Paradigma, Vol. 25, No. 1, Maret 2023, E-ISSN: 2579-3500, Page. 62-70
Published: LPPM Universitas Bina Sarana Informatika
PARADIGMA
website: http://jurnal.bsi.ac.id/index.php/paradigma/

Application of Apriori Algorithm to Determine Sales of Traditional Foods

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ARTICLE INFORMATION

Artikel History:
Received: March 20, 2023
Revised: April 12, 2023
Accepted: April 13, 2023

Keyword:
Data Mining
Algoritma Apriori
Association Rule
Penjualan

ABSTRACT

Competition in the food sales industry is growing, making business owners have to be creative to increase sales turnover. Sales activities that occur every day make sales data increase. Researchers intend to make data on Traditional Restaurant as the basis for data mining processing on food sales using the apriori algorithm. The application of the Apriori Algorithm aims to find the most item combinations based on transaction data and then form association patterns from combinations of items. Association patterns are formed with a minimum support value of 10% and a minimum confidence value of 40% which results in 3 association rules and the most sold food products are Bangka Crackers and Cooked vegetable salad with a support value of 0.105% and a confidence value of 0.583%

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INTRODUCTION

Competition in the growing business world, especially in the sales business, requires business owners to think creatively in finding strategies that can increase sales and marketing of their products (Febrian et al. 2018). One of them is the selection of strategies by utilizing sales data (Subakti and Nataliani 2022). Various types of businesses in the food sector are one of the causes of competition in achieving sales profits. Sales activities that take place every day make sales data increase, resulting in data that can be utilized and processed into useful information for increasing sales (Nurajizah 2019).

Sales can be defined as an activity to buy and satisfy needs and desires for something through the exchange process(Destiani and Zainuddin 2020). " The diversity of foods such as traditional and modern foods has been consumed by many people easily. Traditional food itself has the meaning of food that is often consumed by the community and has a distinctive taste by maintaining its uniqueness" (Marsiti, Suriani, and Sukerti 2019). "Traditional food is an effort to manage the food around it into food that is ready to be consumed for the sustainability of life "(Gardjito, Harmayanti, and Santoso 2019).

Data mining is an activity related to data collection, using historical data to find knowledge, information, regularities, patterns or relationships in large data. The output in data mining can be used as an alternative in decision making or to improve decision making in the future (Efori Buulolo 2020).

Apriori algorithm is a type of association rule in data mining that aims to find a matching relationship in a database (Rizaldi and Adnan 2021). Apriori algorithm is a well-known algorithm for finding high-frequency patterns and predicting purchases from transaction data (Sagin and Ayvaz 2018). High frequency patterns are patterns of items in a database that have a frequency or support above a certain threshold called the minimum support term. These high-frequency patterns are used to construct associative rules as well as several other data mining techniques (Sophia and Yuniar 2017).

DOI: https://doi.org/10.31294/paradigma.v24i2.1840

Researchers want to make the existing data at this Traditional Restaurant as the basis for data mining processing on sales using the apriori algorithm method , with the aim of knowing which food menus are most in demand and which are less in demand, to determine further management policies related to promotions and stock items.

Previous research conducted by Siti Aisyah & Normah with the title Application of the Apriori Algorithm to Sales Data at the Central Jakarta Bappenas Cooperative Supermarket. Here are some of the results of research on the Apriori Algorithm: Every day there are several sales transactions, where the data will continue to grow. Usually this sales data is only used as a store archive, actually in the sales data there is information that can be used to find out the most sales simultaneously so that a method is needed to find out which products sell well using the apriori algorithm and rapidminer software (Siti Aisyah 2019).

Another research was also conducted by Cep Adiwihardja, Nila Hardi, and Wiwiek Widyastuty with the title Implementation of Data Mining of Cosmetic Sales at Zahrani Store Using Apriori Algorithm. Lipstick sales are items that are in great demand by all circles. They can influence the public to buy these products, to find out can use the help of rapid miner tools, products with the most sales can be known. Apriori algorithm is a type of association rule in data mining. Apriori is a very famous algorithm for finding high frequency patterns. High frequency patterns are patterns of items in a database that have a frequency or support above a certain threshold called the minimum support term. Using the apriori algorithm can help to develop marketing strategies (Adiwihardja, Hardi, and Widyastuty 2019).

Based on previous research, it can be concluded that research related to traditional food has not been widely used as a research object so that this research can be one of the references in apriori data mining processing for traditional food. In addition, the number of transactions from the two previous studies is still minimal so that there is no visible difference in association patterns in the calculation of the apriori method.

Based on the background mentioned above, there are several problems discussed in this study as follows: (1) How to increase sales of traditional food by utilizing data on sales reports. (2) How to apply Data Mining method with apriori algorithm to find out the most sold food sales.

The purpose of this research is to find out which food menus are most in demand and which are less in demand, to determine further management policies regarding promotions and stock items.

RESEARCH METHODE

A. Research Stages

The research stages carried out by the author are (Bella Audi Najib 2019):

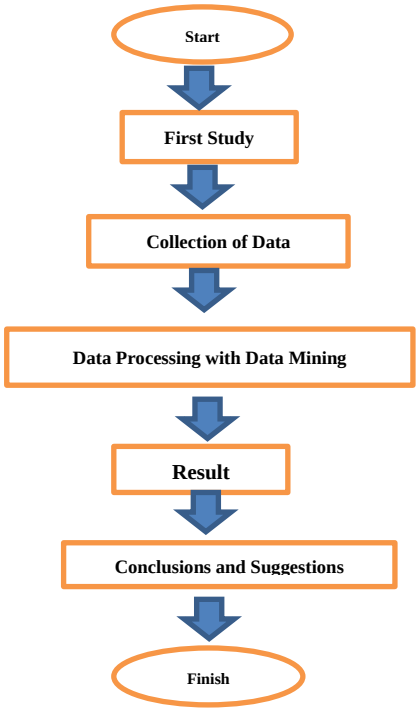

Figure 1. Research Stages

The steps of the research stages are explained as follows:

1. Initial Study
   In this research stage, before the author looks for and studies the main problems that exist at Mama Fitri Restaurant by observing Sales Transactions, the author also studies references in the form of journals, e-books related to Data Mining and the Apriori Algorithm to be used as a theoretical study in this research.
2. Data Collection
   At this stage the author collects data from information through direct interviews with Mrs. Rubiati as the Owner of Mama Fitri Restaurant. The data that will be used in this study is transaction data related to traditional food sales for 1 month, namely March 2020.
3. Data Processing with Data Mining
   The next stage of this research uses data mining techniques with the apriori algorithm method, namely to process data provided by the Owner which is calculated manually. The data collected is quantitative in nature obtained from the object under study.
4. Result Analysis
   The author analyzes the results using Rapidminer Software to connect the compiled and obtained data.
5. Conclusion and Suggestion
   The last stage in this research is drawing conclusions and suggestions. Researchers take from the calculation and processing of manually calculated data. Suggestions contain shortcomings in conducting research.

B. Data Collection Method

1. Observation Method
   In this thesis research, the author collects some

of the data needed by conducting field research. In this studythe authors took the target or object, namely the application of data mining using the apriori algorithmmethod to determine what food menu is most in demand at Mama Fitri's Restaurant.

2. Literature Study
   The author also conducts a literature study which aims to collect data and find the necessary information, as well as looking for several book and journal references that explain *Data Mining* with the Apriori Algortima method related to this research.
3. Data Analysis Method
   Describe the chronology of the research, including the research design, research procedures (in the form of algorithms, pseudocode, or otherwise), how to test, and data acquisition. References must support the description of the research program; then, the explanation can be accepted scientifically.

The steps of the a priori algorithm are as follows: (1) Set k=1 (refers to the 1st itemset). (2) Count all k-itemsets (itemsets that have k-items). (3) Calculate the support of all candidate itemsets. Select the itemset based on the minimum support calculation. (4) Combine all k-sized itemsets to produce k+1 candidate itemsets. (5) Set k = k+1.

RESULTS AND DISCUSSION

A. Problem Analysis at Mama Fitri Restaurant

So far, the sales data of Mama Fitri Restaurant is not well structured, so that the sales data which is increasing day by day only functions as an archive and cannot be utilized by the Restaurant to develop marketing strategies. Therefore, Mama Fitri Restaurant needs a system to process data that can produce sales data on the most frequently purchased food, so that the most frequently purchased food products can be a reference for developing marketing strategies for these products to consumers.

B. Sales Transaction Data of Mama Fitri Restaurant

At this stage, calculations are carried out to get the final result. The stages in analyzing data with the apriori algorithm on the sale of Mix vegetable with peanut sauce, Salad, Cooked vegetable salad, Seasoning of Pecel, Peanut brittle, Tempe chips, Banana chips, Rambak Crackers, Bangka Crackers, Teh Kotak, Bandulan Tea, and Pucuk Tea begin with compiling the data to be analyzed, then compiling all types of food product items in the transaction and will be analyzed using the apriori algorithm with RapidMiner Software. Here are the sales transactions for a month:

Table 1. Sales Transaction Data

No	Date	Foods
1	1 March 2020	Mix vegetable with peanut sauce, fruit salad with spicy brown sugar sauce, Bandulan tea
2		Mix vegetable with peanut sauce, Cooked vegetable salad
3		Cooked vegetable salad
4		Peanut brittle, tempe chips
5		Fruit salad with spicy brown sugar sauce, Rambak Crackers
6		Fruit salad with spicy brown sugar sauce, Banana chips
7		Mix vegetable with peanut sauce, Fruit salad with spicy brown sugar sauce
8		Fruit salad with spicy brown sugar sauce, Bandulan tea
9		Cooked vegetable fruit salad with spicy brown sugar sauce, peanut brittle
10		Mix vegetable with peanut sauce
11		Fruit salad with spicy brown sugar sauce
12	2 March 2020	Tempe chips, banana chips
13		peanut brittle, Rambak Crackers
14		Mix vegetable with peanut sauce, Rambak Crackers
15		Fruit salad with spicy brown sugar sauce, Rambak Crackers
16		Mix vegetable with peanut sauce, Tea of box
17		Cooked vegetable salad, peanut brittle
18		Mix vegetable with peanut sauce, Bangka Crackers, Peanut brittle
19		Mix vegetable with peanut sauce, Rambak Crackers
20		Fruit salad with spicy brown sugar sauce, Rambak Crackers
21		Fruit salad with spicy brown sugar sauce, Leaf tea
22	3 March 2020	Fruit salad with spicy brown sugar sauce, Rambak Crackers
23		Cooked vegetable salad, Bangka Crackers
24		peanut brittle, Leaf tea
25		peanut brittle, Bandulan tea
26		Mix vegetable with peanut sauce, Bandulan tea
27		Fruit salad with spicy brown sugar sauce, Rambak Crackers
28		Mix vegetable with peanut sauce, Fruit salad with spicy brown sugar sauce

29	4 March 2020	Mix vegetable with peanut sauce, Rambak Crackers
30		Mix vegetable with peanut sauce, Rambak Crackers, Bangka Crackers
31		Cooked vegetable salad, Rambak Crackers, peanut brittle
32		Cooked vegetable salad, Bangka Crackers
33		Mix vegetable with peanut sauce, Fruit salad with spicy brown sugar sauce
34		Mix vegetable with peanut sauce, Fruit salad with spicy brown sugar sauce
35		Fruit salad with spicy brown sugar sauce
36		Mix vegetable with peanut sauce, Fruit salad with spicy brown sugar sauce
37		Mix vegetable with peanut sauce, Bandulan tea
38	5 March 2020	Fruit salad with spicy brown sugar sauce, Rambak Crackers
39		Cooked vegetable salad, Bangka Crackers
40		Mix vegetable with peanut sauce, Bangka Crackers
41		Fruit salad with spicy brown sugar sauce, Rambak Crackers
42		Mix vegetable with peanut sauce, Fruit salad with spicy brown sugar sauce
43		Seasoning of Pecel, banana chips
44		Mix vegetable with peanut sauce, Fruit salad with spicy brown sugar sauce, Rambak Crackers
45	6 March 2020	Fruit salad with spicy brown sugar sauce, Rambak Crackers
46		Mix vegetable with peanut sauce, Cooked vegetable salad
47		Seasoning of Pecel, peanut brittle
48		Fruit salad with spicy brown sugar sauce, Rambak Crackers
49		Fruit salad with spicy brown sugar sauce, Rambak Crackers
50		Mix vegetable with peanut sauce, Fruit salad with spicy brown sugar sauce, peanut brittle
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170		Mix vegetable with peanut sauce, Cooked vegetable salad
171		Mix vegetable with peanut sauce, Cooked vegetable salad
172		Mix vegetable with peanut sauce, Rambak Crackers
173		Mix vegetable with peanut sauce, tempe chips
174		Fruit salad with spicy brown sugar sauce, Rambak Crackers
175	28 March 2020	Cooked vegetable salad
176		Fruit salad with spicy brown sugar sauce
177		Cooked vegetable salad, Bangka Crackers
178		Mix vegetable with peanut sauce, Rambak Crackers, Bangka Crackers
179		Mix vegetable with peanut sauce, Bangka Crackers
180		Mix vegetable with peanut sauce, Bangka Crackers
181		Mix vegetable with peanut sauce, Fruit salad with spicy brown sugar sauce, Bangka Crackers
182	29 March 2020	Cooked vegetable fruit salad with spicy brown sugar sauce, Bangka Crackers
183		Mix vegetable with peanut sauce, Tempe chips
184		Fruit salad with spicy brown sugar sauce, Rambak Crackers
185		Cooked vegetable salad, Bangka Crackers
186	30 March 2020	Mix vegetable with peanut sauce, Rambak Crackers
187		Mix vegetable with peanut sauce, Cooked vegetable salad, peanut brittle
188		Fruit salad with spicy brown sugar sauce, Rambak Crackers
189		Cooked vegetable salad, Bangka Crackers
190		Cooked vegetable salad, Bangka Crackers
191		Mix vegetable with peanut sauce, Rambak Crackers
192		Cooked vegetable salad, Leaf tea
193		Cooked vegetable salad
194	31 March 2020	Cooked vegetable salad, peanut brittle, Rambak Crackers
195		Cooked vegetable fruit salad with spicy brown sugar sauce
196		Cooked vegetable salad, Bangka Crackers
197		Mix vegetable with peanut sauce, Rambak Crackers

198	Mix vegetable with peanut sauce, Cooked vegetable salad, peanut brittle
199	Fruit salad with spicy brown sugar sauce, Rambak Crackers
200	Cooked vegetable salad, Bangka Crackers

Table 2. Tabular Format

No	Date	Foods											
		Mix vegetable with peanut sauce	Cooked vegetable fruit salad with spicy brown sauce	Fruit salad with spicy brown sugar sauce	Seasoning of Pecel	Peanut brittle	Kripik Tempe	Kripik Pisang	Rambak Crackers	Bangka Crackers	Tea of box	Teh Bandulan	Leaf tea
1	01/03/2020	1	0	1	0	0	0	0	0	0	0	1	0
2		1	1	0	0	0	0	0	0	0	0	0	0
3		0	1	0	0	0	0	0	0	0	0	0	0
4		0	0	0	0	1	1	0	0	0	0	0	0
5		0	0	1	0	0	0	0	1	0	0	0	0
6		0	0	1	0	0	0	1	0	0	0	0	0
7		1	0	1	0	0	0	0	0	0	0	0	0
8		0	0	1	0	0	0	0	0	0	0	1	0
9		0	1	0	0	1	0	0	0	0	0	0	0
10		1	0	0	0	0	0	0	0	0	0	0	0
11		0	0	1	0	0	0	0	0	0	0	0	0
12	02/03/2020	0	0	0	0	0	1	1	0	0	0	0	0
13		0	0	0	0	1	0	0	1	0	0	0	0
14		1	0	0	0	0	0	0	1	0	0	0	0
15		0	0	1	0	0	0	0	1	0	0	0	0
16		1	0	0	0	0	0	0	0	0	1	0	0
17		0	1	0	0	1	0	0	0	0	0	0	0
18		1	0	0	0	1	0	0	0	1	0	0	0
19		1	0	0	0	0	0	0	1	0	0	0	0
20		0	0	1	0	0	0	0	1	0	0	0	0
21		0	0	1	0	0	0	0	0	0	0	0	1
22	03/03/2020	0	0	1	0	0	0	0	1	0	0	0	0
23		0	1	0	0	0	0	0	0	1	0	0	0
24		0	0	0	0	1	0	0	0	0	0	0	1
25		0	0	0	0	1	0	0	0	0	0	1	0
26		1	0	0	0	0	0	0	0	0	0	1	0
27		0	0	1	0	0	0	0	1	0	0	0	0
28		1	0	1	0	0	0	0	0	0	0	0	0
29	04/03/2020	1	0	0	0	0	0	0	1	0	0	0	0
30		1	0	0	0	0	0	0	1	1	0	0	0
31		0	1	0	0	1	0	0	1	0	0	0	0
32		0	1	0	0	0	0	0	0	1	0	0	0
33		1	0	1	0	0	0	0	0	0	0	0	0
34		1	1	0	0	0	0	0	0	0	0	0	0
35		0	0	1	0	0	0	0	0	0	0	0	0
36		1	0	1	0	0	0	0	0	0	0	0	0
37		1	0	0	0	0	0	0	0	0	0	1	0
38	05/03/2020	0	0	1	0	0	0	0	1	0	0	0	0
39		0	1	0	0	0	0	0	0	1	0	0	0
40		1	0	0	0	0	0	0	0	1	0	0	0
41		0	0	1	0	0	0	0	1	0	0	0	0
42		1	0	1	0	0	0	0	0	0	0	0	0
43		0	0	0	1	0	0	1	0	0	0	0	0
44		1	0	1	0	0	0	0	1	0	0	0	0
45	06/03/2020	0	0	1	0	0	0	0	1	0	0	0	0
46		1	1	0	0	0	0	0	0	0	0	0	0
47		0	0	0	1	1	0	0	0	0	0	0	0
48		0	0	1	0	0	0	0	1	0	0	0	0
49		0	0	1	0	0	0	0	1	0	0	0	0
50		1	0	1	0	1	0	0	0	0	0	0	0
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.	.....	..	..	..	..	..	..	..	..	..	..	..	..
170		1	1	0	0	0	0	0	0	0	0	0	0
171		1	1	0	0	0	0	0	0	0	0	0	0
172		1	0	0	0	0	0	0	1	0	0	0	0
173		1	0	0	0	0	1	0	0	0	0	0	0
174		0	0	1	0	0	0	0	1	0	0	0	0
175	28/03/2020	0	1	0	0	0	0	0	0	0	0	0	0
176							0	0	0	0	0	0	0

6		0	0	1	0								
17													
7		0	1	0	0	0	0	0	0	1	0	0	0
17													
8		1	0	0	0	0	0	0	1	1	0	0	0
17													
9		1	0	0	0	0	0	0	0	1	0	0	0
18													
0		1	0	0	0	0	0	0	0	1	0	0	0
18													
1		1	0	1	0	0	0	0	0	1	0	0	0
18	29/03/20												
2	20	0	1	0	0	0	0	0	0	1	0	0	0
18													
3		1	0	0	0	0	1	0	0	0	0	0	0
18													
4		0	0	1	0	0	0	0	1	0	0	0	0
18													
5		0	1	0	0	0	0	0	0	1	0	0	0
18	30/03/20												
6	20	1	0	0	0	0	0	0	1	0	0	0	0
18													
7		1	1	0	0	1	0	0	0	0	0	0	0
18													
8		0	0	1	0	0	0	0	1	0	0	0	0
18													
9		0	1	0	0	0	0	0	0	1	0	0	0
19													
0		0	1	0	0	0	0	0	0	1	0	0	0
19													
1		1	0	0	0	0	0	0	1	0	0	0	0
19													
2		0	1	0	1	0	0	0	0	0	0	0	1
19													
3		0	1	0	0	0	0	0	0	0	0	0	0
19	31/03/20												
4	20	0	1	0	0	1	0	0	1	0	0	0	0
19													
5		0	1	0	0	0	0	0	0	0	0	0	0
19													
6		0	1	0	0	0	0	0	0	1	0	0	0
19													
7		1	0	0	0	1	0	0	1	0	0	0	0
19													
8		1	1	0	0	1	0	0	0	0	0	0	0
19													
9		0	0	1	0	0	0	0	1	0	0	0	0
20													
0		0	1	0	0	0	0	0	0	1	0	0	0

C. Itemset Formation 1

The process of forming C1 is referred to as 1 itemset with a minimum amount of support = 10%. With the following formula:

$$\text{Support A} = \frac{\Sigma\, Transactions\ containing\ A}{\Sigma\, Transactions}\ x\ 100\% \ldots\ldots (1)$$

D. Formation of 2 Itemset Combination

The process of forming C2 or called 2 itemsets with a minimum amount of support = >10%

$$\text{Support}(A,B) = P(A \cap B)$$

$$\text{Support}(A,B) = \frac{\Sigma\, Transactions\ containing\ A\ and\ B}{\Sigma\, Transaction} x100\% \ldots\ldots\ldots (2)$$

Table 3. Support Combination of 2 Itemset

Itemset	Support Count	Support %
Mix vegetable with peanut sauce, Fruit salad with spicy brown sugar sauce	**28/200**	**14,0%**
Mix vegetable with peanut sauce, Cooked vegetable fruit salad with spicy brown sugar sauce	**15/200**	**7,5%**
Mix vegetable with peanut sauce, peanut brittle	**12/200**	**6,0%**
Mix vegetable with peanut sauce, Rambak Crackers	**26/200**	**13,0%**
Mix vegetable with peanut sauce, Bangka Crackers	**13/200**	**6,5%**
Fruit salad with spicy brown sugar sauce, Cooked vegetable salad	**3/200**	**1,5%**
Fruit salad with spicy brown sugar sauce, peanut brittle	**2/200**	**1,0%**
Fruit salad with spicy brown sugar sauce, Rambak Crackers	**28/200**	**14,0%**
Fruit salad with spicy brown sugar sauce, Bangka Crackers	**4/200**	**2,0%**
Cooked vegetable salad, Peanut brittle	**14/200**	**7,0%**
Cooked vegetable salad, Rambak Crackers	**8/200**	**4,0%**
Cooked vegetable salad, Bangka Crackers	**21/200**	**10,5%**
peanut brittle, Rambak Crackers	**12/200**	**6,0%**
peanut brittle, Bangka Crackers	**1/200**	**0,5%**
Rambak Crackers, Bangka Crackers	**4/200**	**2,0%**

E. Establishment of Association Rules

After finding all the high-frequency patterns, then find the association rule that meets the minimum requirement for confidence with the following formula:

Table 4. Support Combination of 2 Itemset

Itemset	Support Count	Support %
Mix vegetable with peanut sauce	93/200	46,5%
Fruit salad with spicy brown sugar sauce	71/200	31,0%
Cooked vegetable salad	62/200	35,5%
Seasoning of Pecel	5/200	2,5%
peanut brittle	26/200	13,0%
Tempe chips	12/200	6,0%
Banana chips	11/200	5,5%
Rambak Crackers	65/200	32,5%
Bangka Crackers	36/200	18,0%
Tea of Box	2/200	1,0%
Bandulan tea	13/200	6,5%
Leaf tea	6/200	3,0%

Minimum confidence = 40%

The confidence value of the rule A→B

$$\text{Confidence} = P(A \cap B) = \frac{\Sigma\, Transaksi\ yang\ mengandung\ A\ dan\ B}{\Sigma\, Transaksi} x100\% \quad \ldots\ldots\ldots (3)$$

Table 5. Association Rules

Rules	confidence
If you buy MIX VEGETABLE WITH PEANUT SAUCE, you will buy FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE	30,1%
If you buy FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE, you will buy MIX VEGETABLE WITH PEANUT SAUCE	39,4%
If you buy MIX VEGETABLE WITH PEANUT SAUCE, you will buy RAMBAK CRACKERS	28,0%
If you buy RAMBAK CRACKERS you will buy MIX VEGETABLE WITH PEANUT SAUCE	40,0%
If you buy FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE, you will buy RAMBAK CRACKERS	39,4%
If you buy RAMBAK CRACKERS, you will buy FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE	43,1%
If you buy COOKED VEGETABLE FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE, you will buy BANGKA CRACKERS	33,9%
If you buy BANGKA CRACKERS you will buy COOKED VEGETABLE SALAD	58,3%

So, those that meet the minimum Support >10% and Confidence >40% are as follows:

Table 6. Final Association Rules

Final Rule	*Support*	*confidence*
If you buy RAMBAK CRACKERS, you will buy MIX VEGETABLE WITH PEANUT SAUCE	0,130	40,0%
If you buy RAMBAK CRACKERS, you will also buy FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE	0,140	43,1%
If you buy BANGKA CRACKERS, you will buy COOKED VEGETABLE FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE	0,105	58,3%

With the results of the association rules above, the most popular traditional foods at Mama Fitri's restaurant are Rambak Crackers, Mix vegetable with peanut sauce, Fruit salad with spicy brown sugar sauce, Bangka Crackers, and Cooked vegetable fruit salad with spicy brown sugar sauce.

F. Implementation of Apriori Algorithm in Rapidminer 5.3 Tools

1. Create a Tabular Form on a Microsoft Excel worksheet as in table IV.2. Open the Rapidminer Software application and select New *Process.*

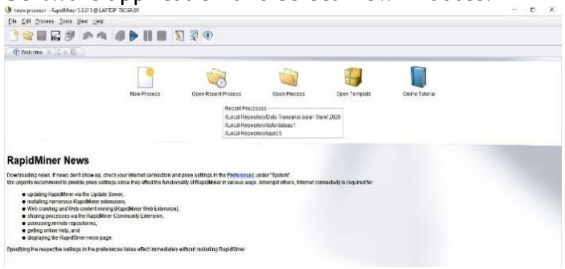

Figure 2. Initial View of Rapidminer

2. Read .xls data, select import which is used to read data and objects of a specific format. Select the data and click 2 times, then select Read Excel to enter thedata, press and slide to the main process.

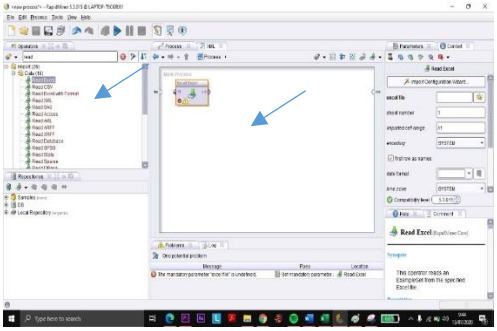

Figure 3. View and *Read Excel Operator* in *Main Process*

3. Entering Excel data By entering .xls data in the *Parameters View* there is an *Import Configuration Wizard* that functions to import .xls data from a computer

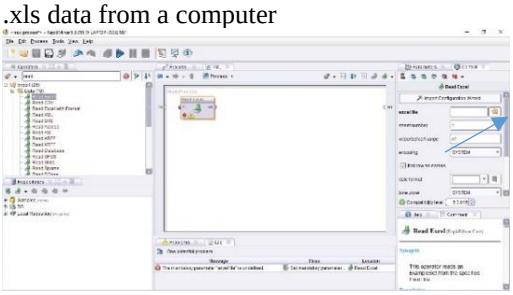

Figure 4. Parameter Display Excel

4. After entering the sales transaction data.xls, then enter the operator, namely the *Numerical to Binomial* operator, *FP Growth*, *Create Association Rule*

Figure 5. Numerical to Binomial, FP Growth, Create Association Rule

5. Fill in the *FP-Growth parametrs* with the specified minimum *support*, which is 10% or 0.1 and fill in the *Create Association Rule Parameters* with the specified minimum *confidence*, which is, 40% or 0.4

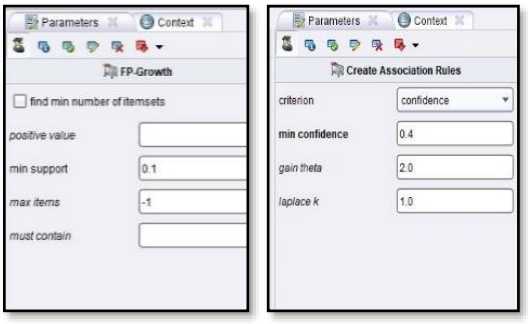

Figure 6. Determining minimum support and minimum confidence

6. Connect all the carriers, as shown below, then click the play icon

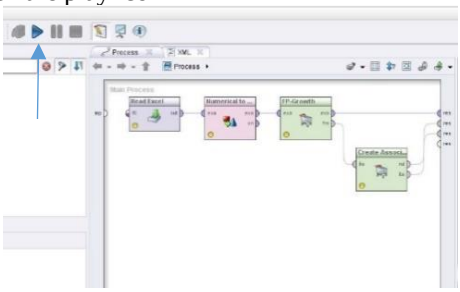

Figure 7. Association Rule Operator Display.

7. After playing, the results of the calculation of *Itemset* C1 and C2 appear which meet the minimum requirements of *Support* 10% or 0.1

Size	Support	Item 1	Item 2
1	0.465	Gado-gado	
1	0.355	Rujak	
1	0.325	Krupuk Rambak	
1	0.310	Karedok	
1	0.180	Krupuk Bangka	
1	0.130	Peyek	
2	0.140	Gado-gado	Rujak
2	0.130	Gado-gado	Krupuk Rambak
2	0.140	Rujak	Krupuk Rambak
2	0.105	Karedok	Krupuk Bangka

Figure 8. Display of *rapidminer software* calculation results itemset 1 and 2.

8. Furthermore, it can also be seen that the final result of the *Association Rule* is 3 *Rules*, with a minimum *confidence* requirement of 40% or 0.4.

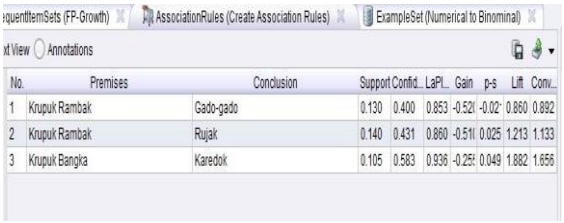

Figure 9. Display of the final *Association Rule* results.

9. *Graph View of* the final *Association Rule* result

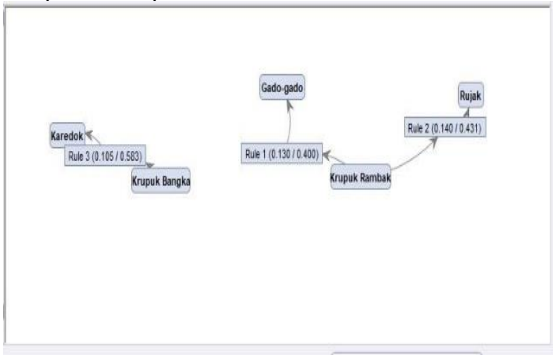

Figure 10. Graph View.

CONCLUSION

The application of *Apriori Algorithm* in this research is to find the most combinations of items

based on transaction data, then form association patterns from the combination of items. The association pattern is formed with a minimum *support* value of 10% and a minimum *confidence* value of 40%, which results in 3 association rules. And the most sold food products are Bangka Crackers and Cooked vegetable fruit salad with spicy brown sugar sauce with a *support* value of 0.105% and a *confidence* value of 0.583% and the the menus are less in demand is mix vegetable with peanut sauce. The resulting pattern analysis can help Restaurant owners make decisions to develop product marketing strategies, so that sales data does not only become an archive. That every month the resulting pattern can vary based on the transaction data analyzed. The greater the amount of data processed, the longer it takes. The greater the *support* value and *confidence* value set, the shorter the processing time of the algorithm.

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