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Determination of Data Mining Application Design Patterns Booking Raw Food In Restaurant Fountain With Apriori Algorithm

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Abstract- *Booking is an activity carried out by certain parties to ensure availability, in carrying out certain activities the company has a supply of material in quantities that exceed the needs. As a result, in the warehouse there is a buildup of raw materials or it can happen otherwise. Inventories of materials that are too small can hinder the company's operations in the form of unavailability of materials when needed. The role of inventory will determine the operation of the company because the inventory will run well if supported by good management. Therefore, the concept of inventory management that affects ordering is very important to be applied by companies so that the goals of effectiveness and efficiency are achieved. So we need a Data Mining that can quickly to determine the Determination of Food Raw Material Ordering Patterns in Restaurant Fountain Using Apriori. Data Mining is the extraction of new information taken from large chunks of data that helps in making decisions. One of the applications of data mining for Determining the Pattern of Ordering Food Raw Materials in Restaurant Fountain Using Apriori. Apriori method is a method for determining frequent itemsets for boolean association rules. The research aims to build the application of Determining the Pattern of Ordering Food Raw Materials in Restaurant Fountain with a web-based application and as a tool for designing applications using the Mysql Database. This data mining is able to determine the ordering of food items in the Restaurant Fountain with the required amount.*

Keywords: Determination of Food Raw Material Ordering Pattern, Data Mining, Apriori method.

1. Introduction

The current technology development needs for more accurate information is needed in everyday life, so that the information will be an important element in the development of society, but a high information needs sometimes is not matched with adequate information presentation. The ability of information technologies to collect and store various types of data outpacing the ability to analyze, summarize and extract knowledge from data. The traditional method for analyzing the data, it can not handle large amounts of data, one of the roles of technology role in the booking rate of Materials.

Booking is an activity undertaken by certain parties to ensure the availability, in carrying out certain activities Companies have supplies in excess of needs. As a result, in a warehouse in the accumulation of raw materials or can be otherwise. Supplies materials that are too small may hinder the company's operations in the form of unavailability of materials when needed. The role of the inventory will determine the operation of the company because the supply will run well if it is supported by good management. Therefore, the concept of inventory management that affect bookings are essential implemented by the company to the effectiveness and the efficiency of goal achieved.

Based on research conducted in Retaurant Fountaian a purchase transaction raw material inventory. Purchase transaction data inventories of raw materials is growing every day and at the Restaurant of the sales transaction data is only stored as archives or books and it is unknown what the benefits of the data available for other activities. Raw material inventory ordering system in Restaurant Fountaian not run well because sales data contained in the books is only allowed to accumulate and growing unbeknown to any further such data. Hence Restaurant Fountaian require the system to process the data to produce a pattern Booking raw materials are most often purchased to be a reference to increase the stock of raw material inventory is depleted raw material inventories are rarely to be purchased. One data processing techniques that can be used to issue the stretcher is a priori algorithm.

2. Theory

2.1 Data Mining

data mining as a process to obtain useful information to warehouse large data base. Data mining can also be interpreted as extracting new information retrieved from large data chunks that help in decision making. The term data mining is sometimes also called knoweledge discovery. One technique that was made in data mining

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is how to discover existing data to build a model. Then, using the model in order to identify the pattern of other data that are not in the data base stored. Prediction needs can also take advantage of this technique. In data mining, data grouping is also done. The aim is that suppose to know the universal pattern of existing data

2.2 *apriori*

Apriori is a basic algorithm proposed by Agrawal and Srikant in 1994 for the determination of *frequent itemsets* for association rules *boolean*, Priori algorithms including the type of association rules in data mining. A rule that states the association between some attributes often called affinity analysis or market basket analysis. Analysis association or association rule mining is data mining techniques to discover the rules of a combination of items. One association analysis stage that attracted the attention of many researchers to produce efficient algorithms is the analysis of patterns of high frequency (frequent pattern mining). Important or not an association can be seen with the two benchmarks, namely: support and confidence. Support (support value) is the percentage of the combination of those items in the database, while confidence (certainty value) is the strong relationship between items in the rules of the association.

Support an item value is obtained by using the formula:

$$support(A) = \frac{jumlah\ transaksi\ mengandung\ A}{total\ transaksi}$$

Meanwhile, the value of *support* of 2 *items* obtained by using the formula:

$$suppotr(A,B) = P(A \cap B)$$

$$support(A,B) = \frac{\sum transaksi\ mengandung\ A\ dan\ B}{\sum transaksi}$$

3. Analysis

a. Table list of raw materials

Here is a table type of feedstock materials in restourant fountain.

Table 1
List of feedstock materials in the restaurant fountain

No.	Material code	name of Material
1.	BB000101	Broccoli
2.	BB000201	Cabbage
3.	BB000301	Swamp cabbage
4.	BB000401	Bean
5.	BB000501	broccoli flowers
6.	BB000601	Sawi
7.	BB000701	Carrot
8.	BB000801	Tomato
9.	BB000901	onions prey
10.	BB001001	Celery
11.	BB001101	Chili
12.	BB001201	onions prey
13.	BB001301	Bombay
14.	BB001401	paprika
15.	BB001501	Lettuce
16.	BB001601	Cucumber
17.	BB001701	Tempe
18.	BB001801	Know
19.	BB001901	Corn
20.	BB002001	Beef
21.	BB002101	Shrimp
22.	BB002201	Dori fish meat
23.	BB002301	Mongolian meat
24.	BB002401	The calamari
25.	BB002501	Chicken meat
26.	BB002601	Egg
27.	BB002701	Rice
28.	BB002801	Pasta

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No.	Material code	name of Material
29.	BB002901	Flour
30.	BB003001	cooking oil
31.	BB003101	Soy sauce
32.	BB003201	Sauce
33.	BB003301	Broth
34.	BB003401	Milk
35.	BB003501	Sausage
36.	BB003601	Cheese
37.	BB003701	Bread
38.	BB003801	Salt
39.	BB003901	Pepper
40.	BB004001	Potato
41.	BB004101	Cassava
42.	BB004201	mushroom
43.	BB004301	Banana
44.	BB004401	Pineapple
45.	BB004501	tuber
46.	BB004601	Kincong
47.	BB004701	Mie
48.	BB004801	Coconut
49.	BB004901	Turmeric
50.	BB005001	Peas

b. table Transactions

Transactions in the table are the number of transactions and what is purchased.

Table 2
table of transactions

Transaction	Materials purchased
1	Vegetables Broccoli, Cabbage vegetables, mustard, Squid
2	Prey Onion, Cucumber, Tomato
3	Chicken meat, calamari, egg, onion Prey
4	Beans, Eggs, Beef
5	Corn, Calamari, Beef
6	Potatoes, Eggs
7	Onions Prey, Chicken, Beef
8	Squid, beans, eggs, tomatoes
9	Chicken, Cucumber, Squid
10	Vegetable broccoli, mustard greens, corn, beans
11	Onions Prey, Chicken, Corn, Potatoes
12	Potatoes, Beef
13	Tomatoes, calamari, Eggs
14	Vegetables Broccoli, Tomatoes, Beans, Onions Prey
15	Beef, Potatoes, Onions Prey
16	Beans, Eggs
17	Prey Onion, Cucumber, Potatoes
18	Tomato, onion Prey
19	Potatoes, Corn
20	Vegetables Broccoli, mustard, eggs

c. **Pattern Analysis of High Frequency**

Looking Quantity (Total) given minimum values $\Phi = 2$ of 20 transactions.

Step 1: Representation Data Transactional Database Transactions in the following data:

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Table 3
Transaction Data Representation in Transactional Database

Transaction	Item purchased
1	Broccoli
1	Cabbage
1	The calamari
1	Sawi
2	onions Prey
2	Cucumber
2	Tomato
3	Chicken meat
3	The calamari
3	Egg
3	onions Prey
4	Bean
4	Egg
4	Beef
5	Corn
5	The calamari
5	Beef
6	Potato
6	Egg
7	onions Prey
7	Chicken meat
7	Beef
8	The calamari
8	Bean
8	Egg
8	Tomato
9	Chicken meat
9	Cucumber
9	The calamari
10	Broccoli
10	Sawi
10	Corn
10	Bean
11	onions Prey
11	Chicken meat
11	Corn
11	Potato
12	Potato
12	Beef
13	Tomato
13	The calamari
17	onions Prey
17	Cucumber
17	Potato
18	Tomato
18	onions Prey
19	Potato
19	Corn
20	Broccoli
20	Sawi
20	Egg
13	Egg
14	Broccoli
14	Tomato
14	Bean
14	onions Prey

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15	Beef
15	Potato
15	onions Prey
16	Bean
16	Egg

Next determine the candidate 2-itemsets from transaction data by combining items in pairs.

Table 4
Candidate 2-itemset

No.	The combination pattern 2 items	Qty
1	Vegetables Broccoli, Sawi	3
2	Broccoli vegetables, calamari	1
3	Vegetables Broccoli, Onion Prey	1
4	Broccoli Vegetable, Cucumbers	0
5	Vegetables Broccoli, Chicken Meat	0
6	Broccoli Vegetables, Eggs	1
7	Vegetables Broccoli, Beans	2
8	Vegetables Broccoli, Beef	0
9	Vegetables Broccoli, Corn	1
10	Broccoli Vegetables, Potatoes	0
11	Vegetables Broccoli, Tomatoes	1
12	Sawi, calamari	1
13	Mustard, onion Prey	0
14	Mustard greens, Cucumbers	0
15	Mustard, Chicken Meat	0
16	Mustard greens, eggs	1
17	Mustard greens, beans	1
18	Mustard, Beef	0
19	Mustard greens, corn	1
20	Collards, Potato	0
21	Mustard greens, tomatoes	0
22	Calamari, onion Prey	1
23	Squid, Cucumbers	1
24	Calamari, Chicken Meat	2
25	Squid, eggs	3
26	Squid, Beans	1
27	Calamari, Beef	1
28	Squid, Corn	1
29	Calamari, Chips	0
30	Calamari, Tomato	2
31	Prey Onion, Cucumber	2
32	Prey Onion, Chicken Meat	3
33	Prey onions, eggs	1
34	Prey onions, beans	1
35	Prey Onions, Beef	2
36	Prey Onions, Corn	1
37	Prey Onions, Potatoes	3
38	Prey Onions, Tomatoes	3

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39	Cucumber, Meat Chicken	1
40	Cucumber, Egg	0
41	Cucumbers, Beans	0
42	Cucumbers, Beef	0
43	Cucumbers, Corn	0
44	Cucumbers, Potatoes	1
45	Cucumbers, Tomatoes	1
46	Chicken, Egg	1
47	Chicken, Beans	0
48	Chicken, Beef	1
49	Chicken, Corn	1
50	Chicken, Potatoes	1
51	Chicken, Tomato	0
52	Eggs, Beans	3
53	Eggs, Beef	1
54	Eggs, Corn	0
55	Eggs, Potatoes	1
56	Eggs, Tomatoes	2
57	Beans, Beef	1
58	Beans, Corn	1
59	Beans, Potatoes	0
60	Beans, Tomatoes	2
61	Beef, Corn	1
62	Beef, Potatoes	2
63	Beef, Tomato	0
64	Corn, Potatoes	2
65	Corn, Tomato	0
66	Potatoes, Tomatoes	0

Step 2:

Berisi items with Quantity has, furthermore looking L1 = {large 1-itemsets} by choosing items that meet the minimum support value ≥ 10% and then searching a support value for each item using the formula:

$$Support = \frac{\text{Jumlah Transaksi mengandung A dan B}}{\text{Total Transaksi}} \times 100\%$$

From the above formula, the value of support obtained by the following calculation.

$$\textbf{\textit{Support}} = \frac{\text{Jumlah Transaksi mengandung Sayur Brokoli dan Sawi}}{20} \times 100\% = = 15\% \frac{3}{20} \times 100\ \%$$

$$\textbf{\textit{Support}} = \frac{\text{Jumlah Transaksi mengandung Sayur Brokoli dan Bunis}}{20} \times 100\% = = 10\% \frac{2}{20} \times 100\ \%$$

$$\textbf{\textit{Support}} = \frac{\text{Jumlah Transaksi mengandung cumi dan Daging Ayam}}{20} \times 100\% = = 10\% \frac{2}{20} \times 100\ \%$$

$$\textbf{\textit{Support}} = \frac{\text{Jumlah Transaksi mengandung Cumi dan Telur}}{20} \times 100\% = = 15\% \frac{3}{20} \times 100\ \%$$

$$\textbf{\textit{Support}} = \frac{\text{Jumlah Transaksi mengandung Cumi dan Tomat}}{20} \times 100\% = = 10\% \frac{2}{20} \times 100\ \%$$

$$\textbf{\textit{Support}} = \frac{\text{Jumlah Transaksi mengandung Bawang Prey dan Timun}}{20} \times 100\% = = 10\% \frac{2}{20} \times 100\ \%$$

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Support = $\frac{\text{Jumlah Transaksi mengandung Bawang Prey dan Daging Ayam}}{20}$ x 100% = = 15%$\frac{3}{20}$ x 100 %

Support = $\frac{\text{Jumlah Transaksi mengandung Bawang Prey dan Daging Sapi}}{20}$ x 100% = = 10%$\frac{2}{20}$ x 100 %

Support = $\frac{\text{Jumlah Transaksi mengandung Bawang Prey dan Kentang}}{20}$ x 100% = = 15%$\frac{3}{20}$ x 100 %

Support = $\frac{\text{Jumlah Transaksi mengandung Bawang Prey dan Tomat}}{20}$ x 100% = = 15%$\frac{3}{20}$ x 100 %

Support = $\frac{\text{Jumlah Transaksi mengandung Telur dan Buncis}}{20}$ x 100% = = 15%$\frac{3}{20}$ x 100 %

Support = $\frac{\text{Jumlah Transaksi mengandung Telur dan Tomat}}{20}$ x 100% = = 10%$\frac{2}{20}$ x 100 %

Support = $\frac{\text{Jumlah Transaksi mengandung Buncis dan Tomat}}{20}$ x 100% = = 10%$\frac{2}{20}$ x 100 %

Support = $\frac{\text{Jumlah Transaksi mengandung Daging Sapi Dan Kentang}}{20}$ x 100% = = 10%$\frac{2}{20}$ x 100 %

Support = $\frac{\text{Jumlah Transaksi mengandung Jagung dan kentang}}{20}$ x 100% = = 10%$\frac{2}{20}$ x 100 %

table 5
L1 (Large 1-itemset)

No.	The combination pattern 2 items	Qty	Support ANB	* 100%
1	Vegetables Broccoli, Sawi	3	0:15	15%
2	Vegetables Broccoli, Beans	2	0.1	10%
3	Calamari, Chicken Meat	2	0.1	10%
4	Squid, eggs	3	0:15	15%
5	Calamari, Tomato	2	0.1	10%
6	Prey Onion, Cucumber	2	0.1	10%
7	Prey Onion, Chicken Meat	3	0:15	15%
8	Prey Onions, Beef	2	0.1	10%
9	Prey Onions, Potatoes	3	0:15	15%
10	Prey Onions, Tomatoes	3	0:15	15%
11	Eggs, Beans	3	0:15	15%
12	Eggs, Tomatoes	2	0.1	10%
13	Beans, Tomatoes	2	0.1	10%
14	Beef, Potatoes	2	0.1	10%
15	Corn, Potatoes	2	0.1	10%

Establishment of Rules Association (Association Rule)

To search for association rules of iterations of the steps in advance, and then will be calculated confidence value of each item contained in the L1 is based on the following formula:

$$Confidence = P(A \rightarrow B) = \frac{\text{Jumlah Transaksi mengandung A dan B}}{\text{Jumlah Transaksi mengandung A}} x\ 100\%$$

From the above formula, Confidence value obtained by the following calculation arrangement.

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Sayur Brokoli dan Sawi}}{\text{Jumlah Transaksi Sayur Brokoli}} \text{ x } 100\%$$

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$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Sayur Brokoli dan Bunis}}{\text{Jumlah Transaksi Sayur Brokoli}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung cumi dan Daging Ayam}}{\text{Jumlah Transaksi Cumi}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Cumi dan Telur}}{\text{Jumlah Transaksi cumi}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Cumi dan Tomat}}{\text{Jumlah Transaksi Cumi}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Bawang Prey dan Timun}}{\text{Jumlah Transaksi Bawang Prey}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Bawang Prey dan Daging Ayam}}{\text{Transaksi Bawang Prey}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Bawang Prey dan Daging Sapi}}{\text{Transaksi Bawang Prey}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Bawang Prey dan Kentang}}{\text{Transaksi Bawang Prey}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Bawang Prey dan Tomat}}{\text{Transaksi Telur}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Telur dan Buncis}}{\text{Transaksi Telur}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Telur dan Tomat}}{\text{Transakasi Telur}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Buncis dan Tomat}}{\text{Transaksi Buncis}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Daging Sapi Dan Kentang}}{\text{Transaksi Daging}} \times 100\%$$

$$\text{Confidence} = \frac{\text{Jumlah Transaksi mengandung Jagung dan kentang}}{\text{Transaksi jagung}} \times 100\%$$

From the above calculation models generated the following new table:

table 6
L1 with Confidence value

Pattern Combination 2-itemsets	***confidence***	
Broccoli vegetable → Sawi	**3/4**	**75%**
Broccoli vegetable → Beans	**2/4**	**50%**
The calamari → Chicken	2/6	33.33%
The calamari → Eggs	**3/6**	**50%**
The calamari → Tomatoes	2/6	33.33%
Onions Prey → Cucumbers	2/8	25%
Prey → Onion Chicken	3/8	37.50%
Onions Prey → Beef	2/8	25%
Prey → Onion Chips	3/8	37.50%
Prey → Tomatoes Onions	3/8	37.50%

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Eggs → Beans	3/7	42.85%
Eggs → Tomatoes	2/7	28.57%
→ Beans Tomatoes	2/5	40%
Beef → Potatoes	2/5	40%
→ Corn Chips	**2/4**	**50%**

The steps that have been made above, the items that meet the Support x Confidence largest and minimum confidence = 50% in Table 4.7 in the text in bold letters, so that by the association rules that formed it can be concluded as follows:

1. If buying Vegetable Broccoli will buy mustard with 15% support and 75% confidence
2. If buying Vegetable Broccoli will buy beans with the support of 10% and 50% confidence
3. If buying calamari it will buy eggs with 15% support and 50% confidence
4. If you buy will buy Corn Chips with the support of 10% and 50% confidence

4. Conclusion

a. By using algorithms aprioi able to find a pattern that can be used as input for stakeholders fountaian restaurant.
b. Found a good pattern as knowledge in accordance with the principles of data mining
c. With the right data more accurate pattern determination process.

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