the influence of cultural and social factors, then economic factors also play a role.	26,7%	71,4%	19,1%	C B → A
3	If the residents of Binjai City choose to marry underage due to the influence of parental, social, and economic factors, then cultural factors also play a role.	12%	50%	6%	D B A → C

4. Conclusion

The analysis results indicate that couples at the Office of Religious Affairs in Binjai City choose to marry underage due to economic, social, and cultural factors, with parental influence also playing a role. Based on the analysis, it was found that the best rule for a 2-itemset has a support of 42.7% and a confidence of 69.6%, the best rule for a 3-itemset has a support of 26.7% and a confidence of 71.4%, and the best rule for a 4-itemset has a support of 12% and a confidence of 50%. These findings suggest that as the minimum support and confidence values are reduced, more data can be processed, resulting in a larger number of association rules being generated. The analysis results indicate that the best rule among the 112 rules found is: If couples at the KUA (Office of Religious Affairs) in Binjai City choose to marry underage due to economic, social, and cultural factors, then parental influence also plays a role. This rule has a support value of 12% and a confidence value of 47.4%.

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