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## Application of Apriori Algorithm to Determine Sales of Traditional Foods

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### 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).

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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):

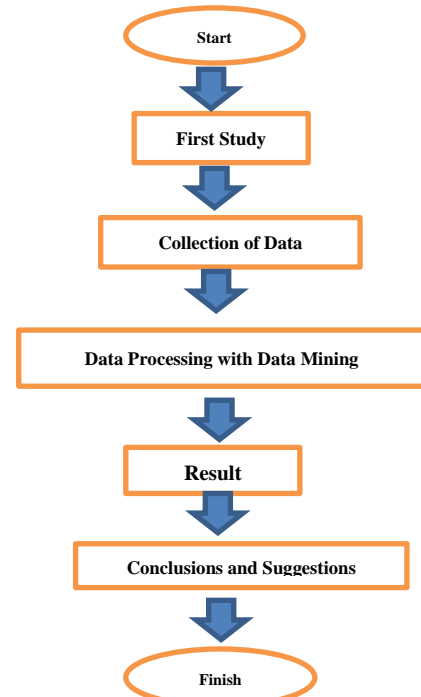


Figure 1. Research Stages

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 study the authors took the target or object, namely the application of data mining using the apriori algorithm method 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 Algorithm 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 | Mix vegetable with peanut sauce, fruit salad with spicy brown sugar |

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



|            |   |   |   |   |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|---|---|---|---|
| 6          | 0 | 0 | 1 | 0 |   |   |   |   |   |   |   |   |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 7          |   |   |   |   |   |   |   |   |   |   |   |   |
| 7          | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 7          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 7          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |
| 0          | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |
| 1          | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 29/03/2020 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |
| 20         | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |
| 3          | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |
| 4          | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |
| 5          | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 30/03/2020 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |
| 6          | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |
| 7          | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |
| 0          | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |
| 1          | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |
| 2          | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |
| 3          | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 31/03/2020 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |
| 4          | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |
| 5          | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |
| 6          | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |
| 7          | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0          |   |   |   |   |   |   |   |   |   |   |   |   |
| 0          | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |

$$\text{Support A} = \frac{\sum \text{Transactions containing A}}{\sum \text{Transactions}} \times 100\% \dots (1)$$

D. Formation of 2 Itemset Combination  
The process of forming C2 or called 2 itemsets with a minimum amount of support = >10%

$$\text{Support(A,B)} = \frac{\sum \text{Transactions containing A and B}}{\sum \text{Transaction}} \times 100\% \dots (2)$$

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%      |

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:

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

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

$$\frac{\sum \text{Transaksi yang mengandung A dan B}}{\sum \text{Transaksi}} \times 100\% \dots\dots (3)$$

Table 5. Association Rules

| Rules   | confidence     |
|---|----------------|
| If you buy MIX VEGETABLE WITH PEANUT SAUCE, you will buy FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE | 3 / 0 = 91,3%  |
| If you buy FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE, you will buy MIX VEGETABLE WITH PEANUT SAUCE | 3 / 9 = 33,3%  |
| If you buy MIX VEGETABLE WITH PEANUT SAUCE, you will buy RAMBAK CRACKERS                          | 2 / 8 = 25,0%  |
| If you buy RAMBAK CRACKERS you will buy MIX VEGETABLE WITH PEANUT SAUCE                           | 4 / 0 = 66,7%  |
| If you buy FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE, you will buy RAMBAK CRACKERS                 | 3 / 9 = 33,3%  |
| If you buy RAMBAK CRACKERS, you will buy FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE                 | 4 / 3 = 133,3% |

|  |               |
|--|---------------|
| SUGAR SAUCE  | 2 / 8 = 25,0% |
| If you buy COOKED VEGETABLE FRUIT SALAD WITH SPICY BROWN SUGAR SAUCE, you will buy BANGKA CRACKERS | 1 / 9 = 11,1% |
| If you buy BANGKA CRACKERS you will buy COOKED VEGETABLE SALAD                                     | 5 / 8 = 62,5% |

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 application and select New Process.

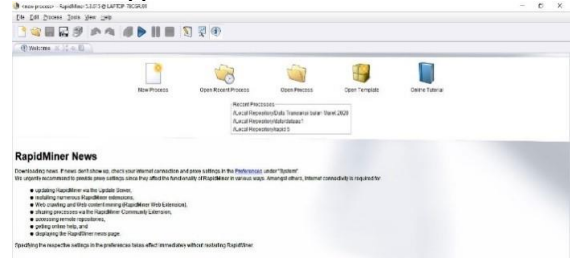


Figure 2. Initial View of Rapidminer

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 the data, press and slide to the main process.

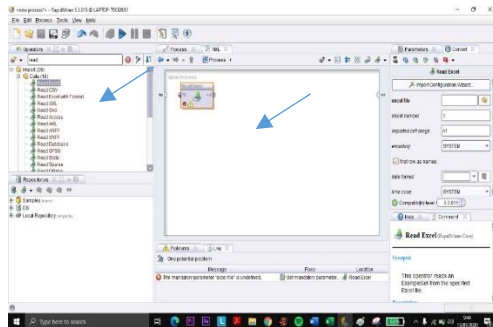


Figure 3. View and Read Excel Operator in Main Process

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

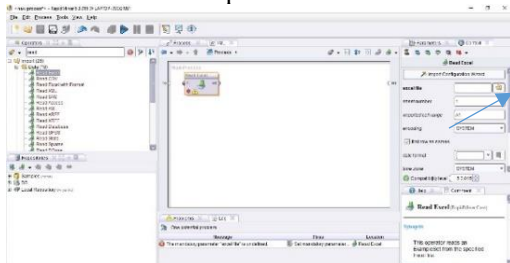


Figure 4. Parameter Display Excel

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* paramtrs 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

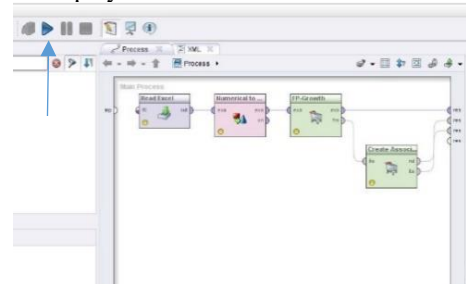


Figure 7. Association Rule Operator Display.

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.

| No. | Premises      | Conclusion | Support | Confid. | LaPl. | Gain   | p-s   | Lift  | Com.  |
|-----|---------------|------------|---------|---------|-------|--------|-------|-------|-------|
| 1   | Krupuk Rambak | Gado-gado  | 0.130   | 0.400   | 0.853 | -0.521 | -0.02 | 0.860 | 0.892 |
| 2   | Krupuk Rambak | Rujak      | 0.140   | 0.431   | 0.860 | -0.510 | 0.025 | 1.213 | 1.133 |
| 3   | Krupuk Bangka | Karedok    | 0.105   | 0.583   | 0.936 | -0.251 | 0.049 | 1.882 | 1.656 |

Figure 9. Display of the final Association Rule results.

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

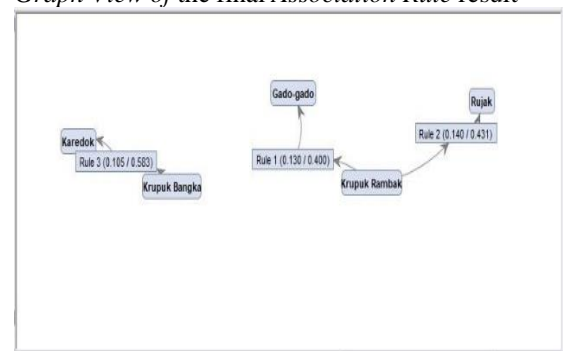


Figure 10. Graph View.

## 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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