

Implementation of Stock Goods Data Mining Using the Apriori Algorithm

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Abstract: Stock inventory in the pharmacy should be well recorded. This is to provide the best service to customers/buyers. Buyers who come with empty results or the drug they want to buy will not feel disappointed, especially if they have made several purchases. This research implements data mining of drug stock inventory, where in the research carried out there are many empty and excess inventory items, resulting in less than optimal service. The research method, namely the survey research method, is a research method that is carried out using surveys or data collection through research respondents. The algorithm used in analyzing the data is the Apriori algorithm. The results of this study are the results of association rules based on predetermined parameters, namely a minimum support of 25% and a minimum confidence of 60%. The rule that is formed is that if consumers buy amoxicillin, they will buy mefenamic acid with a support value of 37% and a confidence of 183%.

Keywords: data mining, a priori algorithms, drug stocks

INTRODUCTION

The rapid development of technology in developing countries, especially Indonesia, has had a positive impact on the whole community, one of the developments felt by the public in the health sector is the Hallo doc application. The Hallodoc application provides precise and accurate knowledge that people feel greatly helped by the Hallodoc application which can be accessed anywhere and anytime related to the symptoms of the disease they are feeling so that people can now immediately carry out the first treatment by buying medicine at the pharmacy.

The pharmacy is a place for drug supplies, both patients from the hospital and customers who are not the result of a doctor's diagnosis, purchase drugs at the pharmacy. Bersinar Farma Pharmacy has a very strategic location on Jl. Sei Mencirim, Kec. Sunggal Kab. Deli Serdang, North Sumatra. In addition to its strategic location, the Bersinar Farma pharmacy is a pharmacy that provides relatively cheap rates so that there are so many enthusiastic buyers and it can be categorized as the best-selling pharmacy in the Sunggal area. To be able to maintain customer trust in the pharmacy, the owner of the pharmacy always provides the best service and controls every drug supply owned by the pharmacy. The importance of the inventory system in a pharmacy and which types of goods are the top priority that must be stocked. This is useful for anticipating a vacancy of goods. Problems in the vacancies of goods often occur due to unpredictable stock of goods due to sales that are so in demand, this can affect consumer service and assets for the Pharmacy. Therefore, this research was conducted to help solve this problem by designing a Data Mining application that functions to predict the most drug sales that can be known, Apriori Algorithm is needed with the help of Tanagra Tools. One of the interesting stages of association analysis is to produce a high-frequency pattern analysis algorithm (frequent pattern mining).

Data mining or Knowledge Discovery in Database (KDD) (Mardi, 2017) is an activity of collecting, using data to find regularities and a series of processes to extract added value from a set of data with patterns and relationships in large data sets (Aidi Saputra et al., 2020).

The association method or association rule mining is needed to see the correlation or association relationship between several attributes, using the a priori algorithm. The a priori algorithm includes a type of association rule to find frequent item sets in a set of data. A priori analysis to determine all a priori rules that meet the minimum requirements for support and confidence (Eka & Siregar, 2018).

Several previous researchers who became the reference for this research were research (Delrinata & Siahaan, 2020) with the title Implementation of the Apriori Algorithm to Determine Drug Stock. A priori analysis to determine minimum requirements for support and confidence. The conclusion in this study is that if you buy amlodipine 5 mg, you will buy sanmol, this is obtained from a support of 33.33% and a confidence of 66.66%, if

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you buy amoxan 500 mg, you will buy sanmol with a support value of 41.66% and a confidence of 71.42% and if you buy sanmol, you will buy amoxan 500 mg with a support value of 41.66% and a confidence of 62.50%.

Research (Mardiah, 2019) entitled Application of Apriori Data Mining in Drug Supply. The application of the Apriori Algorithm is guided by the calculation of Support and Confidence values. The process of calculating Support and Confidence values will be more difficult if the data you want to process is in large quantities.

Another study (Ependi & Putra, 2019) entitled Solutions to Predicting Goods Inventory Using the Apriori Algorithm. By using the a priori algorithm, the company, in this case, the Regional Part Depo Auto 2000 Palembang, can provide the spare parts needed by consumers, especially in the South Sumatra environment, without having to carry out the indent process, this is due to the large number of spare parts that must be provided by PT. Toyota depot to serve the needs of consumers in South Sumatra. From the above process, 646 spare part linkage patterns were obtained from a total of 338 spare parts.

LITERATURE REVIEW

Table 1. Literature Review

No.	Researcher Name (year)	Method	Data	Results
1.	(Saefudin & DN, 2019)	Apriori algorithm	UD sales transaction data. Mumu Jaya Pandeglang for 1 week	From the results of the discussion, design, and implementation that has been carried out in the study it can be concluded that the application built helps UD. Mumu Jaya Pandeglang in determining the types of fish most in demand by consumers, collecting transaction data and fish stock data. Know the most popular types of fish, record transactions, and record fish stocks.
2.	(Kusumo et al., 2019)	Apriori algorithm	a. Which school are you from b. School of origin c. Selected study program	The results of this study are in the form of interesting patterns of data mining results which are important information to support the right promotion strategy in getting prospective new students.
3.	(Delrinata & Siahaan, 2020)	Apriori algorithm	Drug sales transaction data for one year from September 2016 to August 2017	If you buy amlodipine 5 mg, you will buy sanmol, this is obtained from 33.33% support and 66.66% confidence, if you buy 500 mg amoxan, you will buy sanmol with a support value of 41.66% and 71.42% confidence and if you buy sanmol will then buy amoxan 500 mg with a support value of 41.66% and a confidence of 62.50%.
4.	(Ependi & Putra, 2019)	Apriori algorithm	Data on sales of spare parts from vehicles with the Toyota trademark	From the research process, it was found that there were 646 spare part linkage patterns out of a total of 338 spare parts.
5.	(Mardiah, 2019)	Apriori algorithm	Drug Sales Data for Rafif Farma Pharmacy Medan	The application of the Apriori algorithm is guided by the calculation of Support and Confidence values. The process of calculating Support and Confidence values will be more difficult if the data you want to process is in large quantities.
6.	(Algoritma & Dalam, 1994)	Apriori algorithm	Book lending data in one year	The result of this research is that the library can provide more books to borrow based on the existing stock of books. So that the borrower will increase for the library because the borrower is satisfied with the stock that has been provided by the library.
7.	(Qomariah et al., 2020)	Apriori algorithm	Sales transaction data that has occurred. in CV Princes Diary Samarinda, the sample data from transaction	The results of the study found six rules or 6 rules that can be used for sales strategies. If you buy glasses, you will buy a wallet (with a support value of 52.5% and a confidence of 55.9%) If you buy shoelaces, you will buy makeup with a valued

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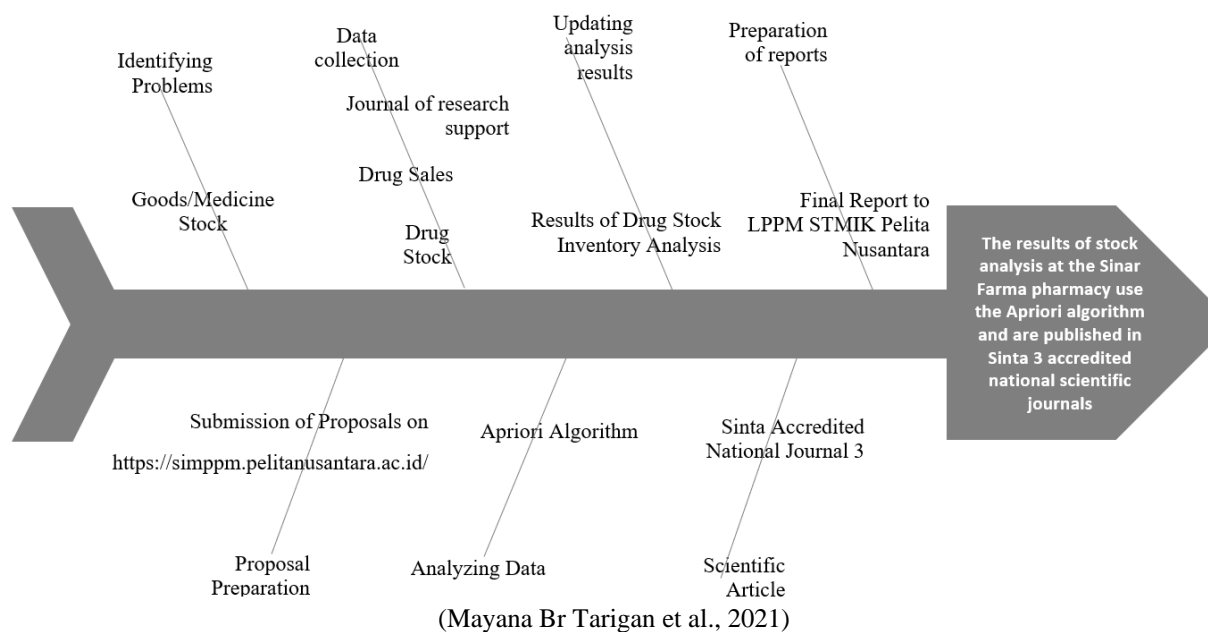
No.	Researcher Name (year)	Method	Data	Results
			data is 936 transaction data, and there are 21 types of goods traded.	support of 55.9% and confidence of 56.4%) If you buy make-up, then you will buy make-up tools and combs (with a support value of 56.4% and a confidence of 61.6%) If you buy a comb, you will buy make-up (with support value of 61.6% and confidence of 65.3%) If you buy Makeup, you will buy a comb and Makeup Tools (with a support value of 65.3% and a confidence of 65.3%) If you buy Makeup, then buy a comb and make-up tools (with a support value of 82.5% and a confidence of 82.5%) the highest association frequency pattern information is if you buy make-up then buy a comb with a support value of 8.825% and a confidence value of 0.825%. with the rules above the first product and the second product can be side by side for dual promotions at attractive prices
8.	(Mardiaha & Yulia, 2021)	Apriori algorithm	Sampel yang digunakan as many as 12 sales transactions of motorcycle parts, the data taken are items that are sold > 6 per month.	Data mining a priori algorithms provide the right decisions for processing data manually or using WEKA 3.9 software, so the most widely sold motorcycle parts are inner tubes, Yamaha oil, and MPX oil with a minimum support value of 90% and a minimum confidence of 100%.
9.	(Batubara et al., 2020)	Apriori algorithm	Data taken regarding purchase data for Equipment and Machinery that has been purchased for supply and replacement of goods at the Library and Archives Sub-Department	Data mining with an a priori algorithm helps determine the inventory of goods and machines needed in 2019 at the Library and Archives Sub-agency so that the items needed are replaced every year. If there is a report on the purchase of new goods for Iron/Metal Shelving inventory, there will also be purchases for Iron/Metal Filling. This purchase was obtained because it has the highest value of support and confidence. The results of this study are that companies can more easily provide products that customers want more based on the existing converse shoe stock. So that sales will increase and can provide benefits for the company because customers are satisfied with the products that have been offered by the company.
10.	(Wahyuni et al., 2017)	Apriori algorithm	Customer request data	

METHOD

The research method is important for a researcher to achieve a goal, and can find answers to the problems posed. The research stages start from identifying the problem to publishing scientific articles, as shown in the following fishbone diagram (Mayana Br Tarigan et al., 2021):

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(Mayana Br Tarigan et al., 2021)
Figure 1. Research Stages

RESULT

At this stage, data processing is carried out. The data used is sales transaction data for 2023, namely from January 1 to February 28, 2023. Sales transaction data used as test data is data from January to February.

Data Selection

In general, the data obtained is not following what we need. Imperfect or invalid data should be discarded because its presence can reduce the quality of the data mining results later. At this stage the data selection stage will be carried out, where sales transaction data are 254 data from 498 data, and data that is not used will be discarded so that the data mining process can run well. The following is a sample of sales transaction data that has been selected in Table 2 below:

Table 2. Transaction data that has been selected

PHARMACY SALES DATA PERIOD 01 JANUARY TO 31 JANUARY 2023			
No	Medicine name	Qty	Transaction date
1	Amoxicilin Tablet	1 board	01-Jan-23
2	Ambroxol Syr	2 bottle	01-Jan-23
3	Pixangsuang Slp	1 tube	01-Jan-23
4	Ambroxol Syr	1 bottle	01-Jan-23
5	Sanmol Tablet	2 board	01-Jan-23
6	Sanmol Syr	2 bottle	01-Jan-23
7	Erithromicin Syr	1 bottle	01-Jan-23
8	Metronidazole Tablet	1 board	01-Jan-23
9	Salisily Talk	1 wrap	02-Jan-23
10	Obh Combi Syr	1 bottle	02-Jan-23
11	Laserin Madu Syr	1 bottle	02-Jan-23
12	Paracetamol Tablet	1 bottle	02-Jan-23
13	Inerson Slp	2 tube	03-Jan-23
14	Gentamicin Cream	1 tube	03-Jan-23

*name of corresponding author



PHARMACY SALES DATA PERIOD 01 JANUARY TO 31 JANUARY 2023			
No	Medicine name	Qty	Transaction date
15	Cefadroxil Syr	1 bottle	03-Jan-23
...
254	Amoxicilin Tablet	3 board	31-Jan-23

Preprocessing

At this stage, data transformation is carried out according to the system that will be used in data mining analysis. This transformation is carried out by entering the selected sales transaction data to be sampled into the data mining application. At this stage, the data selection required by the data mining technique used is also carried out from the data that has been selected. The following data is used for data mining techniques:

Table 3. Transformation Data Attributes

PERIOD 01 JANUARY TO 31 JANUARY 2023			
No	Transaction date	Medicine name	Qty
1	1-Jan-23	Amoxicilin Tablet	1 board
2	1-Jan-23	Ambroxol Syr	2 bottle
3	1-Jan-23	Pixangsuang Slp	1 tube
4	1-Jan-23	Ambroxol Syr	1 bottle
5	1-Jan-23	Sanmol Tablet	2 board
6	1-Jan-23	Sanmol Syr	2 bottle
7	1-Jan-23	Erithromicin Syr	1 bottle
8	1-Jan-23	Metronidazole Tablet	1 board
9	2-Jan-23	Salisily Talk	1 wrap
10	2-Jan-23	Obh Combi Syr	1 bottle
11	2-Jan-23	Laserin Madu Syr	1 bottle
12	2-Jan-23	Paracetamol Tablet	1 bottle
13	3-Jan-23	Inerson Slp	2 tube
14	3-Jan-23	Gentamicin Cream	1 tube
15	3-Jan-23	Cefadroxil Syr	1 bottle
16	3-Jan-23	Yusimox Syr	2 bottle
17	3-Jan-23	Sanmol Syr	1 bottle
18	3-Jan-23	Ctm Tablet	3 board
...
254	31-Jan-23	Amoxicilin Tablet	1 board

Analysis With Apriori Algorithm

The stages of data processing that can be carried out on an a priori algorithm with input from data processing are then processed in the formation of an itemset to produce the selected combination. The stages of the a priori algorithm system in the data mining process are as follows:

1. Determine the minimum support and minimum confidence values
2. Determine the 1-itemset and 2-itemset support values
3. Determine the confidence value
4. Formation of association rules.

The data taken is product sales transaction data for 2021 from January to February 2023, where the data is data that represents the data as a whole. Product sales data for January and February at Bersinar Farma Pharmacy took several samples to carry out a priori calculations. The data that will be processed by the a priori algorithm calculation with the assumption of minimum support of 25% and 60% confidence is taken as a sample of sales data as follows:

*name of corresponding author



Table 4. Sales Transaction

PHARMACY SALES DATA		
PERIOD 01 JANUARY TO 31 JANUARY 2023		
No	Transaction date	Medicine name
1	1-Jan-23	Amoxicilin Tablet, Ambroxol Syr, Pixangsuang Slp, Ambroxol Syr, Sanmol Tablet, Sanmol Syr, Erithromicin Syr, Metronidazole Tablet
2	2-Jan-23	Salisily Talk, Obh Combi Syr, Laserin Madu Syr, Paracetamol Tablet
3	3-Jan-23	Inerson Slp, Gentamicin Cream, Cefadroxil Syr, Yusimox Syr, Sanmol Syr, Stm Tablet, Laserin Syr, Obh Syr, Aspilet Tab, Diapet Tab
4	4-Jan-23	Abate, Gentamicin Cream, Bedak Pricky Besar, Silex Syr, Amoxicilin Tab, Mixagrip Flu & Batuk, Mixagrip Sakit Kepala, Mucohexin Syr, Ranitidine Tab, Promag Tab, Propepsa Syr Besar, Asam Mefenamam Tab, Erithromicin Tab, Ctm Tab
5	5-Jan-23	Sporetik Syr, Ambroxol Syr, Antimo Tablet
6	6-Jan-23	Antimo Cair, Mkp Lang 60ML, Ctm Tablet, Mucohexim Tablet, Ctm Tablet, Napacin Tablet, Helixim Syr, Sanmag Syr,
7	7-Jan-23	Gentamicin Cream, Inpepsa Syr Kecil, Amoxicilin Tab, Kalpanak Cream, Mefinal Tablet, Erysanbe Tab,
8	8-Jan-23	Metronidazole Tablet, Kapas 25 Gr, Susu Entrasol 185 Gr, Mkp Ayam 30ML, Cimetidine Tablet
9	9-Jan-23	Amoxicilin Tablet, Abate, Napacin Tablet, Acyclovir 200Mg Tab, Gentamicin Cream, Kalpanax Cream
10	10-Jan-23	Pixangsuang Slp, Cdr Eff 10S, Captropil 25Mg Tablet, Ranitidine Tablet, Ambroxol Syr
11	11-Jan-23	Amoxicilin Tablet, Peditox, Caladin Lotion 60ML, Asam Mefenamam Tab, Betadine 30ML, Betametasone Cream, Clindamycin Capsul, Betametasone Cream, Bodrex Tablet
12	12-Jan-23	Amoxicilin Tablet, Mkp Lang 60ML, Asam Mefenamam Tab, Ambroxol Syr, Yusimox Syr, Degirol Tablet
13	13-Jan-23	Sanmol Syr, Novamox Syr, Metronidazole Tablet, Amoxicilin Tablet, Degirol Tablet, Betadine Slp
14	14-Jan-23	Napacin Tablet, Clindamycin Capsul, Acyclovir 400Mg Tab, Metformin 500Mg Tab, Lacto-B Sch, Konidin Tablet, Bodrex Tablet, Amoxicilin Tablet
15	15-Jan-23	Bodrex Tablet, Penicilin Tablet, Neurobion Tablet, Asam Mefenamam Tab
16	16-Jan-23	Entrosthop Tab, Abate, Ester C Tablet, Bisoprolol 5 Mg Tab, Obh Syr, Oralit Sch, Neurobion 5000 Tab, Rhinos Sr Cap
17	17-Jan-23	Konidin Tablet, Glibbenclamide 5 Mg, Amoxicilin Tablet, Promag Tablet, Kalpanax Cream, Asam Mefenamam Tab
18	18-Jan-23	Entrosthop Tab, Cdr Eff 10S, Neurobion Tab, Amoxicilin Tablet
19	19-Jan-23	Glimepiride 2 Mg, Akhohol 70% 100ML, Kapas 25 Gr, Bisolvon Syr, Ester C Tablet, Neurobion Inj
20	20-Jan-23	Asam Mefenamam Tab, Sangobion Kids Syr, Glibbenclamide 5 Mg, Kapsuma Tab, Amoxicilin Tablet, Bodrex Tablet
21	21-Jan-23	Ranitidine Tablet, Cimetidine Tablet, Sanmag Syr, Asam Mefenamam Tab, Konidin Tablet
22	22-Jan-23	Cerebrofort Syr, Captropil 25Mg Tablet, Glibbenclamide 5 Mg, Bodrexin Tab, Amoxicilin Tablet, Bisoprolol 5 Mg Tab, Yusimox Syr, Neurobion 5000 Tab
23	24-Jan-23	Entrosthop Tab, Betason-N Cream, Sangobion Capsul, Neurobion Tab, Konidin Tablet, Amoxicilin Tablet, Ctm Tablet, Asam Mefenamam Tab, Vitamin B6 Tab, Glibbenclamide 5 Mg, Cerebrofort Syr
24	25-Jan-23	

*name of corresponding author



**PHARMACY SALES DATA
PERIOD 01 JANUARY TO 31 JANUARY 2023**

No	Transaction date	Medicine name
25	26-Jan-23	Mkp Ayam 30MI, Pixangsuang Slp, Gentamicin Cream, Bisoprolol 5 Mg Tab, Neurobion 5000 Tab, Oralit Sch, Amoxicilin Tablet, Bodrex Tablet, Captropil 25Mg Tablet, Omestan Tab, Neo Entrostop Tablet, Pedialyte Syr, Lipitor 10 Mg Tablet, Polysilane Tab, Asam Mefenamat Tab, Neurobion 5000 Tab, Amoxicilin Tablet, Cefixime Capsul, Captropil 25Mg Tablet, Glibbenclamide 5 Mg, Sangobion Capsul, Polysilane Tab, Lansoprazole 30Mg Cap, Mylanta Syr, Cdr Eff 10S, Omestan Tab, Neurobion 5000 Tab, Simvastatin 10Mg Tab, Polysilane Tab, Acitral Syr, Glibbenclamide 5 Mg, Polysilane Tab, Azithromicin Tablet, Bisoprolol 5 Mg Tab, Amoxicilin Tablet, Ranitidine Tablet, Asam Mefenamat Tab, Cimetidine Tablet, Bodrex Tablet, Cefixime Capsul, Betadine 30MI, Neurobion 5000 Tab, Tolak Angin Cair, Tolak Angin Cair
26	27-Jan-23	Captropil 25Mg Tablet, Ambroxol Tab, Glibenclamide 4 Mg, Tropicana Diabetix, Amoxicilin Tablet, Dexanta Tablet, Omestan Tab, Asam Mefenamat Tab, Simvastatin 10Mg Tab, Neurobion 5000 Tab, Azithromicin Tablet, Mucohexim Tablet
27	28-Jan-23	Folavit Tablet, Aspilet Tablet, Dexanta Tablet, Folavit Tablet, Cavid-D3 Tab, Santa-E Tab
28	29-Jan-23	Folavit Tablet, Vitamin B6 Tab, Amoxicilin Tablet, Neurobion 5000 Tab, Lipitor 20 Mg Tablet, Mkp Lang 60MI, Asam Mefenamat Tab, Sangobion Capsul, Omestan Tab, Vitamin B6 Tab
29	30-Jan-23	Ultraflu Tab, Glimipiride 2 Mg, Glibbenclamide 5 Mg, Cataflam 50Mg Tab, Omestan Tab, Neurobion Tab, Posntan Tab, Amoxicilin Tablet, Susu Entrasol 185 Gr, Bye-Bye Fever Sch, Sgm 360 Gr
30	31-Jan-23	Azithromicin Tablet, Sanmol Syr, Omemox Syr, Ambroxol Syr, Glibbenclamide 5 Mg, Omestan Tab, Amoxicilin Tablet, Asam Mefenamat Tab, Amoxicilin Tablet

So from the transaction data above, the transaction data per item is obtained as follows:

Table 5. Transaction Data Per Item

PHARMACY SALES DATA PERIOD 01 JANUARY TO 31 JANUARY 2023		
No	Medicine name	Number of Transactions
1	Abate	3
2	Acitral Syr	1
3	Acyclovor 200Mg Tab	1
4	Acyclovor 400Mg Tab	1
5	Akhohol 70% 100MI	1
6	Ambroxol Syr	7
7	Amoxicilin Tablet	21
8	Antimo Cair	1
9	Antimo Tablet	1
10	Asam Mefenamat Tab	13
11	Aspilet Tablet	2
12	Azithromicin Tablet	3
13	Bedak Pricky Besar	1
14	Betadine 30MI	2

*name of corresponding author



**PHARMACY SALES DATA
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No	Medicine name	Number of Transactions
15	Betadine Slp	1
16	Betametasone Cream	2
17	Betason-N Cream	1
18	Bisolvon Syr	1
19	Bisoprolol 5 Mg Tab	4
20	Bodrex Tablet	6
21	Bodrexin Tab	1
22	Bye-Bye Fever Sch	1
23	Caladine Lotion 60Ml	1
24	Captopril 25Mg Tablet	5
25	Cataflam 50Mg Tab	2
26	Cavid-D3 Tab	1
27	Cdr Eff 10S	3
28	Cefadroxil Syr	1
29	Cefixime Capsul	2
30	Cerebrofort Syr	2
31	Cimetidine Tablet	3
32	Clindamycin Capsul	2
33	Ctm Tablet	5
34	Degirol Tablet	4
35	Diapet Tab	1
36	Entrostop Tab	3
37	Erythromicin Tab	2
38	Erysanbe Tablet	1
39	Ester C Tablet	2
40	Folavit Tablet	3
41	Gentamicin Cream	5
42	Glibenclamide 5 Mg	9
43	Glibenclamide 4 Mg	1
44	Glimipiride 2 Mg	2
45	Helixim Syr	1
46	Inerson Slp	1
47	Inepesa Syr Kecil	1
48	Kalpanax Cream	3
49	Kapas 25 Gr	2
50	Kapsuma Tab	1
51	Konidin Tablet	4
52	Lacto-B Sch	1
53	Lansoprazole 30Mg Cap	1
54	Laserin Madu Syr	1
55	Laserin Syr	1
56	Lipitor 10 Mg Tablet	1
57	Lipitor 20 Mg Tablet	1
58	Mefinal Tablet	1
59	Metformin 500Mg Tab	1

*name of corresponding author



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**PHARMACY SALES DATA
PERIOD 01 JANUARY TO 31 JANUARY 2023**

No	Medicine name	Number of Transactions
60	Metronidazole Tablet	3
61	Mixagrip Flu & Batuk	1
62	Mixagrip Sakit Kepala	1
63	Mkp Ayam 30MI	2
64	Mkp Lang 60MI	3
65	Mucohexcin Syr	1
66	Mucohexim Tablet	2
67	Mylanta Syr	1
68	Napacin Tablet	3
69	Neo Entrostop Tablet	1
70	Neurobion 5000 Tab	8
71	Neurobion Inj	1
72	Neurobion Tab	4
73	Novamox Syr	1
74	Obh Combi Syr	1
75	Obh Syr	2
76	Omemox Syr	1
77	Omestan Syr	1
78	Omestan Tab	6
79	Oralit Sch	2
80	Paracetamol Tablet	1
81	Pedialyte Syr	1
82	Peditox	1
83	Penicilin Tablet	1
84	Pixangsuang Slp	3
85	Polysilane Tab	4
86	Posntan Tab	1
87	Promag Tablet	1
88	Promag Tablet	1
89	Propepsa Syr Besar	1
90	Ranitidine Tablet	4
91	Rhinos Sr Cap	1
92	Salisily Talk	1
93	Sangobion Capsul	3
94	Sangobion Kids Syr	1
95	Sanmag Syr	2
96	Sanmol Syr	4
97	Sanmol Tablet	1
98	Santa-E Tab	1
99	Sgm 360 Gr	1
100	Silex Syr	1
101	Simvastatin 10Mg Tab	2
102	Sporetik Syr	1
103	Susu Entrasol 185 Gr	2
104	Tolak Angin Cair	1

*name of corresponding author



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PHARMACY SALES DATA PERIOD 01 JANUARY TO 31 JANUARY 2023		
No	Medicine name	Number of Transactions
105	Tropicana Diabetix	1
106	Ultraflu Tab	1
107	Vitamin B6 Tab	3
108	Yusimox Syr	3

a. Formation of Itemset 1

The process of forming 1 itemset by utilizing the Support formula, where the minimum specified support value is 10%. With a description of the calculation as follows:

$$\text{Support (A)} = \frac{\sum \text{Transaction Containing A}}{\sum \text{Transaction}} \times 100\%$$

Information:

\sum = Number of Transactions

A = Item

1. Abate = $\frac{3}{30} \times 100\% = 0,1000$
2. Acitral Syr = $\frac{1}{30} \times 100\% = 0,0333$
3. Acyclovir 200mg = $\frac{1}{30} \times 100\% = 0,0333$
4. Acyclovir 400mg = $\frac{1}{30} \times 100\% = 0,0333$
5. Alkohol 70% 100ml = $\frac{1}{30} \times 100\% = 0,0333$
6. Ambroxol Syr = $\frac{7}{30} \times 100\% = 0,2333$
7. Amoxicillin = $\frac{21}{30} \times 100\% = 0,7000$
8. Antimo Cair = $\frac{1}{30} \times 100\% = 0,0333$
9. Antimo Tablet = $\frac{1}{30} \times 100\% = 0,0333$
10. Asam Mefenamat Tab = $\frac{13}{30} \times 100\% = 0,4333$

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Dst.

The calculation results above can be seen in Table 6 as follows:

Table 6. Itemset Candidate 1

PHARMACY SALES DATA PERIOD 01 JANUARY TO 31 JANUARY 2023				PHARMACY SALES DATA PERIOD 01 JANUARY TO 31 JANUARY 2023			
No	Medicine name	Number of Transactions	Support %	No	Medicine name	Number of Transactions	Support %
1	Abate	3	10%	15	Betadine Slp	1	3%
2	Acitral Syr	1	3%	16	Betametason Cream	2	7%
3	Acyclovor 200Mg Tab	1	3%	17	Betason-N Cream	1	3%
4	Acyclovor 400Mg Tab	1	3%	18	Bisolvon Syr	1	3%
5	Akhohol 70% 100MI	1	3%	19	Bisoprolol 5 Mg Tab	4	13%
6	Ambroxol Syr	7	23%	20	Bodrex Tablet	6	20%
7	Amoxicilin Tablet	21	70%	21	Bodrexin Tab	1	3%
8	Antimo Cair	1	3%	22	Bye-Bye Fever Sch	1	3%
9	Antimo Tablet	1	3%	23	Caladine Lotion 60MI	1	3%
10	Asam Mefenamat Tab	13	43%	24	Captropil 25Mg Tablet	5	17%
11	Aspilet Tablet	2	7%	25	Cataflam 50Mg Tab	2	7%
12	Azithromicin Tablet	3	10%	26	Cavid-D3 Tab	1	3%
13	Bedak Pricky Besar	1	3%	27	Cdr Eff 10S	3	10%
14	Betadine 30MI	2	7%	28	Cefadroxil Syr	1	3%

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PHARMACY SALES DATA PERIOD 01 JANUARY TO 31 JANUARY 2023				PHARMACY SALES DATA PERIOD 01 JANUARY TO 31 JANUARY 2023			
No	Medicine name	Number of Transactions	Support %	No	Medicine name	Number of Transactions	Support %
29	Cefixime Capsul	2	7%	69	Neo Entrostop Tablet	1	3%
30	Cerebrofort Syr	2	7%	70	Neurobion 5000 Tab	8	27%
31	Cimetidine Tablet	3	10%	71	Neurobion Inj	1	3%
32	Clindamycin Capsul	2	7%	72	Neurobion Tab	4	13%
33	Ctm Tablet	5	17%	73	Novamox Syr	1	3%
34	Degirol Tablet	4	13%	74	Obh Combi Syr	1	3%
35	Diapet Tab	1	3%	75	Obh Syr	2	7%
36	Entrostop Tab	3	10%	76	Omemox Syr	1	3%
37	Erithromicin Tab	2	7%	77	Omestan Syr	1	3%
38	Erysanbe Tablet	1	3%	78	Omestan Tab	6	20%
39	Ester C Tablet	2	7%	79	Oralit Sch	2	7%
40	Folavit Tablet	3	10%	80	Paracetamol Tablet	1	3%
41	Gentamicin Cream	5	17%	81	Pedialyte Syr	1	3%
42	Glibenclamide 5 Mg	9	30%	82	Peditox	1	3%
43	Glibenclamide 4 Mg	1	3%	83	Penicilin Tablet	1	3%
44	Glimipiride 2 Mg	2	7%	84	Pixangsuang Slp	3	10%
45	Helixim Syr	1	3%	85	Polysilane Tab	4	13%
46	Inerson Slp	1	3%	86	Posntan Tab	1	3%
47	Inepesa Syr Kecil	1	3%	87	Promag Tablet	1	3%
48	Kalpanax Cream	3	10%	88	Promag Tablet	1	3%
49	Kapas 25 Gr	2	7%	89	Propepsa Syr Besar	1	3%
50	Kapsuma Tab	1	3%	90	Ranitidine Tablet	4	13%
51	Konidin Tablet	4	13%	91	Rhinos Sr Cap	1	3%
52	Lacto-B Sch	1	3%	92	Salisily Talk	1	3%
53	Lansoprazole 30Mg Cap	1	3%	93	Sangobion Capsul	3	10%
54	Laserin Madu Syr	1	3%	94	Sangobion Kids Syr	1	3%
55	Laserin Syr	1	3%	95	Sanmag Syr	2	7%
56	Lipitor 10 Mg Tablet	1	3%	96	Sanmol Syr	4	13%
57	Lipitor 20 Mg Tablet	1	3%	97	Sanmol Tablet	1	3%
58	Mefinal Tablet	1	3%	98	Santa-E Tab	1	3%
59	Metformin 500Mg Tab	1	3%	99	Sgm 360 Gr	1	3%
60	Metronidazole Tablet	3	10%	100	Silex Syr	1	3%
61	Mixagrip Flu & Batuk	1	3%	101	Simvastatin 10Mg Tab	2	7%
62	Mixagrip Sakit Kepala	1	3%	102	Sporetik Syr	1	3%
63	Mkp Ayam 30MI	2	7%	103	Susu Entrasol 185 Gr	2	7%
64	Mkp Lang 60MI	3	10%	104	Tolak Angin Cair	1	3%
65	Mucohexcin Syr	1	3%	105	Tropicana Diabetix	1	3%
66	Mucohexim Tablet	2	7%	106	Ultraflu Tab	1	3%
67	Mylanta Syr	1	3%	107	Vitamin B6 Tab	3	10%
68	Napacin Tablet	3	10%	108	Yusimox Syr	3	10%

So based on the specified support percentage, the itemset1 combination that meets the requirements is as follows:

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Table 7. Itemset 1

PHARMACY SALES DATA			
PERIOD 01 JANUARY TO 31 JANUARY 2023			
No	Medicine name	Number of Transactions	Support %
1	Amoxicilin Tablet	21	70%
2	Asam Mefenamat Tab	13	43%
3	Glibenclamide 5 Mg	9	30%
4	Neurobion 5000 Tab	8	27%

Combination of 2 Itemsets

The process of forming the support2 itemset by utilizing the Support formula, where the minimum specified support value is 25%. The data used for the combination of 2 itemsets is described as follows:

$$\text{Support (A,B)} = \frac{P(A \cap B)}{P(A \cup B)} \times 100\%$$

$$\text{Support (A,B)} = \frac{\sum \text{Transaction Contains A dan B}}{\sum \text{Transaction}} \times 100\%$$

1. Amoxicillin + Asam Mefenamat = $\frac{11}{30} \times 100\% = 37\%$
2. Amoxicillin + Glibenclamide = $\frac{6}{30} \times 100\% = 20\%$
3. Amoxicillin + Neurobion 5000 = $\frac{3}{30} \times 100\% = 10\%$
4. Asam Mefenamat + Glibenclamide = $\frac{6}{30} \times 100\% = 20\%$
5. Asam Mefenamat + Neurobion 5000 = $\frac{3}{30} \times 100\% = 10\%$
6. Glibenclamide + Neurobion 5000 = $\frac{3}{30} \times 100\% = 10\%$

From the calculation above, the support value for each itemset 2 is obtained as follows:

Table 8. Itemset 2

No	Medicine name	Number of Transactions	Support %
1	Amoxicilin Tablet + Asam Mefenamat	11	37%
2	Amoxicilin Tablet + Glibenclamide 5 Mg	6	20%
3	Amoxicilin Tablet + Neurobion 5000 Tab	3	10%
4	Asam Mefenamat Tab + Glibenclamide 5 Mg	6	20%
5	Asam Mefenamat Tab + Neurobion 5000 Tab	3	10%
6	Glibenclamide 5 Mg + Neurobion 5000 Tab	3	10%

So based on the specified support percentage, the itemset 2 combination that meets the requirements is as follows:

Table 9. Itemset Confidence Calculation Results

No	Medicine name	Number of Transactions	Support %
1	Amoxicilin Tablet + Asam Mefenamat	11	37%

b. Formation of Association Rules

After all high-frequency patterns are found, then we look for association rules that meet the minimum requirements for confidence by calculating the confidence of associative rules $A \rightarrow B$. Minimum confidence = 60%

Table 10. Itemset Confidence Calculation Results

No	Medicine name	Number of Transactions	Support %
1	Amoxicilin Tablet + Asam Mefenamat	11	37%

The confidence value of the $A \rightarrow B$ rule is obtained by the formula:

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$$\text{Confidence (A)} = \frac{\sum \text{Transaksi Mengandung A dan B}}{\sum \text{Transaksi A}} \times 100\%$$

1. Confidence (Amoxicillin + Asam Mefenamat) = $\frac{11}{6} \times 100\% = 183\%$

So from the calculation above, the confidence value of each itemset2 is obtained so that the results are as shown in Table 11 below:

Table 11. Itemset Confidence Calculation Results

No	Medicine name	Number of Transactions	Support %	Confidence %
1	Amoxicilin Tablet + Asam Mefenamat	11	37%	183%

The specified minimum confidence is 60%, the result is an association rule based on predetermined parameters, namely a minimum support of 25% and a minimum confidence of 60%. The following rules are formed, if consumers buy amoxicilin, they will buy mefenamic acid with a support value of 37% and a confidence of 183%.

CONCLUSION

The results of the study draw the conclusion that the a priori algorithm can be applied to the analysis of drug stock inventory at the Sinar Farma pharmacy with data mining. Where the specified minimum confidence is 60%, the minimum support is 25%, the association rules are determined based on parameters and the minimum confidence is 60%. The researcher determines the formation of a rule, namely if consumers buy amoxicilin, they will buy mefenamic acid with a support value of 37% and a confidence of 183%.

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