

Implementation Of Apriori Data Mining Algorithm to Increase Sales Of Caringin Shop

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DOI:

<https://doi.org/10.53697/jkomitek.v4i1.1799>

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Received: 05-06-2024

Accepted: 08-06-2024

Published: 16-06-2024



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Abstract: The caringin shop is a shop that sells daily household and kitchen needs. Caringin shop sales tend to stagnate because in the last few months there has been no significant increase in turnover and tight business competition where the large number of similar shops has become a problem. This requires a precise and careful marketing strategy. This research implements an a priori algorithm as a marketing strategy. The data used was 146 transactions for 1 week. The analysis was carried out manually using Microsoft Excel and libraries in the Python programming language that supports apriori algorithms packaged in a simple web-based application. The analysis resulted in a conclusion that if a consumer buys sugar, then the tendency is to buy coffee with a confidence level of 65% supported by a support value of 10% of all transactions with a lift ratio of 3.9, if buying coffee, then the tendency is to buy sugar with a confidence level of 62% supported by a support value of 10% of all transactions with a lift ratio of 3.9, and if buying eggs, then the tendency is to buy instant noodles with a confidence level of 61% supported by a support value of 11% of all transactions with a lift ratio of 2.8.

Keywords: Apriori, Python, Web, Sales

Introduction

The caringin shop is a shop that sells various household and kitchen equipment for daily needs (Setiani et al., 2021). The caringin shop is in South Bengkulu Regency. The caringin shop is managed independently by the shop owner. Caringin stores are small scale stores compared to minimarket franchise stores such as Indomaret and Alfamart. Technological advances and the proliferation of minimarket franchise stores are the starting point for obstacles to the development of caringin stores (Nisa, Siska Fitriyanti and Dewi Siska, 2021; Novriady and Nasrudin, 2021).

The caringin store experienced several problems that hampered the store's development (Kusak et al., 2021). The problems faced are the decline in shop turnover in the last few months, the number of shop visitors is starting to decline, and tight business competition and a number of similar shops which are not far from the caringin shop (Adebayo & Aziz, 2019). Plus, the proliferation of large-scale store franchises has made

competition increasingly fierce and small-scale stores such as caringin stores are starting to be abandoned. Based on the three problems above, caringin stores need appropriate and accurate sales strategies so that they can increase store sales(Zhao et al., 2021).

The solution offered in this research is implementing an a priori algorithm. The a priori algorithm produces an analysis of the relationship between products and other products and predicts product sales patterns (Br Sembiring and Sembiring, 2023). The results of this research are in the form of additional knowledge for store managers in developing business strategies in the form of sales links between products, product layout, and recommendations for product discount packages(Zhou, 2020).

The aim of this research is to produce a sales strategy for caringin stores through the implementation of an a priori algorithm. This aims to increase sales turnover, provide a better experience to customers(Xie, 2021), recommend products that are right for customer needs, and provide insight and basic considerations in developing stores based on accurate data(Li et al., 2021).

Methodology

Problem Analysis

Researchers have conducted in-depth interviews with the owner of the Caringin Shop and produced several problem points that were captured(Verma et al., 2020). These points are that there is a tendency to decrease turnover but it is not significant. This is due to the mushrooming of similar shop franchises which are starting to appear around the caringin shop area. In addition, caringin store owners have minimal knowledge regarding store sales strategies based on advanced research and analysis(Sadikin, 2024). Based on information from the shop owner, the researcher is interested in raising the research topic of increasing sales by implementing the a priori algorithm(Abdullah et al., 2019).

Implementation Method

This research uses various implementation methods. The implementation methods used in this research are as follows:

1. Problem Analysis

Researchers began to identify the root of the problem in the research theme, namely increasing product sales. As a result of identifying the root of the problem in this research, the researcher confirmed the findings with the shop owner through in-depth interviews. Apart from that, researchers propose solutions that become research proposals.

2. Data Collection

At this stage, researchers collected data through interviews, surveys and literature studies. Primary data was obtained from interviews and surveys at caringin stores. Secondary data was obtained through literature studies by studying data and information from various information sources related to data mining and a priori

algorithms. Apart from that, researchers also determine the population and data samples that will be used in the data analysis stage (Saxena & Rajpoot, 2021).

3. Data Processing

At this stage, researchers carry out data selection, data preprocessing, and data transformation.

4. Data Analysis

At this stage, researchers begin to carry out data mining analysis using a priori algorithms through the stages of high frequency pattern analysis and associative rule formation.

5. Evaluation and Drawing Conclusions

At this stage, researchers carry out evaluations using the lift ratio and draw conclusions based on the results of data mining analysis.

6. Documentation

Researchers in the documentation stage prepare research reports in order to complete the entire series of research (Jhang et al., 2019).

System Planning

At this stage the researcher designs a web-based application that contains the implementation of an a priori algorithm. The system designs developed are flowcharts and mock ups.

Flow Chart

Before designing the application, the researcher created a flow chart to make it easier to implement the a priori algorithm. The flow chart of the implementation of the a priori algorithm is shown in Figure 3.1.

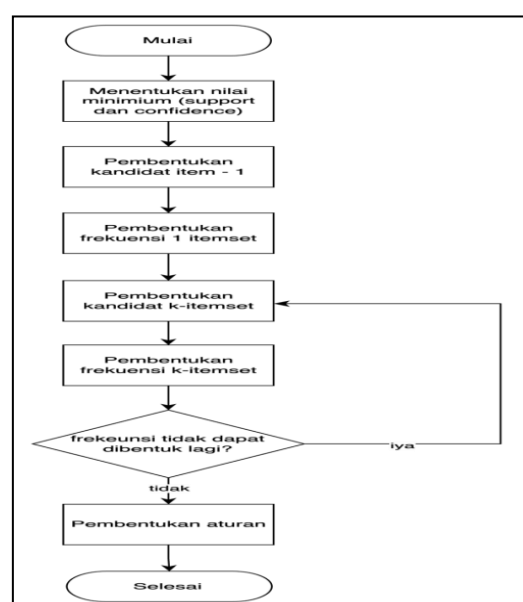


Figure 3.1. A priori algorithm flow chart

Result and Discussion

Implementation

The implementation stage contains various sub-stages that form the entire implementation of the a priori algorithm. The stages that are passed include the following.

1. Data Understanding

Researchers carry out data understanding to find out and understand what data is needed in analysis using a priori algorithms to achieve business goals and obtain better sales strategies. The data required is sales transaction data per product which includes the attributes transaction/invoice number, product name, transaction date. The transaction/invoice number shows the unique ID or primary key of the sales data. The product name represents the product being transacted. Transaction date shows data on the date when the transaction occurred.

2. Data Processing

Researchers at the data processing stage carry out data selection, data cleaning, determine data attributes according to the stages of data understanding, and carry out data transformation. Researchers also eliminate data if they do not have complete data attributes, for example, invoice numbers are not available, dates are not listed, and product names are empty. The data for 146 transactions obtained and taken during the 1 week period from April 6 - 12 2024 is shown in Table 4.1.

Table 4.1. Processed Data

InvoiceNo	Product	Quantity	Invoice Date
1	SUSU FORMULA	1	06/04/2024
1	POPOK BAYI	2	06/04/2024
1	TISU BASAH	1	06/04/2024
2	TEH	1	06/04/2024
2	GULA	1	06/04/2024
3	KOPI	1	06/04/2024
3	GULA	1	06/04/2024
4	GULA	2	06/04/2024
4	KOPI	3	06/04/2024
4	KENTAL MANIS	2	06/04/2024
5	TISU	2	06/04/2024
5	AIR MINERAL	1	06/04/2024
5	MIE INSTAN	4	06/04/2024
6	SUSU FORMULA	1	06/04/2024
6	POPOK BAYI	1	06/04/2024
7	TISU BASAH	1	06/04/2024
7	POPOK BAYI	1	06/04/2024
8	KENTAL MANIS	1	06/04/2024
8	KOPI	2	06/04/2024
8	AIR MINERAL	4	06/04/2024
9	TISU BASAH	2	06/04/2024
9	SUSU FORMULA	1	06/04/2024
10	MIE INSTAN	3	06/04/2024
10	KECAP	2	06/04/2024

10	SAOS	2	06/04/2024
11	MINYAK GORENG	1	06/04/2024
11	TELUR	10	06/04/2024
12	TELUR	6	06/04/2024
12	MINYAK GORENG	1	06/04/2024
12	MIE INSTAN	2	06/04/2024
13	TISU	1	06/04/2024
13	GULA	1	06/04/2024
13	KOPI	1	06/04/2024
14	TEH	1	06/04/2024
14	GULA	1	06/04/2024
15	SUSU FORMULA	1	06/04/2024
15	TEH	1	06/04/2024
15	KOPI	1	06/04/2024
16	KOPI	1	07/04/2024
16	TEH	1	07/04/2024
16	GULA	1	07/04/2024
17	SUSU FORMULA	1	07/04/2024
17	GULA	1	07/04/2024
18	POPOK BAYI	1	07/04/2024
18	MINYAK TELON	1	07/04/2024
19	TISU BASAH	1	07/04/2024
19	TISU	1	07/04/2024
20	MIE INSTAN	3	07/04/2024
20	TELUR	5	07/04/2024
21	AIR MINERAL	1	07/04/2024
22	MIE INSTAN	2	07/04/2024
23	KOPI	1	07/04/2024
23	GULA	1	07/04/2024
24	TELUR	5	07/04/2024
24	MIE INSTAN	1	07/04/2024
25	MINYAK TELON	1	07/04/2024
25	POPOK BAYI	2	07/04/2024
25	SABUN MANDI	2	07/04/2024
26	SIKAT GIGI	2	07/04/2024
26	PASTA GIGI	1	07/04/2024
27	SIKAT GIGI	1	07/04/2024
27	PASTA GIGI	1	07/04/2024
27	SABUN MANDI	1	07/04/2024
28	KECAP	1	07/04/2024
28	MIE INSTAN	1	07/04/2024
29	MIE INSTAN	1	07/04/2024
29	TELUR	3	07/04/2024
30	SAMPO	1	07/04/2024
30	SABUN MANDI	1	07/04/2024
30	PASTA GIGI	1	07/04/2024
31	SUSU FORMULA	1	07/04/2024
31	POPOK BAYI	1	07/04/2024

32	TISU BASAH	1	07/04/2024
32	TISU	1	07/04/2024
33	TEPUNG	1	07/04/2024
33	TELUR	6	07/04/2024
33	BUMBU	2	07/04/2024
34	SAOS	2	07/04/2024
35	MIE INSTAN	8	07/04/2024
36	TELUR	4	07/04/2024
36	KECAP	1	07/04/2024
37	ROKOK	1	07/04/2024
37	MIE INSTAN	1	07/04/2024
38	ROKOK	1	07/04/2024
39	GULA	1	07/04/2024
39	KOPI	1	07/04/2024
40	PERMEN	3	07/04/2024
40	MINUMAN DINGIN	3	07/04/2024
41	SUSU FORMULA	1	07/04/2024
42	POPOK BAYI	1	07/04/2024
43	ROKOK	2	07/04/2024
43	MINUMAN DINGIN	1	07/04/2024
44	ROKOK	1	07/04/2024
44	MIE INSTAN	4	07/04/2024
45	TELUR	4	07/04/2024
45	GARAM	1	07/04/2024
46	TELUR	1	08/04/2024
46	MIE INSTAN	5	08/04/2024
46	GARAM	1	08/04/2024
47	SAOS	1	08/04/2024
47	KECAP	1	08/04/2024
47	GARAM	1	08/04/2024
47	BUMBU	1	08/04/2024
48	MIE INSTAN	3	08/04/2024
48	SARDEN	1	08/04/2024
49	PASTA GIGI	1	08/04/2024
49	SIKAT GIGI	1	08/04/2024
50	ROKOK	2	08/04/2024
50	PERMEN	5	08/04/2024
51	ROKOK	3	08/04/2024
51	PERMEN	2	08/04/2024
52	MINUMAN DINGIN	2	08/04/2024
52	ROKOK	1	08/04/2024
53	KOPI	1	08/04/2024
53	ROKOK	1	08/04/2024
54	PERMEN	2	08/04/2024
54	ROKOK	1	08/04/2024
55	MIE INSTAN	2	08/04/2024
55	TELUR	2	08/04/2024
56	GULA	1	08/04/2024

56	KOPI	1	08/04/2024
56	TEH	1	08/04/2024
57	MINYAK GORENG	1	08/04/2024
57	TELUR	3	08/04/2024
57	MIE INSTAN	2	08/04/2024
58	PASTA GIGI	1	08/04/2024
58	SIKAT GIGI	1	08/04/2024
59	MINYAK TELON	1	08/04/2024
59	SUSU FORMULA	1	08/04/2024
60	KECAP	1	08/04/2024
60	BUMBU	1	08/04/2024
61	SUSU FORMULA	1	08/04/2024
61	POPOK BAYI	1	08/04/2024
62	TEH	1	08/04/2024
62	GULA	1	08/04/2024
62	KOPI	1	08/04/2024
63	GULA	1	08/04/2024
63	KOPI	1	08/04/2024
63	KENTAL MANIS	1	08/04/2024
64	TISU	1	08/04/2024
64	AIR MINERAL	1	08/04/2024
64	TELUR	3	08/04/2024
64	MIE INSTAN	1	08/04/2024
65	SUSU FORMULA	1	08/04/2024
65	POPOK BAYI	1	08/04/2024
66	TISU BASAH	1	08/04/2024
67	POPOK BAYI	1	08/04/2024
68	KENTAL MANIS	1	08/04/2024
68	KOPI	1	08/04/2024
68	AIR MINERAL	1	08/04/2024
69	TISU BASAH	1	08/04/2024
69	SUSU FORMULA	1	08/04/2024
70	MIE INSTAN	1	08/04/2024
71	BUMBU	1	08/04/2024
71	KECAP	1	08/04/2024
72	MINYAK GORENG	1	08/04/2024
72	TELUR	4	08/04/2024
72	MIE INSTAN	4	08/04/2024
73	MINYAK GORENG	2	08/04/2024
73	MIE INSTAN	4	09/04/2024
74	ROKOK	2	09/04/2024
74	GULA	1	09/04/2024
74	KOPI	1	09/04/2024
75	TEH	1	09/04/2024
75	GULA	1	09/04/2024
75	SUSU FORMULA	1	09/04/2024
76	TEH	1	09/04/2024
76	KOPI	1	09/04/2024

77	KOPI	1	09/04/2024
78	TEH	1	09/04/2024
79	GULA	1	09/04/2024
79	SUSU FORMULA	1	09/04/2024
80	GULA	1	09/04/2024
80	POPOK BAYI	1	09/04/2024
81	MINYAK TELON	1	09/04/2024
81	TISU BASAH	1	09/04/2024
81	POPOK BAYI	1	09/04/2024
82	MIE INSTAN	1	09/04/2024
82	TELUR	1	09/04/2024
82	AIR MINERAL	1	09/04/2024
83	ROKOK	1	09/04/2024
83	KOPI	1	09/04/2024
83	GULA	1	09/04/2024
84	TELUR	1	09/04/2024
84	MINYAK GORENG	1	09/04/2024
84	TISU BASAH	1	09/04/2024
84	POPOK BAYI	1	09/04/2024
85	SABUN MANDI	1	09/04/2024
85	SIKAT GIGI	1	09/04/2024
85	SAMPO	1	09/04/2024
86	SIKAT GIGI	1	09/04/2024
86	PASTA GIGI	1	09/04/2024
86	SABUN MANDI	1	09/04/2024
87	BUMBU	1	09/04/2024
87	SAOS	1	09/04/2024
87	SARDEN	1	09/04/2024
88	TELUR	2	09/04/2024
89	SAMPO	2	09/04/2024
89	SABUN MANDI	1	09/04/2024
90	PASTA GIGI	2	09/04/2024
91	SUSU FORMULA	2	09/04/2024
91	POPOK BAYI	2	09/04/2024
91	TISU BASAH	2	09/04/2024
91	MINYAK TELON	1	09/04/2024
92	TEPUNG	1	09/04/2024
92	TELUR	5	09/04/2024
92	BUMBU	2	09/04/2024
93	SAOS	3	09/04/2024
93	MIE INSTAN	3	09/04/2024
93	TELUR	2	09/04/2024
94	KECAP	2	09/04/2024
95	ROKOK	1	09/04/2024
95	KOPI	1	09/04/2024
96	ROKOK	1	09/04/2024
97	GULA	1	09/04/2024
97	KOPI	1	09/04/2024

98	PERMEN	2	09/04/2024
99	MINUMAN DINGIN	2	09/04/2024
100	SUSU FORMULA	1	09/04/2024
101	POPOK BAYI	1	09/04/2024
102	ROKOK	2	09/04/2024
102	MINUMAN DINGIN	2	09/04/2024
103	ROKOK	2	09/04/2024
103	MIE INSTAN	2	09/04/2024
103	TELUR	4	09/04/2024
103	GARAM	1	09/04/2024
104	GARAM	2	09/04/2024
104	MIE INSTAN	2	09/04/2024
104	TEPUNG	1	09/04/2024
105	KECAP	1	09/04/2024
105	GARAM	1	10/04/2024
105	BUMBU	1	10/04/2024
106	MIE INSTAN	3	10/04/2024
106	TEPUNG	1	10/04/2024
107	PASTA GIGI	1	10/04/2024
107	SIKAT GIGI	1	10/04/2024
108	ROKOK	1	10/04/2024
108	PERMEN	1	10/04/2024
109	ROKOK	1	10/04/2024
110	PERMEN	1	10/04/2024
110	MINUMAN DINGIN	1	10/04/2024
110	ROKOK	1	10/04/2024
111	KOPI	1	10/04/2024
111	ROKOK	1	10/04/2024
111	PERMEN	1	10/04/2024
112	ROKOK	1	10/04/2024
112	MIE INSTAN	1	10/04/2024
112	TELUR	1	10/04/2024
113	GULA	1	10/04/2024
113	KOPI	1	10/04/2024
113	TEH	1	10/04/2024
114	MINYAK GORENG	1	10/04/2024
115	TELUR	1	10/04/2024
116	MIE INSTAN	1	10/04/2024
116	PASTA GIGI	1	10/04/2024
116	SIKAT GIGI	1	10/04/2024
117	MINYAK TELON	1	10/04/2024
117	SUSU FORMULA	1	10/04/2024
118	KECAP	1	10/04/2024
118	BUMBU	1	10/04/2024
119	PERMEN	3	11/04/2024
119	MINUMAN DINGIN	3	11/04/2024
119	SUSU FORMULA	1	11/04/2024
119	POPOK BAYI	1	11/04/2024

120	ROKOK	2	11/04/2024
120	MINUMAN DINGIN	1	11/04/2024
121	ROKOK	1	11/04/2024
121	MIE INSTAN	4	11/04/2024
121	TELUR	4	11/04/2024
122	GARAM	1	11/04/2024
123	GARAM	1	11/04/2024
123	MIE INSTAN	5	11/04/2024
123	SAOS	1	11/04/2024
124	TEPUNG	1	11/04/2024
124	GARAM	1	11/04/2024
124	BUMBU	1	11/04/2024
125	MIE INSTAN	3	11/04/2024
125	SARDEN	1	11/04/2024
125	GARAM	1	11/04/2024
126	SIKAT GIGI	1	11/04/2024
126	SAMPO	2	11/04/2024
127	PERMEN	5	11/04/2024
127	ROKOK	3	11/04/2024
128	PERMEN	2	11/04/2024
128	MINUMAN DINGIN	2	11/04/2024
128	ROKOK	1	11/04/2024
129	KOPI	1	11/04/2024
129	ROKOK	1	11/04/2024
129	PERMEN	2	11/04/2024
130	MIE INSTAN	2	11/04/2024
130	TELUR	2	11/04/2024
130	GULA	1	11/04/2024
131	TELUR	1	12/04/2024
131	MINYAK GORENG	1	12/04/2024
132	TISU BASAH	1	12/04/2024
132	POPOK BAYI	1	12/04/2024
132	SABUN MANDI	1	12/04/2024
133	SIKAT GIGI	1	12/04/2024
133	SAMPO	1	12/04/2024
133	SIKAT GIGI	1	12/04/2024
134	PASTA GIGI	1	12/04/2024
134	SABUN MANDI	1	12/04/2024
135	BUMBU	1	12/04/2024
135	SAOS	1	12/04/2024
135	SARDEN	1	12/04/2024
136	TELUR	2	12/04/2024
137	SAMPO	2	12/04/2024
137	SABUN MANDI	1	12/04/2024
137	PASTA GIGI	2	12/04/2024
138	SUSU FORMULA	2	12/04/2024
138	POPOK BAYI	2	12/04/2024
138	TISU BASAH	2	12/04/2024

138	TISU	1	12/04/2024
139	SUSU FORMULA	1	12/04/2024
139	POPOK BAYI	2	12/04/2024
139	TISU BASAH	1	12/04/2024
140	TEH	1	12/04/2024
140	GULA	1	12/04/2024
141	KOPI	1	12/04/2024
141	GULA	1	12/04/2024
142	GULA	2	12/04/2024
142	KOPI	3	12/04/2024
142	KENTAL MANIS	2	12/04/2024
143	TISU	2	12/04/2024
143	AIR MINERAL	1	12/04/2024
143	TISU BASAH	1	12/04/2024
144	SUSU FORMULA	1	12/04/2024
144	MIE INSTAN	1	12/04/2024
144	BUMBU	1	12/04/2024
145	KECAP	1	12/04/2024
145	MINYAK GORENG	1	12/04/2024
146	TELUR	4	12/04/2024
146	MIE INSTAN	4	12/04/2024
146	MINYAK GORENG	2	12/04/2024

Sumber: Data Primer (2024) yang telah diolah menggunakan Ms.excel

Conclusion

A priori algorithms can provide alternatives for increasing sales based on association strategies with historical data on products purchased by customers. This research implements an a priori algorithm wrapped in a web-based application, making it easier for shop owners to carry out analysis to obtain alternative sales strategies. The a priori algorithm has succeeded in providing knowledge or insight to shop owners that there is a relationship between one product and another so that shop owners can make decisions based on the analyzed data.

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