Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 7, Issue 1, January 2023
DOI : https://doi.org/10.33395/sinkron.v8i1.12071
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Data Mining Implementation For Product Transaction Patterns Using Apriori Method

Galih Wasito Aji[1)], Putri Aisyiyah Rakhma Devi[2)*]
[1)2)]Faculty of Engineering, Informatics Study Program, Muhammadiyah University of Gresik, Indonesia
[1)]gwasitoa@gmail.com, [2)]deviaisyiyah@umg.ac.id

Submitted : Dec 27, 2022 | **Accepted** : Jan 3, 2023 | **Published** : Jan 4, 2023

Abstract: In the era of information technology, entrepreneurs must have a good marketing strategy so that profits do not decrease. The decline in profits is happening at fast food restaurants for example fast food restaurants in Gresik city. This is due to the incompatibility of products sold with customers in Gresik city. Many promos given by marketing didn't go well, resulting in sales targets not being achieved. To overcome this, good sales data analysis is needed to get products that match with type of customer. Using data mining with the Apriori algorithm is very appropriate for looking customer purchasing patterns. Association rules that are formed with support and confidence as benchmarks provide, a good reference regarding customer purchasing patterns. Research at fast food restaurant in Gresik was conducted by taking transaction data from September 2021 - September 2022 totaling 48,750 transactions with 134 transactions/day. The results of the research are customer buying patterns that are formed in 10 rules with highest percentage. The best rules that can be the best promos is: if customers buy Rice then buy Drinks with 11,19% support and 68,1% confidence. From the results of research that has been done, customer purchasing patterns have been obtained and can be used as a reference by marketing.

Keywords: Apriori Algorithm; Association Rules; Data Mining; Marketing strategy; Purchasing Pattern

INTRODUCTION

Information technology that is increasingly advanced makes humans have to be able to follow its developments indiscriminately. The more attached humans to information technology makes humans have to adapt to deal with all possibilities that occur. The development of information technology in all lines of life inevitably has to be followed by every human being if you don't want to be left behind. Information technology itself can be considered as a program or tool for changing and disseminating information that includes all the technical equipment used (Huda, 2020). Technology is something related to objects or tools that are made to facilitate human activities, for example machines and other hardware, while information is data or facts that humans need. In the business world, the use of information technology is an absolute must if you want to make a profit. Apart from requiring good calculations in terms of production, a business also needs a good distribution strategy. Distribution is carried out so that customers can enjoy products or services and of course good distribution requires an appropriate and accurate marketing strategy. To develop an appropriate marketing strategy, entrepreneurs can utilize existing transaction data sets (Alma et al., 2020).

Marketing strategy or sales strategy is all efforts made by humans, groups, companies and even a country to market, introduce, sell their products with the aim of making money or profit. A good marketing strategy will increase the likelihood that a product will be known, known, purchased by customers. In the current era of information technology, the use of social media as a place to promote products is a mandatory step that must be taken by every business actor. Marketing strategies by utilizing technology and information should be mastered by every business actor in order to increase profits. The better a company's marketing strategy, the higher the profit that will be obtained. Lots of business actors use information technology as a medium to offer their products. except for fast food restaurants. Kentucky Fried Chicken (hereinafter referred to as KFC) is one of the most famous fast-food restaurants in Indonesia. The many variations on the menu at KFC Indonesia make KFC loved by all people. In the field of fast food, the competition is getting tougher day by day, many new fast-food restaurants are entering Indonesia. This makes KFC have to improve if you don't want to lose competitiveness with other restaurants. Various policies have been taken to increase restaurant revenue, one of which is adding a promo menu to the sales package. However, not all of these promos succeeded in increasing restaurant revenue. At KFC Gresik there is often a mismatch between the promo menu and the existing customer types.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 7, Issue 1, January 2023
DOI : https://doi.org/10.33395/sinkron.v8i1.12071
e-ISSN : 2541-2019
p-ISSN : 2541-044X

The promo given should be adjusted to the type of customer in that city so that the ongoing promo can provide benefits according to the target. To find products that suit the type of customer at KFC Gresik, it is necessary to do research on what menus are of interest to customers so that promotions can be carried out in a more targeted and precise manner. In an effort to increase profits and avoid reducing staff at KFC Gresik, the authors conducted research to obtain a menu that suits the type of customer in Gresik by implementing data mining for transaction patterns using the Apriori Algorithm. Data mining is an automated or semi-automatic process of finding patterns in data. Data mining is an analytical technique for obtaining meaningful patterns and rules in large databases. These patterns are obtained from several databases, for example transaction data, relational databases, data warehouses (Qomariah et al., 2020).The use of the Apriori Algorithm is intended to look for customer purchasing patterns and provide the right solutions for making decisions in selecting menus (Aulia et al., 2021) .The Apriori algorithm is a popular algorithm that functions to find association rules and patterns of relationships between items (Oktafia et al., 2022). Transaction data at KFC Gresik from September 2021-September 2022 will be examined to find ties between products by implementing the Apriori Algorithm.

LITERATURE REVIEW

Previous research that the author uses as a reference explained in table 1.

Tabel 1. Previous Research

No	Author	Year	Title	Conclusion
1	Golda TM Napitupulu, Anggi Oktaviani, Dahlia Sarkawi, Ita Yulianti	2019	Application of Data Mining on Pipe Sales at CV. Gaskindo Sentosa Using the Apriori Algorithm Method	Using the Apriori Algorithm it can find excess selling points of best-selling products that can be used to market other products(Oktaviani et al., 2019).
2	Royyan Mahmud, Andry Hartanto	2020	Application of Data Mining Laptop Recommendations Using the Apriori Algorithm	Application of the Apriori Algorithm in selecting laptops is effective for seeing consumer buying patterns where during data processing it can be seen which laptops are frequently purchased by customers(Mahmud & Hartanto, 2020).
3	Novita Aulia, Indra, Nahya Nur	2021	Implementation of Data Mining using the Apriori Algorithm to Determine Patterns of Purchasing Drugs in Hospitals	System for implementing the Apriori Algorithm on drug purchasing patterns in hospitals that has been made meets expectations to be able to assist in determining which drugs are most often sold in a hospital pharmacy (Aulia et al., 2021).
4	Sutrisno	2020	Application of the Apriori Algorithm to find patterns of selling fund products at PT. Bank Rakyat Indonesia (Persero) Tbk Kanca Jakarta Pasar Minggu	Research using the Apriori Algorithm can find relationships between fund products that are of interest to customers simultaneously (Sutrisno, 2020).
5	Marsono	2019	Application of Data Mining Setting Patterns of Goods Layout at Berkah Self-Service for Sales Strategy Using the Apriori Algorithm	First conclusion can improve Berkah Self-service sales strategy through sales data, these two systems can help increase sales targets at Berkah Self-service and the third this system can help in determining the layout of goods better(Marsono, 2019).
6	Paujiah Nur Harahap, Sulidawaty	2020	Implementation of Data Mining in Predicting Sales Transactions Using the Apriori Algorithm (Case Study of PT. Arma Anugerah Abadi Branch of Sei Rampah)	Association analysis with the Apriori Algorithm can find association rules for the combination of sales of bakery products, and find out which bakery products are most in demand by customers (Harahap & Sulindawaty, 2020).

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 7, Issue 1, January 2023
DOI : https://doi.org/10.33395/sinkron.v8i1.12071
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Data Mining It is the process of searching for hidden values from the database with the aim of obtaining information that is not known manually (Mai et al., 2022). In another sense data mining is a series of processes in exploring a database to find new knowledge that cannot be found manually (Kusumo et al., 2019).
In this study the stages of data mining are carried out as follows:

1. Data Cleaning
   That is the process where irrelevant and incomplete information or data will be discarded (Mahmud & Hartanto, 2020). The data received from the manager is overall transaction data from September 2021 - September 2022 and from this data only product data is taken according to research.
2. Data Selection
   That is the process of selecting data in a database where the data received is only data that is suitable for analysis (Purnia et al., 2017).Data products that used in this research are only product data that are familiar to customers in the city of Gresik, meaning that the product under study is a regular product, not a product promo.
3. Data Transformation
   Existing data is changed or transformed into a data format according to the method used to make it easier to process. Because for processing there are several data mining techniques that require the use of certain data formats (Qomariah et al., 2020). The initial data products is product data for one year from which the data is changed or transformed into product data per day.
4. Compilation of Test Data
   Data that has passed the three stages above will become test data, this test data is transaction data for selected products per day taken from the average product data per year.

Apriori Algorithm

Association Rules is a data mining technique that is useful for obtaining associative rules between a combination of items. Association rules identify relationships that occur from various events simultaneously (Mardi, 2017). Association analysis is often called market basket analysis because it is often applied to analysis of shopping basket contents (Rusdianto et al., 2020). The purpose of applying the association rule is to get information between items that are connected to other items to become a rule. Using the Apriori Algorithm the association rule is applied to pattern that appears most frequently. Association rules in the form of "if … then …" or "if … and… then …" are the results of calculations or they can be called rules (Naldy & Andri, 2021). The association rules that will later be obtained after calculations with the Apriori algorithm will be the right benchmark for marketing in determining promo products according to customer purchasing patterns.

After going through the data mining process, the calculation of the selected test data will proceed to the next stage, namely calculations using the Apriori algorithm. Another understanding of the a priori algorithm is the basic algorithm proposed in 1994 by Agrawal & Srikant with the aim of determining frequent item sets for Boolean association rules (Marsono, 2019).There are 2 benchmarks used, namely support and confidence which functions to determine whether or not the association is important. Support is a supporting value, namely the value of item combinations in the database, while confidence is a certainty value, namely the strength of the attachment between items in association rules (Misriani, 2019). This is figure number 1 which is the flowchart of the Apriori algorithm in this study:

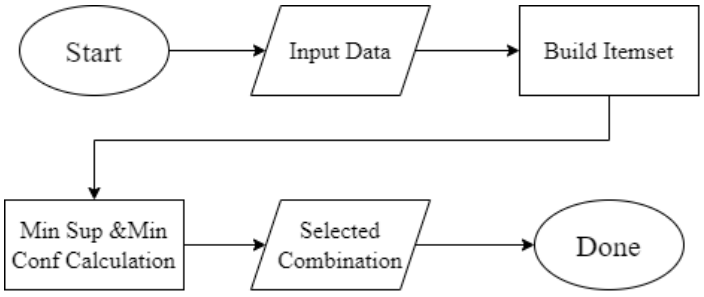

Figure 1: Apriori Algorithm Flowchart

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 7, Issue 1, January 2023
DOI : https://doi.org/10.33395/sinkron.v8i1.12071
e-ISSN : 2541-2019
p-ISSN : 2541-044X

METHOD

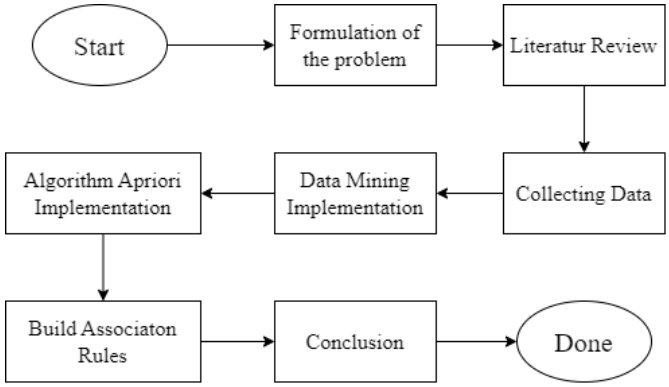

Figure 2: Research Flowchart

In this study there are several steps taken to get good results. The explanation of the research flowchart in Figure 2 is as follows:

1. Formulation of the problem
   This method was carried out with the aim of identifying the problems raised in the research so that the final result which is a solution to the problem is in accordance with the research flow (Syafrianto & Ayniyah, 2021).
2. Literature review
   This method is carried out by collecting research-related article references. Read and review every article that has been collected to get the right reference as a benchmark in the research conducted.
3. Data Collection
   First is observation in the research area, is a way to obtain data with this method. Observations were made by observing customer buying patterns in the city of Gresik for quite a long time, second is interview method was carried out by giving several questions related to research to the manager. This question specifically relates to transactions, products and benefits. As well as asking for key data related to research to the manager and then third is Retrieval and selection of supporting data related to research so that the research carried out obtains more valid results.

RESULT

At the fast-food restaurant there are lots of products, both new products and old products, still stored in the post machine database. Product selection is carried out in accordance with the research so that the research results are more accurate. The product data that is examined is product data that is still valid and is often purchased at Gresik city. Product data is divided into 6 categories based on the type of product. To find out the relationship pattern between products in sales transactions, complete transaction data is needed. Transaction data is a recap of product sales for each existing transaction. In the period September 2021 - September 2022 transactions were 48,750. The transaction data is less accurate when included in research because there are transactions for old products that are currently not being sold. To overcome this, the calculation of the average transaction per day for one year is carried out, namely 134 transactions. Table 2 is a table that contains selected product category data.

Tabel 2. Product Category

Kombo	Chicken	Rice	Drink	Goceng	Snack
SBESAR 1	1 Pcs	Rice	Float	Sundae	Twisty
SBESAR 2	2 Pcs	Bento	Soda	Ice cone	Fries
SBESAR 3	CStrips	Yakiniku	IchiTea	Puding	Pom-pom
SBESAR 4	Wingbkt		Mineral	CripsyBgr	Fishbgr
SBESAR 5	SnckBkct		Coffee	Spagety	ColBgr
SBESAR 6	9Pcs		Ovaltine	CreamSp	Scramble Egg
SBESAR 7	Winger			Soup	Or Bgr
CKM				Perkedel	
Family					
Sstar 1					

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 7, Issue 1, January 2023
DOI : https://doi.org/10.33395/sinkron.v8i1.12071
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Sstar 2					
WingK					
Kburger					

Table 3 is a table of average transactions, namely 134 transactions. The Tr in table 3 is the number of transaction and the itemset is the product data in the transaction according to the categories described in table 2.

Tabel 3. Transaction Data

Tr	*Itemset*					
	Kombo	Chicken	Rice	Drink	Goceng	Snack
1	SBESAR 1				Sundae	
2	Sstar 1					
3		Chicken	Rice	Soda		
4	SBESAR 1				Sundae	
5					Sundae	
6	SBESAR 1					
7	SBESAR 1					
8		Chicken	Rice		Sundae	
9	SBESAR 1					Fries
10		Chicken		Float		Fries
11	Sstar 1					
12	SBESAR 1				Sundae	
13	SBESAR 5					
14					Sundae	
15		Chicken	Rice	Float		
16	SBESAR 1				Creamsp	
17					Sundae	
18		9pcs				Fries
19	SBESAR 1	Chicken				
20				Float	Creamsp	Fries
21	SBESAR 5					
22				Soda		Fries
23	SBESAR 1				Sundae	
24		Chicken		Float		
25				Mineral		Fries
26	SBESAR 2					
27		9pcs		Float		
28			Bento	Float		
29	SBESAR 6					
30		Chicken	Rice		Sundae	
31	SBESAR 1			Float		
32					Sundae	Or Bgr
33	CKM					
34			Bento	Float		
35					Sundae	
36	SBESAR 1					
37	CKM					
38	SBESAR 5					
39					Sundae	
40	SBESAR 1		Rice			
41				Float		Twisty
42	CKM					
43			Bento	Soda		
44		Chicken	Rice		Sundae	
45	SBESAR 1					
46					Sundae	

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 7, Issue 1, January 2023
DOI : https://doi.org/10.33395/sinkron.v8i1.12071
e-ISSN : 2541-2019
p-ISSN : 2541-044X

47				Float		Fries
48	SBESAR 7					
49				Ovaltin		
50	SBESAR 1					
51				Mineral		Col Bgr
52					Sundae	
53	SBESAR 2					
54			Bento	Float		
55	SBESAR 1					
56				Float	Sundae	
57		Chicken	Rice	IchiTea		
58					Sundae	
59	SBESAR 1		Rice			
60					Sundae	
61		Chicken	Rice		Sundae	
62	SBESAR 1					
63					Sundae	Fries
64					Sundae	
65	SBESAR 2			Mineral	Perkedel	
66	SBESAR 4					
67		Chicken	Rice	Float		
68	SBESAR 1					Fries
69				Float	Spagety	
70					Crispbgr	
71	SBESAR 1					
72		Cstrips			Creamsp	
73				Float	Sundae	Col Bgr
74	SBESAR 2					
75		Chicken	Rice	Float		
76	SBESAR 1					
77					Crispbgr	Fries
78	WingK			Soda		
79					Spagety	
80	SBESAR 1					Fries
81					Soup	
82	SBESAR 4				Creamsp	
83					Spagety	Fries
84	SBESAR 1	Chicken				
85		Chicken			Creamsp	
86	SBESAR 2					
87	CKM					
88	SBESAR 1				Creamsp	
89		WingBkct				Fries
90	Family					
91				Mineral	Soup	
92					Crispbgr	
93	SBESAR 1					
94			Bento	Mineral		
95		Chicken		IchiTea		Fries
96	SBESAR 1					
97	WingK					
98		Chicken				
99	CKM					
100	SBESAR 1				Creamsp	
101		WingBkct				
102		Chicken	Rice	IchiTea		
103					Spagety	

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 7, Issue 1, January 2023
DOI : https://doi.org/10.33395/sinkron.v8i1.12071
e-ISSN : 2541-2019
p-ISSN : 2541-044X

104	SBESAR 1					
105				Coffee		Fries
106		Chicken	Rice	Float		
107					Spagety	
108	SBESAR 1				Puding	
109						Pom-pom
110		Snackbkt				
111	SBESAR 4					
112				Float	Spagety	
113	WingK		Rice	Float		
114					Spagety	
115						Fishbgr
116	SBESAR 1					
117		Chicken	Rice			
118					Spagety	
119	Sstar 1					
120					Puding	
121	SBESAR 1			Float		
122					Ice Cone	
123	SBESAR 4					
124				Ovaltin		
125	SBESAR 1				Soup	
126			Yakiniku	Float		Fries
127	Sstar 1					
128					Ice Cone	
129				Mineral		Col Bgr
130	SBESAR 1				Perkedel	
131		Winger	Rice	Mineral		
132					Creamsp	
133	Sstar 1					
134					Sundae	

From the transaction data table in table 3, proceed to calculations using the Apriori algorithm by finding support for each product using the formula for finding support, namely (Rusdianto et al., 2020).

$$Support\ (A) = \frac{\sum Transaction\ Contain\ (A)}{\sum Transaction} \quad (1)$$

Using formula 1 transaction data is entered to find support for 1 itemset. The calculation is as follows:

$$Support\ (Kombo) = \frac{60}{134} = 0{,}45$$
$$Support\ (Chicken) = \frac{26}{134} = 0{,}19$$
$$Support\ (Rice) = \frac{22}{134} = 0{,}16$$
$$Support\ (Drink) = \frac{38}{134} = 0{,}28$$
$$Support\ (Goceng) = \frac{51}{134} = 0{,}37$$
$$Support\ (Snack) = \frac{23}{134} = 0{,}17$$

The calculation above is the process of forming 1 itemset or C1. Then calculations are carried out to form 2 itemsets or the process of forming C2 and find support for each item in C2 using the following formula no 2 (Oktaviani et al., 2019) :

$$Support\ (A, B) = \frac{\sum Transaction\ contain\ (A, B)}{\sum Transaction} \quad (2)$$

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 7, Issue 1, January 2023
DOI : https://doi.org/10.33395/sinkron.v8i1.12071
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Using the formula no 2 from data C1 to find support for the 2 itemset combination. The calculation is as follows:

$$Support\ (\ Kombo, Chicken\ ) = \frac{\sum Transaction\ Contain\ kombo\ and\ chicken}{\sum Transaction} =$$

$$Support\ (\ Kombo, Chicken\ ) = \frac{2}{134} = 0{,}0149$$

Tabel 4. C2 Support Calculation Results

Item		Total	Support
Kombo	Chicken	2	0,0149
Kombo	Rice	3	0,0224
Kombo	Drink	5	0,0373
Kombo	Goceng	12	0,0896
Kombo	Snack	3	0,0224
Chicken	Rice	13	0,0971
Chicken	Drink	12	0,0896
Chicken	Goceng	6	0,0448
Chicken	Snack	4	0,0299
Rice	Drink	15	0,1119
Rice	Goceng	4	0,0299
Rice	Snack	1	0,0075
Drink	Goceng	7	0,0522
Drink	Snack	12	0,0896
Goceng	Snack	3	0,0224

Table 4 is the complete calculation result to form 2 item sets. The minimum support set in this study is 0.02 and items that have support below 0.02 are not used in the next stage. Because the promo menu that will be formed only consists of 2 item combinations, the calculation to find a combination of 3 items is not carried out and the formation of association rules just uses a combination of 2 item sets or C2 (Syafrianto & Ayniyah, 2021).

After a high-frequency pattern is found, it will proceed to form an association rule that meets the minimum requirements for confidence by calculating the confidence of the A -> B associative rule (Harahap & Sulindawaty, 2020). The minimum confidence set is 0.08. The confidence value can be calculated using the formula (Zahrotul Wardah, Devi Fitrianah, Kristono, 2017):

$$Confidence(A \rightarrow B) = P\ (B \mid A) = \frac{\sum Transaction\ Contain\ A\ and\ B}{\sum Transaction(A)} \qquad (3)$$

With the formula no 3, the confidence value of the 2 itemset combination will be calculated. The following is a combination of the 2 selected item sets in table 5:

Tabel 5. Selected combination 2 itemset

Item		Total	Support
Kombo	Rice	3	0,0224
Kombo	Drink	5	0,0373
Kombo	Goceng	12	0,0896
Kombo	Snack	3	0,0224
Chicken	Rice	13	0,0971
Chicken	Drink	12	0,0896
Chicken	Goceng	6	0,0448
Chicken	Snack	4	0,0299
Rice	Drink	15	0,1119
Rice	Goceng	4	0,0299
Drink	Goceng	7	0,0522

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 7, Issue 1, January 2023
DOI : https://doi.org/10.33395/sinkron.v8i1.12071
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Drink	Snack	12	0,0896
Goceng	Snack	3	0,0224

Calculation of the confidence value of each data in table 6 is as follows:

$$Confidence\ P\ (\ Rice|\ Kombo) = \frac{\sum Transaction\ Contain\ \ (Kombo\ , Rice)}{\sum Transaction\ \ Kombo} = \frac{3}{60} = 0{,}05$$

$$Confidence\ P\ (Drink\ |\ Kombo) = \frac{\sum Transaction\ Contain\ \ (Kombo\ , Drink\ )}{\sum Transaction\ \ Kombo} = \frac{5}{60} = 0{,}083$$

Tabel 6. Confidence Value

Confidence Item	Result	
Confidence P (Rice | Kombo)	= 3/60	= 0,05
Confidence P (Drink | Kombo)	= 5/60	= 0,083
Confidence P (Goceng | Kombo)	= 12/60	= 0,183
Confidence P (Snack | Kombo)	= 3/60	= 0,048
Confidence P (Rice | Chicken)	= 13/26	= 0,5
Confidence P (Drink | Chicken)	= 12/26	= 0,461
Confidence P (Goceng | Chicken)	= 6/26	= 0,230
Confidence P (Snack | Chicken)	= 4/26	= 0,153
Confidence P (Drink | Rice)	= 15/22	= 0,681
Confidence P (Goceng | Rice)	= 4/22	= 0,181
Confidence P (Goceng | Drink)	= 7/38	= 0,184
Confidence P (Snack | Drink)	= 12/38	= 0,315
Confidence P (Snack| Goceng)	= 3/51	= 0,058

From the results of the above calculations, the association rules are obtained as follows in table 7:

Tabel 7. Association Rules C2

Rules	Confidence	
If you buy a combo then buy rice	3/60	0,050
If you buy a combo then buy a drink	5/60	0,083
If you buy a combo, then buy a goceng	12/60	0,183
If you buy a combo then buy a snack	3/60	0,048
If you buy chicken, buy rice	13/26	0,500
If you buy chicken, buy a drink	12/26	0,461
If you buy chicken, buy goceng	6/26	0,230
If you buy chicken, buy snacks	4/26	0,153
If you buy rice, buy a drink	15/22	0,681
If you buy rice, buy goceng	4/22	0,181
If you buy a drink, buy a shake	7/38	0,184
If you buy a drink, buy a snack	12/38	0,315
If you buy goceng then buy a snack	3/51	0,058

The minimum confidence set is 0.08, so rules with confidence <0.08 will not be used as final rules. From calculations using the Apriori Algorithm, customer purchasing patterns have been obtained. From this buying pattern, the marketing can determine what products are the best-selling products in Gresik city and can determine promos that suit the type of customer in Gresik. Based on the calculations, the result is on table 8

.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 7, Issue 1, January 2023
DOI : https://doi.org/10.33395/sinkron.v8i1.12071
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Tabel 8. Final Result

No	Rules	Support	Confidence
1	If a customer buys rice, they buy a drink	11,19 %	68,1 %.
2	If the customer buys chicken then buy rice	9,71 %	50 %.
3	If the customer buys chicken then buy a drink	8,96 %	46,1 %.
4	If a customer buys a drink, then he buys a snack	8,96 %	31,5%
5	If the customer buys chicken then buy goceng	4,48%	23%
6	If a customer buys a drink, then he buys a goceng	5,22%	18,4%
7	If the customer buys a combo, then buy a goceng	8,96 %	18,3%
8	If a customer buys rice, they buy goceng	2,99%	18,1%
9	If a customer buys chicken, they buy a snack	2,99%	15,3%
10	If the customer buys a combo then buy a drink	3,73%	8,3%

From this calculation, implementation system with apriori method can be build. Same data used to input in the system and the system have same final result. Detail implementation system is on figure no 3,4 and 5.

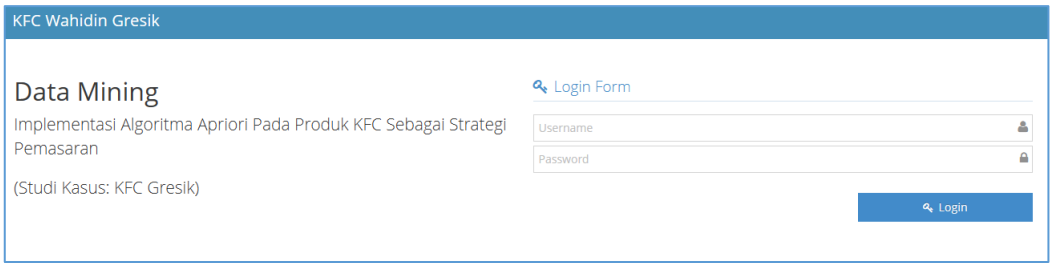

Figure 3: Login Page

Figure 3, the login page is a first page for the admin to login on system. After login admin will be redirected to the main page (figure no 4).

Figure 4: Main Page

The main page (figure 4) main page is the first page that admin access after login. On the left side there is a "Transaction Data" menu which functions to enter transaction data. Menu "Process Apriori" to perform system calculation processes. Menu "Results" to see the calculation results (figure 5). Lastly is the logout button to exit the system.

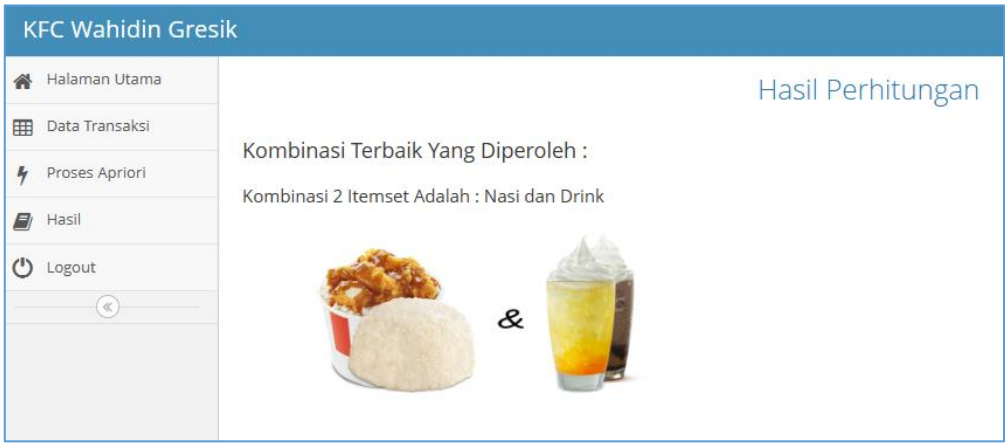

Figure 5: Result Page

*name of corresponding author

e-ISSN : 2541-2019
p-ISSN : 2541-044X

The result page (figure 5) is containing the result by system which the result has the same result as manual calculation. The best rules is if customer buy rice then buy drink.

DISCUSSIONS

In this study, the Apriori algorithm succeeded in providing item association rules according to customer transaction patterns. These association rules can be used as a reference by marketing parties to create the right promo menu. In addition to obtaining transaction patterns, other research states that the Apriori algorithm can be used to determine the layout of goods so that customers can easily pick up items that are frequently purchased together. The limitation of this study is that the transaction data used is only transaction data that is in one store branch, namely in the city of Gresik and the possibility that the results given are invalid or in accordance with shops in other cities. In addition to the limitations on transaction data, there are other limitations, namely the existence of other methods for obtaining association rules. In future research this can be used as a comparison which method is most appropriate for product association rules.

CONCLUSION

From the research that has been done, it can be concluded that the implementation of data mining with the apriori algorithm has found solutions to existing problems. Research conducted on 1 year transaction data of 48,750 transactions with an average of 134 transactions per day, the final result is the formation of association rules that can be used as a reference by marketing to make promos according to customer buying patterns in the city of Gresik. The association rule final have 10 rules with the highest percentage, in this case it can be interpreted that these three rules can be used as a good reference for marketing to make promo menus related to the three association rules. The limitation of this research is access to transaction data, if author could access every transaction data from each existing outlet, of course it would provide an increasingly accurate reference for marketing in compiling promo menus according to customer types.

REFERENCES

Alma, E., Utami, E., & Wibowo, F. W. (2020). *Implementasi Algoritma Apriori untuk Rekomendasi Produk pada Toko Online*. *7*(1).

Aulia, N., Indra, & Nur, N. (2021). Implementasi Data Mining menggunakan Algoritma Apriori untuk Menentukan Pola Pembelian Obat di Rumah Sakit. *Journal of Computer and Information System (J-CIS)*, *4*(2), 19–29. https://doi.org/10.31605/jcis.v4i2.1259

Harahap, P. N., & Sulindawaty, S. (2020). Implementasi Data Mining Dalam Memprediksi Transaksi Penjualan Menggunakan Algoritma Apriori (Studi Kasus PT.Arma Anugerah Abadi Cabang Sei Rampah). *Matics*, *11*(2), 46. https://doi.org/10.18860/mat.v11i2.7821

Huda, I. A. (2020). Irkham Abdaul Huda,Perkembangan Teknologi Informasi Dan Komunikasi (Tik) Terhadap Kualitas Pembelajaran Di Sekolah Dasar,Jurnal Pendidikan dan Konseling,Vol2No1,2020:hal121. *Jurnal Pendidikan Dan Konseling (JPDK)*, *2*(1), 121–125.

Kusumo, H., Sediyono, E., & Marwata, M. (2019). Analisis Algoritma Apriori untuk Mendukung Strategi Promosi Perguruan Tinggi. *Walisongo Journal of Information Technology*, *1*(1), 49. https://doi.org/10.21580/wjit.2019.1.1.4000

Mahmud, R., & Hartanto, A. (2020). Penerapan Data Mining Rekomendasi Laptop Menggunakan Algoritma Apriori. *Juisi*, *06*(02), 21–30.

Mai, P., Tarigan, S., Hardinata, J. T., Qurniawan, H., Safii, M., & Winanjaya, R. (2022). *Implementasi Data Mining Menggunakan Algoritma Apriori Dalam Menentukan Persediaan Barang (Studi Kasus : Toko Sinar Harahap)*. *12*(2), 51–61.

Mardi, Y. (2017). Data Mining : Klasifikasi Menggunakan Algoritma C4.5. *Edik Informatika*, *2*(2), 213–219. https://doi.org/10.22202/ei.2016.v2i2.1465

Marsono, M. (2019). Penerapan Data Mining Pengaturan Pola Tata Letak Barang Pada Berkah Swalayan Untuk Strategi Penjualan Menggunakan Algoritma Apriori. *InfoTekJar (Jurnal Riceonal Informatika Dan Teknologi Jaringan)*, *3*(2), 170–175. https://doi.org/10.30743/infotekjar.v3i2.908

Misriani. (2019). *Implementasi Data Mining pada Penjualan Produk Millionare Club Indonesia dengan Algoritma Apriori*. *1*(1), 16–21.

Naldy, E. T., & Andri, A. (2021). Penerapan Data Mining Untuk Analisis Daftar Pembelian Konsumen Dengan Menggunakan Algoritma Apriori Pada Transaksi Penjualan Toko Bangunan MDN. *Jurnal Riceonal Ilmu Komputer*, *2*(2), 89–101. https://doi.org/10.47747/jurnalnik.v2i2.525

Oktafia, H., Wijaya, L., Yuliansyah, C., Sistem, P., Universitas, I., Insan, B., Ilmu, P., Universitas, K., Petulai, P., & Apriori, A. (2022). *Implementasi Asosiasi Rule Mining Pada Data Transaksi*. *1*(1), 30–35.

Oktaviani, A., TM Napitupul, G., Sarkawi, D., & Yulianti, I. (2019). Penerapan Data Mining Terhadap

*name of corresponding author

Penjualan Pipa Pada Cv. Gaskindo Sentosa Menggunakan Metode Algoritma Apriori. *Jurnal Riset Informatika*, *1*(4), 167–172. https://doi.org/10.34288/jri.v1i4.96

Purnia, D. S., Warnilah, A. llah, Studi, P., Informatika, T., Teknik, F., Nusa Mandiri, S., & Jakarta. (2017). Implementasi Data Mining Pada Penjualan kacamata Dengan Menggunakan Algoritma Apriori. *Indonesian Journal on Computer and Information Technology*, *2*(2), 31–39.

Qomariah, S., Basrie, B., & Pa'a, S. F. (2020). Implementasi Algoritma Apriori Pada Data Penjuanlan Produk Asesoris Cv Princes Diary Samarinda. *Just TI (Jurnal Sains Terapan Teknologi Informasi)*, *12*(2), 31. https://doi.org/10.46964/justti.v12i2.321

Rusdianto, D., Zaelani, L., Informasi, S., Teknologi, F., Universitas, I., Bandung, B., Informasi, S., Teknologi, F., Universitas, I., Bandung, B., Informasi, S., Teknologi, F., Universitas, I., & Bandung, B. (2020). Implementasi Data Mining Menggunakan Algoritma Apriori Untuk Mengetahui Pola Peminjaman BUKU DI Perpustakaan Universitas. *Jurnal Sistem Informasi , J-SIKA Volume 02 Nomor 02 , Desember 2020*, *02*(02), 1–10.

Sutrisno, S. (2020). Penerapan Algoritma Apriori Untuk Mencari Pola Penjualan Produk Dana Pada Pt Bank Rakyat Indonesia (Persero) Tbk Kanca Jakarta Pasar Minggu. *Jurnal Sistem Informasi Dan Informatika (Simika)*, *3*(1), 12–26. https://doi.org/10.47080/simika.v3i1.834

Syafrianto, S., & Ayniyah, D. (2021). Implementasi Data Mining Menggunakan Metode Algoritma Apriori Pada Toko Dhurroh Elektronik. *Jurnal Teknika*, *13*(2), 67. https://doi.org/10.30736/jt.v13i2.624

Zahrotul Wardah, Devi Fitrianah, Kristono, 2020. (2017). Implementasi Data Mining Pada Penjualan Tiket Kereta api Menggunakan Algoritma Apriori (Studi Kasus : PT. Pesona Ceria Travel). *Pelita Informatika Budi Darma*, *2*(2), 31–39.

*name of corresponding author