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Research pa



Proposed Sales Strategy in Herbal Medicine Products Using the Association Rule Method for Trimitra Herbal Pharmacy

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Abstract

Pharmacies are a place for selling drugs based on a prescription from a doctor. Pharmacies themselves have a close relationship with pharmaceutical companies and of course the Ministry of Health as a regulator related to the sale and marketing of drugs to the public. The main task of a pharmacy is to distribute drugs and provide a report data recap. At present, the problems faced in drug distribution are the uneven demand for drug distribution. Sometimes, the drug runs out or excess stock will be problematic with the accumulation of the amount of goods in the warehouse and can become expired and can be dangerous if distributed to the public. To overcome this problem, a computerized system was created. The system functions to recap the amount of goods and provides a recommendation on what items are most purchased by customers or patients. The method used is by using the Association rule Algorithm. The algorithm can display the number of relationships or relationships of the most sold products from 20% to 80% by calculating the value of support and confident.

Keywords: *Association rule; Information system; Pharmacies; Stock management.*

1. Introduction

At present, health is a very important matter where many activities are carried out outside the room starting from work, activities with the family and others. Very busy activities sometimes make people forget about their health. This causes the source of the disease to always be there. When this disease arises, it certainly requires medication to cure it. With the need for these drugs, the community will quickly find the nearest pharmacy and look for the drug. The most important thing is the availability of these drugs at the pharmacy.

The speed of getting a drug, of course, is very important for patients. Delays in the search for drugs can aggravate the disease suffered and can even cause death. Because of that, accuracy is needed in determining which pharmacy provides the medicine needed.

Pharmacies also have a dual role other than as an extension of the government for drug distribution. Another function is to provide services and counselling to the community related to the importance of health.

To visit a pharmacy, customers or patients can come directly and even online. With this online visit, the patient can check whether the reference drug is in the pharmacy or not.

The reliability of this information system can be more precise and quickly respond to all patient needs. Trimitra Herbal Pharmacy, as one of the concepts of modern pharmacies, tries to develop a new concept which will create an online sales and availability information system. Patients or customers can directly see the list of drugs available at the pharmacy and provide suggestions and recommendations for the next drug. The information system is not only used by patients but by pharmacy owners where pharmacy management systems can be helped by the results of sales data analysis. From the results of the analysis, it can be seen the pattern of drug purchases made by patients. The results of this analysis serve as a product promotion strategy and stock submission. The process is carried out by computerized techniques with the association method wherein the transaction database will find important information data in the previous transaction that cannot be done manually.

2. Literature Review

Pharmacies are a place to provide debriefing about health which serves to hold, store and sell drugs. The important thing from pharmacies is being able to provide information to the public about the functions and types of drugs. Another strategic function of the pharmacy is a media from the government and the private sector working in the health sector that processes the buying and selling of drugs or other medical devices. The sales transaction is large and in a fairly long period of time. To analyze the sales data, the concept of data mining is needed which functions to find important information on the data [1].

A manager is able to determine the buying pattern in a sales transaction by analyzing sales data. From the purchase pattern, it can be seen which drugs or medical devices are most often purchased by consumers. This will make it easier to determine which drug or medical device will be placed on the front of the sales rack and its adjacent position. The strategy or system by placing goods or products that are often sold on shelves with close placement is usually called "market basket analysis" [2].

Competition between companies in business today has utilized information technology where customers and buyers can transact, market their products directly without having to meet. The function of the information system is to produce a database of recorded sales transactions in previous years. In the database there is information that is very useful to see the most number of items. The

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work system can be made automatically and semi-automatically. The association method is a method that combines the concepts of data mining in the computer field and sales to find a product relation in a database. The method of work of this method is to find patterns of combinations of goods sold. The data can be used to determine recommendations for a product and to determine its sales strategy. Concept of data mining is also known as the concept of Support and Confident. Support is a measure that shows how much the level of goods dominates sales in the market analyzed from the results of overall sales. Then, confident is a measure that shows a sales transaction between 2, 3 and 4 item set goods from a combination of goods sold [3].

A process of selling goods will be grouped from each product that is widely purchased by consumers. This method is very important to determine the relationship between goods and consumer behaviour in purchasing. From the purchase pattern, a sales strategy can be developed and applied to an E-commerce application or information system. Through this e-commerce information system, the number of products and goods can be found and greatly facilitates customers. This will shorten the data search time. Product and service promotion systems can be displayed directly from a system [4].

3. Methodology

Data mining method is to work by combining knowledge and business concepts with analysis of statistics, artificial intelligence, mathematics and machine learning. This method will extract and identify a useful data for science in a large database.

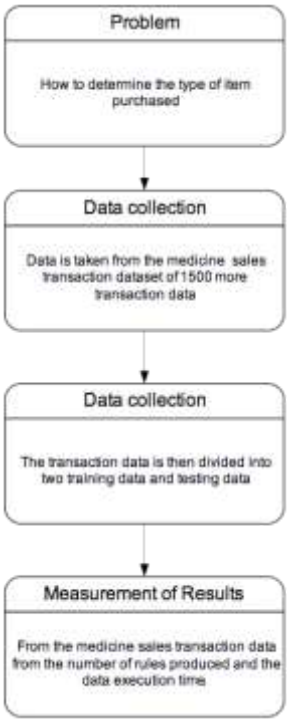

Fig. 1: Research Method

Stages of research methods

- Determination of type of goods
  This study uses drug sales transaction data at Trimitra Herbal Pharmacy as many as 1500 transactions in the 2015 to 2017 sales year period, with the term limits of 1 to 4, and minconf by 20% to 90%. Furthermore, from the results of the application execution, it was found rules or the number of goods relations that were most purchased in this study called the drug purchase recommendation. The rule found in the application varies greatly from the item set length. The length of these items will determine the number of recommendations given. If the item set length reaches 3-itemset, then there are 4 recommended drugs.
- Pattern Formation in the Priori Method and FP-Growth
  The first stage in the calculation of a priori algorithm to find Association rules is to write data on transactions that occur in a certain period. Transaction data generated in each transaction that is mapped, there may be transactions that have the same item. The more transaction data that has the same item, the compression process with the FP-tree data structure is more effective. The advantage of the FP-tree is that it only requires two transaction data scans that prove to be very efficient.
- Use of training data and training
  The function of using training and testing data is to compare and trace with sales data before, where transaction data taken more than 1500 transaction data from 125 medicinal and herbal products sold. The output of this method is a system that will display recommendations for goods sold and can be used for future promotion strategies.
- Measurement of results
  The next step is to make a combination of 2 item sets on each data and the frequency of each combination calculated according to tabular data. The pattern of combinations obtained can be seen in the frequency of each item sets found. The next step is to select a frequency that is greater or equal to the specified minimum limit. For example, a minimum support limit of ≥ 20 is determined. With a minimum calculation of support and confidence of 50% to 95%.

4. Results and Discussion

Formation of tabulation data from the results of medicine sales in Trimitra Herbal Pharmacies.

No.	BP001	BP002	BP003	BP004
P001	0	1	1	1
P002	0	1	1	1
P003	0	1	1	1
P004	1	1	1	1
P005	0	1	1	1
P006	0	1	1	1
P007	1	1	1	1

Fig. 2: Tabulation Data

Explanation:

In the picture above is a process of normalizing the data of products sold at the Trimita Herbal Pharmacy. In the table you can see the data list of product codes and buyer codes which are weighted with the values "1" and "0". The concept of a priori division with the distribution of several iterations by looking at the drug sales transaction data, from the data will be carried out the data normalization process. Data or variables that are not needed will be deleted in the database. The system will then look for the combination of items purchased 2 item items and 3 item items.

Steps of the a priori method on the system:

1. Establishment of candidate data "k" then combination of data (K-1) taken in the previous data iteration.
2. The characteristic of a priori algorithm is that it will eliminate the previous transaction data or a data trimming process.
3. Calculate the amount of support and confident taken from drug transaction data.
4. By scanning the data more than twice. Determining the frequency of the items or products that are most purchased with K-Item set value and minimum support value if the data value is fulfilled, the scanning database will be stopped.

No.	Premises	Conclusion	Sup...	Confid...
1	ACITRAL TAB	ACETON 60ML	1	1
2	ACETON 60ML	ACITRAL TAB	1	1
3	ACITRAL TAB	ABSOLUTE	1	1
4	ABSOLUTE	ACITRAL TAB	1	1
5	ACITRAL TAB	ABBOCATH 20	1	1
6	ABBOCATH 20	ACITRAL TAB	1	1
7	ABBOCATH 18	ACITRAL TAB	0.25	1
8	ACETON 60ML	ABSOLUTE	1	1
9	ABSOLUTE	ACETON 60ML	1	1

```php
<?php
// proses pembancaan data dengan metode apriori pada
//database transaksi penjualan APotik Trimitra Herbal

include 'Apriori.php';

$Apriori = new Apriori();
$Apriori->setMaxScan(3);
$Apriori->setMinSup(2);
$Apriori->setMinConf(80);
$Apriori->setDelimiter(',');
$Apriori->process('data_Apotik.txt');
?>
```

Fig. 3: Results of Calculation of Support and Confident

Information:
Fig. 3 is a process of calculating support and confident about the number of products purchased with a combination of 2 item set. "Acrital and Aceton" types of goods are two combinations of goods whose increase in sales reaches up to 80%.



Fig. 4: Results of the Calculation of 3-4 Item set Transactions

Information:
Fig. 4 is a combination process of up to 4 item set. This means that the item has been purchased by a buyer whose sales increase reaches up to 20%.



Fig. 5: Trimitra Herbal Pharmacy Information System

Information:
1. Fig. 5 shows data on goods and herbal medicines at Trimitra Herbal dispensaries in which there are a number of stock items and information on goods sold.
2. In the main menu which is the design of the user interface implementation that contains information including:
3. The menu "profile" contains the background of the Trimitra Pharmacy Herbs, locations, and types of herbs sold,
4. On the "product" menu contains a catalog of types of herbal products that are sold complete with the types and prices of these herbal medicines,
5. On the "Purchase" menu, it contains information on how to purchase and delivery costs if it is far outside the city.
6. The shopping basket contains a list of purchased herbal medicines.



Fig. 6: Recommendation number of items that are most purchased

Information:
Fig. 6 shows that the system automatically displays the best-selling products.



Fig. 7: View Section of the Admin Page

Information:
Fig. 7 is a product data list that will always be updated on administrator and system parts. Data parameters are seen from "product name", "weight", "price", "stock", and "entry date". While, the entry date serves to check whether the drug is expired or not.

5. Conclusion

From the results of the experiment, it can be concluded that associative applications and algorithms in sales information systems can be used to determine data patterns. The system is able to analyse more than 1500 transaction data, the amount and stock increases up to 80%. From these data can be used by management to determine the strategy for the promotion and sale of goods at the Trimitra Herbal Pharmacy, so that data on goods stock and distribution can be made evenly.
For further research to maximize the results of data analysis, it is necessary to add more capacity and data storage. So that, sales data from last year can be recorded and become a record, so that it can be crucial information to determine the next strategic management decision making.

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