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Analysis of the Application of Transaction Data with Association Techniques using the Apriori Algorithm in Pharmacy

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Abstract
The development of information technology influences the rapid growth in the amount of data collected and stored in large t. Dimas Pharmacy, located at Jl. Segara Kec. Nipah Panjang is one of the public health services that sells various medicines, medical devices, and so on. This study is expected to provide positive benefits for owners of Dimas Nipah Panjang Pharmacy in Providing information about the pattern of medicine purchases made by consumers and Facilitating pharmacy owners to know the available medicine supplies in the warehouse so as not to experience emptiness when needed. Problem Formulation, Literature Study, Data Collection, Calculation and Analysis of Associations with Priori Algorithms, Results Evaluation and Analysis and Report Making. Based on the results of interviews and observations that have been made, the authors obtain data from the Dimas Pharmacy sales transaction. Data held ± 1000 sales transaction data for the period of May and June. But the author only entered 216 sales transactions in May and 141 sales transactions in June. After knowing the method of data selection, the authors conducted data selection by taking 6 items of significant data specifications in certain contexts, namely Anti Serotonin / Allergy, Antacid / Ulcer, Antibiotics, Antipyretics, Inflammation, Hypertension Each of these items had different brands. From these results it can be explained that the sales transaction of the Dimas Pharmacy in May and June generates or generates relationships between shopping product items. With the calculation of the Apriori Association Algorithm, a Market Basket Analysis relationship was found between Medicinal Pronicy and Dexa items. With the Rule "IF Buy Pronicy, THEN Buy Dexa". The rule is generated from the highest support and confident values of the overall support and confident items. The highest support value is 0.15 and the highest confident value is 0.5".

Keywords: Analysis, Data Mining, Pharmacy, Association, Transaction

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1.0 INTRODUCTION

The development of information technology has an impact on the rapid growth in the amount of data collected and stored in large databases. A method or technique is needed that can turn mountains of data into valuable information or useful knowledge to support business decision-making (Pratama and Rasywir 2019; Priandika, Tanthowi, and Pasha 2022; Yahya, Amer, and Siddiqui 2020). A method that can be used to make this happen is data mining (Felzenszwalb et al. 2009; Informatika, Rekayasa, Jakakom, Telkomsel, et al. 2022; Rohmah, Sembiring, and ... 2021; Sadewo, Windarto, and Wanto 2018; Sari, Astri, and Rasywir 2020; Tamtelahitu 2020). Recently, data mining has been implemented in various fields, including in the fields of business or trade, education, and telecommunications. In the business sector, for example, the results of implementing the Apriori algorithm data mining can assist business people in making decisions about what is related to inventory (Jang and Kim 2019; Manurung and Hasugian 2019; Renfro et al. 2019; Rodrigues et al. 2022). For example, the importance of the inventory system in a pharmacy and what types of goods are the top priority that must be stocked to anticipate product shortages. Because the lack of stock of goods can affect consumer service and Pharmacy income. The Apriori Algorithm, which is one of the Association Rules methods, is suitable to be applied when there are several item relationships that you want to analyze (Aini, Purnama, and Irmayani 2020; Devi, Sunoto, and Hendrawan 2020; Lestari and Suroto 2020; Suherman and Azandra 2019). Detection of medicines that are frequently purchased together is carried out using the Association Rule, in which data items are retrieved from a relational database. The process uses the Apriori Algorithm, which functions to form candidate item combinations, and then

tests whether the combination meets the minimum support and minimum confidence parameters which are the threshold values given by the user. Dimas Pharmacy which is located at Jl. Segara Kec. Nipah Panjang is a public health service facility that sells various medicines, health equipment, and so on. The number of sales transactions that occur up to 500 transactions per month can find patterns in the form of products that are often purchased together in a transaction. Therefore, by using this a priori algorithm, pharmacy owners can find out consumer purchasing patterns, and what medicines are purchased simultaneously and can maintain medicine stocks in the warehouse so they don't experience vacancies. Previously, similar research has been carried out. In the 2017 research by Winda Aprianti, et al with the title "Application of the Apriori Algorithm for Medicine Sales Transactions at Azka Pharmacy" in 2017 produced an application for the Application of the Apriori Algorithm for Medicine Sales Transactions at Azka Pharmacy built using the Visual Basic programming language and MySQL database (Informatika, Rekayasa, Jakakom, Apotek, et al. 2022; Wu et al. 2020a, 2020b). The results of the analysis of the influence of minimum support and minimum confidence above 10% and 75% did not produce any rules. In Dodyk Iriandi's research entitled "Analysis of Associations in Medicine Transactions Using the Apriori Apotek Trimulya Algorithm" in 2017 resulted in the SAATA Web application being used as a medium to assist business owners in determining combinations of items that are often sold together itemsets of an item from transactions that have been occur within a certain period. As a reference material for arranging goods or restocking goods as seen from the frequency with which the goods are sold. In the research of Muhammad Kennedi Tampubolon, et al with the title "Implementation of the Apriori Algorithm Data Mining in the Medical Equipment Inventory System" in 2015 resulted in the application of the Apriori Algorithm in the Data Mining technique which is very efficient and can speed up the process of forming trends in the pattern of itemset combinations resulting from the sale of medical devices At the Kelambir-2 Medan Pharmacy, those with the highest support and confidence are the Uric Acid Stick - Sugar Stick and the Cholesterol Stick - Sugar Stick. Based on the problems above, the author is interested in analyzing medicine transactions at pharmacies using an a priori algorithm. Which the authors put the title "Analysis of the Application of Transaction Data With Association Techniques Using the Apriori Algorithm at Dimas Nipah Panjang Pharmacy".

Based on the background of the problem that occurred, the problem to be studied can be formulated as follows such as how to apply data mining with association techniques and analyze sales transactions to determine medicines purchasing patterns at A Dimas pharmacy?. And how to maintain medicines supplies in the warehouse using an a priori algorithm for the Dim AS Pharmacy?. To ensure that research activities do not deviate from the desired objectives, the author specifies some research limitations. This research was carried out by analyzing sales transaction data to determine medicines purchasing patterns and maintain medicines supplies in the warehouse at the Dimas Pharmacy. This research takes sales transaction data that has lasted for two months, namely May and June. This research uses an a priori algorithm and is supported by tools, namely the Weka 3.8.1 application. The technique used is Association with the APriori Algorithm. The data used is the number of sales transactions based on medicines brands. The research that the author conducted has the following objectives. Dig up information and analyze sales transaction data using the Apriori algorithm technique to find out patterns of medicines purchases at Dimas Pharmacy. Applying the a priori algorithm method on sales transactions whose results will be used for information on medicines supplies in warehouses and decision making or strategic business policies at Dimas Pharmacy. Implementing data mining with an a priori algorithm in medicines sales transactions at the Dimas Pharmacy. This research is expected to provide positive benefits for the owner of the Dimas Nipah Panjang Pharmacy and also for the researchers themselves, while the benefits obtained include Provide information about patterns of medicines purchases made by consumers at Dimas Nipah Panjang Pharmacy. Make it easier for pharmacy owners to find out which medicines are available in the warehouse so that there is no shortage when needed, and it is hoped that it can increase sales at the Dimas Nipah Panjang pharmacy. Make it easier for consumers so that they don't have difficulty finding the medicine they want to buy and provide first aid for consumers.

2.0 LITERATURE REVIEW

Analysis is an investigation of an event (writing, deed, etc.) to find out the actual situation (causes, circumstances, etc.). According to experts, there is an understanding of analysis, including: Analysis is a financial report that aims to obtain information on the development of a company's financial condition by comparing financial reports between two or more periods (Jiawei and Murata 2019; Pada et al. 2022; Suherman and Azandra 2019). Comparative analysis can be divided into 2 types, namely:

1. Analysis of Changes (up and down) To see financial changes in two or three financial reporting periods.
2. Trend Analysis To see the trend in the direction of financial position over three financial reporting periods. Usually use, “Analysis can be defined as the decomposition of a complete information system into its component parts to identify and evaluate problems, opportunities, obstacles that occur, and expected needs so that improvements can be proposed.”

Data mining is the process of looking for patterns or interesting information in selected data using certain techniques or methods. Data mining techniques, methods, or algorithms vary greatly. The selection of the right method or algorithm really depends on the goals and process of Knowledge Discovery in Database (KDD). According to experts, there is a definition of data mining, including: " data mining is a process that employs one or

more techniques computer learning (machine learning) for analyzing and extracting knowledge (knowledge) automatically. Another definition of them is induction-based learning is the process of forming definitions of concepts carried out in a way that observe examples of specifications from the concepts to be studied. Knowledge Discovery in Database (KDD) is an implementation method in data mining. In this context, data Mining is one step of the KDD process. The goal of data mining is to allow a company to improve marketing, sales, and operations customer support through understanding better than its customers. Data mining is a series of processes to seek added value from a data set in the form of knowledge that was previously unknown (Idam, Junaidi, and Handayani 2019; Ramadiani and Rahmah 2019; Yuli Mardi 2019).

Pharmacy as one of the health service facilities needs to prioritize the interests of the community and is obliged to provide, store, and deliver pharmaceutical supplies of good quality and their validity is guaranteed. According to experts, there are definitions of a pharmacy, including: " A pharmacy is a pharmaceutical service provider where pharmaceutical practice is carried out by a pharmacist. Pharmaceutical service is a direct and responsible service to patients related to pharmaceutical preparations with the aim of achieving definite results to improve the patient's quality of life. The pharmaceutical work carried out includes manufacturing including quality control of pharmaceutical preparations, securing, procuring, storing and distributing or dispensing medicines, managing medicines, administering medicines or doctor's prescriptions, providing medicine information services, as well as developing medicines, medicinal ingredients, traditional medicines and cosmetics. A pharmacy is a pharmaceutical service facility where pharmaceutical practice is carried out by pharmacists. To ensure the quality of pharmaceutical services in pharmacies, an evaluation of the quality of pharmaceutical services must be carried out.

A priori algorithms can be used to assist in the decision-making management side (Assegaff, Rasywir, and Pratama 2023; Dodo Zaenal Abidin et al. 2019; Fachruddin et al. 2020; Hartiwi et al. 2020). The a priori algorithm is known as an iterative approach level-wise search, where k- itemset is used to explore or discover (k+1)- itemset. According to experts, there is an understanding of the a priori algorithm, including A priori algorithm is a type of rule association on data mining. This algorithm is aimed at finding combinations of itemsets that have a certain frequency value according to the desired criteria or filters. Explains that the Apriori algorithm is used to find frequent item sets that meet the minimum support and then get a rule that meets the minimum confidence of the frequent itemsets. The basic methodology of association analysis is divided into two stages:

1. High frequency pattern analysis
   This stage looks for item combinations that meet the minimum requirements of the support value in the database. The support value of an item is obtained by the formula (Gho, Abidin, and Rasywir 2013; Lestari and Suroto 2020):

   Support(W) = (number of transactions containing w)/(number of transactions that have occurred)

   Meanwhile, for two or more itemsets, the formula is:
   Support(W,X) = (number of transactions containing W & X)/(all number of transactions)

2. Formation of associative rules
   After all high frequency patterns are found, then look for associative rules that meet the minimum requirements for confidence by calculating the confidence of the associative rule W_X.
   The confidence value of the W_X rule is obtained from formula 2.3

Confidence(W->X) = (The number of transactions containing W and X)/(number of transactions containing W)

According to experts, there are definitions of WEKA, including: "WEKA is a practical machine learning tools package. "WEKA" stands for "Waikato Environment for Knowledge Analysis", which was created at the University of Waikato, New Zealand for research, education, and various applications. WEKA is able to solve data mining problems in the real world, especially the classification that underlies machine learning approaches. This software is written in the Java class hierarchy with object-oriented methods and can run on almost all platforms. WEKA data is easy to use and applied at several different levels. State of the art learning algorithm implementations are available that can be applied to datasets from the command line. WEKA contains tools for data preprocessing, classification, regression, clustering, association rules, and visualization. Users can preprocess data, include it in a learning scheme, and analyze the resulting classifier and its performance, all without writing program code at all. An example of using WEKA is to apply a learning method to a dataset and analyze the results to obtain information about the data, or apply several methods and compare their performance to choose from.

3.0 METHODOLOGY

The research framework is the stages carried out during research. The research framework was created to make it easier to achieve research results, to complete the research on time and for the research to proceed as expected. The research framework used is as follows:

1. Formulation of the problem

At this stage, a review of the research object is carried out to observe it in more depth to find the problems that exist at the Dimas Nipah Panjang.

2. Study of Literature
   At this stage, the author conducts what is called a literature review, namely studying reference books and the results of previous similar writings that have been carried out by other people. The aim is to gain a foothold for the author to understand the problem being researched correctly and by a scientific framework.
3. Data collection
   At the data collection stage, the author made direct observations of the area and conducted interviews with the owners:
   a. Direct Observation
      Research using this observation method is carried out by making direct observations of the objects to be studied with the aim of strengthening the data, finding out and getting direct information about the sales transaction process and stock data in the Dimas Nipah Panjang Pharmacy warehouse.
   b. Interview
      The author conducted questions and answers directly to the owner of the Dimas Nipah Panjang Pharmacy regarding the sales transaction process and anticipating medicine stock at the Dimas Nipah Panjang Pharmacy.
4. Calculation and Analysis of Associations with the Apriori Algorithm
   At this stage the author carries out a priori algorithm calculations by forming a pattern consisting of two stages, the first is looking for frequent itemsets (a set of items that meet the minimum support value) and the second is forming an association pattern from the frequent itemsets that have been obtained using confidence values.
5. Evaluation and Results Analysis
   At this stage, the author analyzes the results of the a priori algorithm calculations. The results obtained can be used for item placement by looking at the minimum support value and minimum confidence value.
6. Pembuatan Laporan
   At this stage, a report is prepared based on the results of the research using primary and secondary data collection techniques, so that it becomes a research report that is in accordance with the analysis being studied.

4.0 RESULTS AND DISCUSSION

Problem Analysis

Dimas Pharmacy is one of the many pharmacies in Nipah Panjang sub-district which sells various medicines, medical equipment, and so on. This pharmacy is located on Jalan Segara, Nipah Panjang sub-district, and has three permanent employees. Dimas Pharmacy always tries to provide quality services and products, but it is felt that this is still not enough to be able to compete with other pharmacies in Nipah Panjang. Therefore, Dimas pharmacy must be able to understand what its consumers need. One way is to keep various types of medicines available in pharmacy warehouses.

The Apriori algorithm is one of the Association Rules methods suitable to be applied when there are several relationship items that you want to analyze. Detection of medicines that are often purchased together is done using the Association Rule, which is item data taken from a database relational. This process uses the Apriori algorithm, which functions to form candidate combinations of items, then test whether the combination meets the minimum support parameters and minimum confidence e which is the threshold value provided by the user.

Calculation of the Apriori Algorithm

Based on the results of interviews and observations that have been carried out, the author obtained sales transaction data for Dimas Pharmacy. The data held is ±1000 sales transaction data for the period May and June. However, the author only entered 216 sales transactions in May and 141 sales transactions in June. The following is a table of transaction data for May and June.

Table 1. Snippet of Sales Transaction Data

Transactions	Purchased Items
1	Pronicy, Dexa, Grathazon, Dumex
2	Antasida, Amoxillin, Pronicy
3	Grathazon, Pi Kang Suang, Dexa, Fimestan
4	Renadinac, Amlodipine, Amoxillin, Antasida
5	Amlodipine, Fimestan, Neuralgin
6	Dumex, Paracetamol, Pronicy
7	Pi Kang Suang, Magtral, Neuralgin

Transactions	Purchased Items
8	Pronicy, Amoxillin, Antasida, Grathazon, Dumex
9	Dexa, Grathazon, Pronicy, Pi Kang Suang, Magtral
10	Dumex, Renadinac, Antasida

To make calculations easier, the author replaced the names of the data with the initial letters of the alphabet to make it easier to remember and speed up data copying. So, the results are as follows:

Table 2. Table of Medicine Naming

No	Alphabetical Prefix
1	A
2	B
3	C
4	D
5	E
6	F
7	G
8	H
9	I
10	J

Table 3. Snippet of Transaction Data with Alphabetical Prefixes

Transactions	Purchased Items
1	A, B, C, G
2	D, F, A
3	C, H, B, K
4	L, M, F, D
5	M, K, J
6	G, I, A
7	H, E, J
8	A, F, D, C, G
9	B, C, A, H, E
10	G, L, D

Then the data item is made in tabular form as shown below:

Table 4. Tabular Table

Transactions	A	B	C	D	E	F	G	H	I	J	K	L	M
1	1	1	1	0	0	0	1	0	0	0	0	0	0
2	1	0	0	1	0	1	0	0	0	0	0	0	0
3	0	1	1	0	0	0	0	1	0	0	1	0	0
4	0	0	0	1	0	1	0	0	0	0	0	1	1
5	0	0	0	0	0	0	0	0	0	1	1	0	1
6	1	0	0	0	0	0	1	0	1	0	0	0	0
7	0	0	0	0	1	0	0	1	0	1	0	0	0
8	1	0	1	1	0	1	1	0	0	0	0	0	0
9	1	1	1	0	1	0	0	1	0	0	0	0	0
10	0	0	0	1	0	0	1	0	0	0	0	1	0
∑	**5**	**3**	**4**	**4**	**2**	**3**	**4**	**3**	**1**	**2**	**2**	**2**	**2**

Note: From the table, there are alphabetical prefixes, numbers 0 and 1. The alphabetic prefix indicates the name of the medicine item that has been determined referring to table 4. The number 0 indicates that there is no item in the transaction, while the number 1 indicates that the item does not exist in the transaction.

The next step determines Φ. The author determines Φ = 3, then we can determine the frequency of the itemset. From the table above it is known that the total Φ for transactions k = 1 is 7 items. So:

F1 = {{A},{B},{C},{D},{F},{G},{H}}

For k = 2 (2 elements), we need a table for each pair of items. The possible sets are: {A,B}, {A,C}, {A,D}, {A,F}, {A,G}, {A,H}, {B,C}, {B,D}, {B,F}, {B,G}, {B,H}, {C,D}, {C,F}, {C,G}, {C,H}, {D,F }, {D,G}, {D,H}, {F,G}, {F,H}, {G,H}. Tables for candidates for 2 item sets:

Information: From these tables, there are the initial letters of the alphabet and the 2 elements above. The initial letter of the alphabet indicates the name of the medicine item that has been determined referring to table 4.6, P means items are sold together, while S means no items are sold together or no transaction occurs. ∑ represents the number of items set frequencies.

The number of frequencies in the item set must be greater than or equal to the sum of the item set frequencies (∑ >= Φ). From the table above, it can be obtained:

F 2 = {{A,C}, {A,G}, {B,C}, {D,F}}

We can combine the combination of item sets in F 2 to form a 3-itemset candidate. Item sets that can be combined are item sets that have the first k-1 items in common. For example, {A,C} and {A,G} have the same first k-1 itemset, namely A, then they can be combined into a new 3-itemset, namely {A,C,G}. For k = 3 (3 elements), the possible sets that can be formed are: {A,C,G}, {A,G,B}, {A,B,D}, {A,C,F}.

Note: From the above tables, we get F 3 = {}, because there is no ∑ >= Φ so F 4, F 5, F 6, and F 7 are also empty sets.

The rule used is if x then y, where x is the antecedent and y is the consequent. Based on this rule, 2 items are needed, one of which is the antecedent and the rest is the consequent. From the steps above, we get 1 Fk, namely F 2. F1 is not included because it only consists of 1 item. The antecedent may have more than 1 element, while the consequent consists of 1 element.

Determine (ss-s) as the antecedent and s as the consequent of Fk which was obtained based on the rule in the previous step.

In F 2 we get the set F 2 = {{A,C}, {A,G}, {B,C}, {D,F}}

Then it can be arranged:

For {A,C}:

If (ss-s) = A, if s = C, Then → if buy A then buy C

If (ss-s) = C, if s = A, Then → if buy C then buy A

For {A,G}:

If (ss-s) = A, if s = G, Then → if buy A then buy G

If (ss-s) = G, if s = A, Then → if buy G then buy A

For {B,C}:

If (ss-s) = B, if s = C, Then → if buy B then buy C

If (ss-s) = C, if s = B, Then → if buy C then buy B

For {D,F}:

If (ss-s) = D, if s = F, Then → if buy D then buy F

If (ss-s) = F, if s = D, Then → if buy F then buy D

From the steps above, we get 12 rules that can be used, namely:

1. If buy A then buy C
2. If buy C then buy A
3. If buy A then buy G
4. If buy G then buy A
5. If buy B then buy C
6. If buy C then buy B
7. If buy D then buy F
8. If buy F then buy D

The next step is to calculate support and confidence.

$$\text{SUPPORT} = (\sum \llbracket \text{transaction contains A and B} \rrbracket)/(\sum \llbracket \text{total number of transactions} \rrbracket) \times 100\%$$

$$\text{CONFIDENCE} = (\sum \llbracket \text{transaction contains A and B} \rrbracket)/(\sum \llbracket \text{transaction contains A} \rrbracket) \times 100\%$$

For ∑ items purchased at once in if buy A then buy C, there are 3 transactions. The total number of transactions is 10, so the support is:

SUPPORT=3/10 x100%=30%

For ∑ items purchased at once in if buy A then buy B there are 3 transactions, while the number of transactions for buying A is 5 transactions, so the confidence is:

CONFIDENCE=3/5 x100%=60%

Table 5. Tabel Support dan Confidence

Rule	Support	Confidence
If buy A then buy C	(3/10)x100% = 30%	(3/5)x100% = 60%
If buy C then buy A	(3/10)x100% = 30%	(3/4)x100% = 75%
If buy A then buy G	(3/10)x100% = 30%	(3/5)x100% = 60%
If buy G then buy A	(3/10)x100% = 30%	(3/4)x100% = 75%
If buy B then buy C	(3/10)x100% = 30%	(3/3)x100% = 100%
If buy C then buy B	(3/10)x100% = 30%	(3/4)x100% = 75%
If buy D then buy F	(3/10)x100% = 30%	(3/4)x100% = 75%
If buy F then buy D	(3/10)x100% = 30%	(3/3)x100% = 100%

Note: After obtaining support and confidence for each candidate, multiply the support and confidence, where the confidence is taken 75% and above so that the following table is obtained:

Table 6. Multiplication Table of Support and Confidence

Rule	Support	Confidence	Support x Confidence
If buy C then buy A	30%	75%	0,225
If buy G then buy A	30%	75%	0,225
If buy B then buy C	30%	100%	0,3
If buy F then buy D	30%	100%	0,3

Note: After getting the multiplication result between support and confidence, choose the one with the largest multiplication result. The greatest result of this multiplication is the rule used when selling. Because the product of the four sales above has unequal value, what can be used as a rule is:

- If you buy Dexa, you will buy Grathazon with 30% support and 100% confidence
- If you buy Amoxicillin, you will buy an antacid with 30% support and 100% confidence

Data Visualization Results for Each Attribute

Association Analysis Results using Weka Tools

The result of association analysis is a data mining technique for finding associative rules between a combination of items, it is important or not that an associative rule can be known by two parameters, namely, Support (support value) and Confidence (certainty value).

1. Association Analysis Results with Weka Tools for the Period of May

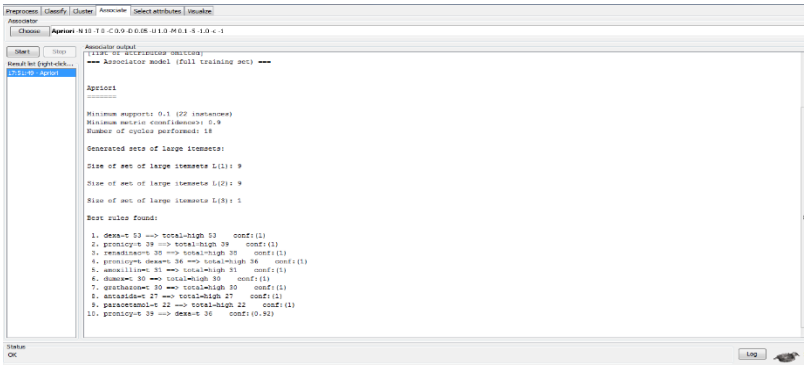

Figure 1. Association Analysis for the May Period

Description: Figure 1 is the result of association analysis for the May period, where the minimum support value is 0.15 and the minimum confidence value is 0.5. From this analysis, the best rules were produced, namely Dexa at 53, Pronicy at 39, and Renadinac at 38.

2. Results of Association Analysis with Weka Tools for the June Period

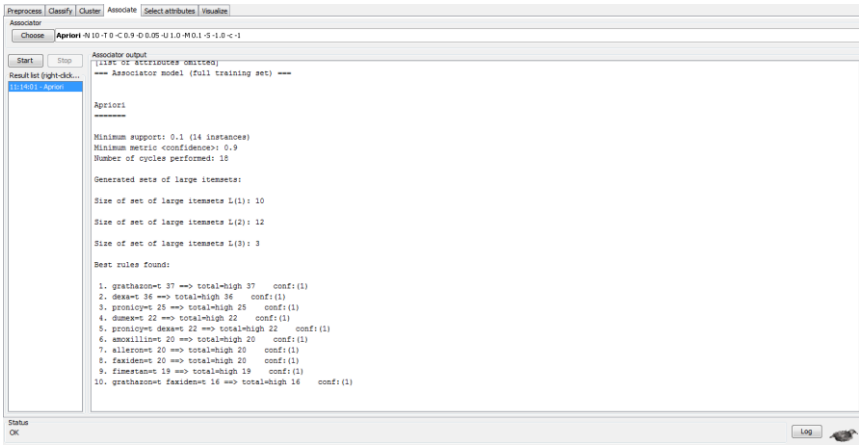

Figure 2. Association Analysis for the June Period

Note: Figure 2 is the result of association analysis for the June period, where the minimum support value is 0.15 and the minimum confidence value is 0.5. From this analysis, the best rules were obtained, namely Grathazon with 37, Dexa with 36, Pronicy with 25, and Dumex with 22.

3. Results of Association Analysis with Weka Tools for the May-June Period

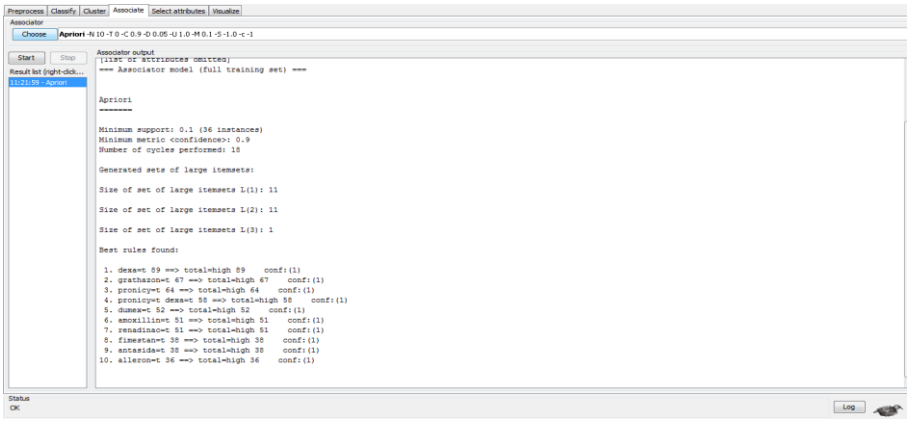

Figure 3. Association Analysis for the May-June Period

Note: Figure 3 is the result of association analysis for the March-April period, where the minimum support value is 0.15 and the minimum confidence value is 0.5. From this analysis, the best rules were produced, namely Dexa at 89, Grathazon at 67, and Pronicy at 64.

Analysis of Comparison Results of Item Association at Dimas Pharmacy with Apriori Algorithm

After conducting association analysis using WEKA tools, different results were obtained for each period. A comparison of the analysis results can be seen in the table below:

Table 7. Comparison of Sales Data

SALES DATA			
Parameter	**May-June combined**	**May**	**June**
Rule	Dexa Grathazon Pronicy	Dexa Pronicy Renadinac	Grathazon Dexa Pronicy Dumex
Instances	357	216	141
Support	0,15	0,15	0,15
Confidence	0,5	0,5	0,5
Number of Items	Dexa = 89 Grathazon= 67 Pronicy= 64	Dexa = 53 Pronicy = 39 Renadinac = 38	Grathazon = 37 Dexa= 36 Pronicy = 25 Dumex = 22

Note: The table above is a comparison of sales data per period. In the combined May-June period there are 3 rules, namely Dexa with 89 items, Grathazon with 67 items, and Pronicy with 64 instances of 357 items. This period has support of 0.15 and confidence of 0.5. In the May period, there were 4 rules, namely Dexa with a total of 53 items, Pronicy with a total of 39, Renadinac with a total of 38, and Amoxillin with a total of 31 from instances of 216 items. This period has support of 0.15 and confidence of 0.5. In the June period, there are 3 rules, namely Grathazon with 37 items, Dexa with 36 items, and Pronicy with 141 items. This period has support of 0.15 and confidence of 0.5. 0,5.

From the table above it can be explained that Dimas Pharmacy sales transactions in May and June resulted in or generated relationships between shopping product items. By calculating the Apriori Association Algorithm, a Market Basket Analysis relationship was found between the Dexa, Grathazon, and Pronicy products with the Rule:

1. Dexa
2. Grathazon
3. Pronicy
4. IF Buy Pronicy, THEN Buy Dexa
5. IF Buy Pronicy, THEN Buy Dexa
6. IF Buy Pronicy, THEN Buy Dexa
7. IF Buy Pronicy, THEN Buy Dexa
8. IF Dexa, THEN Buy Pronicy
9. IF Dexa, THEN Buy Pronicy
10. IF Dexa, THEN Buy Pronicy

This rule is generated from the highest support and confidence values from the total support and confidence values of other items. The highest support value is 0.15 and the highest confidence value is 0.5.

Comparative Analysis of Venn Diagrams

A Venn diagram is a diagram that shows all possible logical relationships and hypotheses between a group (sets, assemblages, groups, and objects).

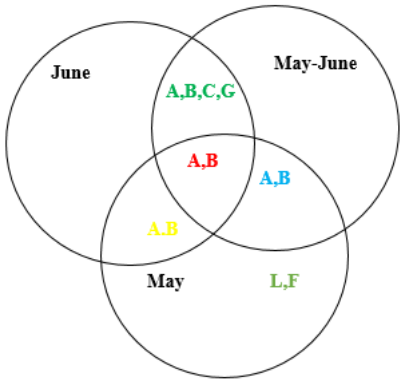

Figure 4. Diagram Venn for Comparation

Description: The image above explains the relationship between the total results of comparative analysis of sales data using a Venn diagram each month. Those represented by the initial letter of the alphabet as the name of the medicine item that has been determined refer to table 4.6. The explanation is:

1. The relationship between June and the months of May-June which are connected or intersect with each other are the green letters of the alphabet, namely Pronicy, Dexa, Grathazon and Dumex.
2. The relationship between the months of June and May that be connected or intersect with each other are the yellow alphabet letter prefixes, namely Pronicy, Dexa.
3. The relationship between the months of May-June and the month of May which are connected to each other or intersect with each other are the beginnings of the blue letters of the alphabet, namely Pronicy, Dexa.
4. The relationships between the months of June, May-June and May that be converging or touching each other are prefixes of the red letters of the alphabet, namely Pronicy, Dexa.
5. Meanwhile, the orange alphabetic prefix found in May is not related to each other because these medicine items are only available in that month.

So, from the explanation above it can be concluded that Dimas Pharmacy sales transactions in May and June generate or generate relationships between shopping product items. By calculating the Venn Diagram, a relationship between the Pronicy and Dexa medicine items was found to be a set or intersecting relationship. It is generated from a set of interconnected between the months of May, June, and May-June.

5.0 CONCLUSION

The conclusions that can be drawn from the results of the research that has been done in the previous chapters are:

1. This study uses sales transaction data for May with a total of 216 and June with a total sample data of 141. With a total of 357 all data.
2. From the Apriori algorithm calculations, it produces a Market Basket Analysis relationship between Dexa products and 89 items purchased, Grathazon with 67 items purchased, Pronicy with 64 items purchased and Dumex with 52 items purchased. This relationship produces 10 rules, namely:
   a. Dexa
   b. Grathazon
   c. Pronicy
   d. IF Buy Pronicy, THEN Buy Dexa
   e. IF Buy Pronicy, THEN Buy Dexa
   f. IF Buy Pronicy, THEN Buy Dexa
   g. IF Buy Pronicy, THEN Buy Dexa
   h. IF Buy Dexa, THEN Buy Pronicy
   i. IF Buy Dexa, THEN Buy Pronicy
   j. IF Buy Dexa, THEN Buy Pronicy

   The rule is generated from the highest support and confidence values of all other support and confidence item values. The highest support value is 0.15 and the highest confidence value is 0.5 which is fulfilled by the rule.
3. It was explained that Dimas Pharmacy's sales transactions in May and June generated or generated relationships between shopping product items. With the calculation of the Apriori Association Algorithm, a Market Basket Analysis relationship was found between the Pronicy and Dexa Medicine items. With the Rule "IF Buy Pronicy, THEN Buy Dexa". The rule is generated from the highest support and confidence values of all other support and confident item values. The highest support value is 0.15 and the highest confidence value is 0.5".

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