Batik Sales Product Recommendation System On E-Commerce Website Using Fp-Growth Algorithm

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Batik Sales Product Recommendation System On E-Commerce Website Using Fp-Growth Algorithm

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Abstract **— Batik is a traditional Indonesian fabric that has been famous to foreign countries. The types and motives of batik in Indonesia are different and have very deep philosophical values. Batik is currently found in traditional markets with very diverse values and patterns. In the conventional market system buyers are not only foreign tourists but also involve local tourists. Sales like this will make direct interaction between consumers and buyers so that the transaction and buying and selling processes occur. In this system, traditional shops and markets are abundant, causing uneven sales systems. This is because not all stores can sell and offer simultaneously sometimes there are some stores visited by many buyers and some do not. The solution to this problem is to create a sales system that is online or known as E-commerce. The advantage of this system is that buyers do not need to come to conventional markets and enough through cyberspace. The current E-Commerce system only offers one product so that other items cannot be offered. The weakness of the system can be overcome by adding product recommendation concepts that will be offered automatically by the system. The products offered are superior products or best sellers. The product will appear on the system, each buyer opens the product website page offered and then processed using the Fp-Growth algorithm. The algorithm will calculate the most sold products in the database and appear on the website. The system will work automatically so that the products offered are evenly distributed and will increase to become sales media and promotional media for products sold.**

Keywords — Batik, Product Recommendation System, E-Commerce, FP – Growth, Algorithm

1. Introduction

On E-commerce websites we have found many sales of goods and services. The system allows the transaction process to be faster and more precise and over time and costs, so that customer and buyer meetings are virtual and transactions are carried out in cyberspace. This system is able to replace a conventional sales system where buyers meet directly with customers. Conventional systems allow the process of offering goods directly so that buyers are satisfied with the goods offered while the weakness of this system is time wasted if the items are sought out or there are no recommendations for superior products.

The second factor is in terms of security that is not guaranteed, for example the market is a crowded area where transactions are carried out with relatively large amounts of cash. In some cases sales made online with e-commerce websites have many features offered, for example stock items, discount prices, and information on goods sold. In an online system buyers can buy more than one item. The weakness of the system is the possibility that the goods purchased are not as expected and the shipping process is long because E-commerce sales will use a third party as a freight forwarder. This becomes more risky and risky because of the security and warranty of the condition of goods delivered to third parties. Some of these weaknesses can be avoided by using a product recommendation method or best seller that is displayed on the front page of the website. The system performs a scanning process according to previous sales data in this case batik cloth. The computer system will automatically select sales data with the help of algorithms. Fp-Growth will record the value of support

and confident. Support is the frequency of the amount of goods purchased while confident is the estimate of the best-selling item based on sales in the previous month or year. With this system the shop owner does not need to assume or offer another product because the system will recommend periodically and automatically. This system is able to attract buyers to buy one or more items that previously the buyer only wants to buy one or two items, finally interested in buying the recommended item.

2. Background

A transaction data that is too large in a database can be found useful information about purchasing consumer data using data mining techniques. This technique can be used to find out market conditions or consumers by observing sales data. In the e-commerce system the sales database is stored on a server so that the amount of data is very large. The concept of data mining is to search for information from a data by observing patterns and connections between data. This relationship will produce a pattern match or what is called a product recommendation. With the addition of an algorithm help, the data relations and relationships can be exploratory and determined. [1]

The development of data mining algorithms is known as FP-Growth and still functions with a priori algorithms. The disadvantages of a priori algorithms will be adjusted by FP-Growth. The working system of the algorithm is to determine a data that often appears in a transaction or called the frequency of itemsets. [2]

Grouping the types of goods in a sales system is generally implemented on an online certified sales system. This system is commonly referred to as market basket analysis. This calculation works by looking at the relationship between the goods sold. For example goods of 'A' and 'B' and are not influenced by the number of items. In the data mining technique the apiriori algorithm will produce a number of rule methods to read and pay attention to the total number of goods transactions. This calculation is taken from a data item itemset that is different in each sales transaction. [3]

The procedure of connectedness between tables at the pole of purchasing goods is called a system association rule. This system looks for a pattern of combinations in an itemset with a value called condition and result. In a pattern of goods association processing a data is called support, a measure that shows the level of dominance and a measure of the feasibility of a transaction. This system is called confident. Confident measurement itself is influenced by the connection of two types of goods, for example buyers '1' buy goods '2' seen in a transaction. [4]

The function of a data mining is used to analyze a form of a pattern or rule on a set of data using a software or software that can be used to identify data inputted by the user. [5]

Knowing an association pattern in a data transaction can use data mining techniques. With this technique the system knows a rule of a product's relationship with other products, where patterns and ways consumers can buy a product can be known. The process for determining a product relationship is known as data mining techniques. This technique works by using mathematical calculations and Artificial Intelligence statistical techniques and machine learning and generally data mining techniques are implemented in a large database. [6]

In making an online sales system application is usually made in the programming language PHP and mySQL as the supporting database. This programming language is used because it is easily implemented and used to create a web page that is static and dynamic. The PHP programming language is combined with an HTML webpage where programs are made able to connect with databases and web pages to be more dynamic and interactive. [7]

An interactive and dynamic sales website will have interactions between sellers and buyers, resulting in a process of buying or ordering goods. The purchase data will automatically be stored in a database, the database system used using MySQL, and transaction data stored in a database, maintains data security faster and is multi-user and open source. [8]

3. System Design

In designing this system, the data processing process will be explained on the E-commerce website. In this case the sale of batik cloth is website-based. The website system is made in the PHP programming language. The system was chosen because it is easy to use and apply, and can run on devices that are mobile or use a home PC. In order for the system to work, software and hardware support is needed as follows:

Hardware

a. Computer

In this system the computer is used as an E-commerce website creation process and the website maintenance process itself. The owner or admin can record and view data on ongoing transactions. The admin function is to add data or update batik products offered to customers.

b. Server

The server function in this system is used to store product databases and identity data of customers who make transactions. The purpose of using the server is to make the transaction process safe and confidential by relying on the security features that are available on the server.

Software

a. My SQL

The MySQL function is used as a process of storing and creating sales transaction data. The data will be processed using Apriori and Fp-Growth algorithms to record sales results and display automatically by the system.

b. Rapid Miner

The miner function in this system is used to record and process previous sales data by testing the data with an algorithm. The concept of rapid miners is to take an interesting feature and information on a sales or transaction data.

c. Adobe Photoshop

The Adobe Photoshop function on this system is used to design products in attractive forms.

d. Dreamweaver

The Dreamweaver function is used to design the form of pages from websites that are created using the PHP and mysQL programming languages.

4. Implementation and Testing

In the implementation of testing this system will be applied in three stages. First, test the algorithm. Second, testing on sales transactions, and third, testing product recommendations or best sellers.

Table 1.1 Testing of transaction data patterns

No.	Product Name	Weight (Kg)	Price	Stock	Entry Date
1	Batik Besurek	0	300	49	13 Januari 2019
2	Batik Jambi	0	12	300	13 Januari 2019
3	Batik Jawa Pekalongan	0	300	10	13 Januari 2019
4	Batik Gentongan	0	200	50	13 Januari 2019
5	Batik Tuban Corak	0	200	50	13 Januari 2019
6	Batik Jawa Pekalongan	0	300	49	13 Januari 2019
7	Batik Tuban	0	0	50	13 Januari 2019
8	Batik Solo	0	40	40	13 Januari 2019
9	Batik Gentongan	0	300	20	13 Januari 2019
10	Batik Cianjur	0	125	20	13 Januari 2019

Information:

Table 1.1 is a data weighting pattern taken from transaction data. This system is used to determine the value of support and confident that there are batik sales transaction data.

Table 1.2 Data normalization system

No.	Batik Besurek	Batik Jambi	Batik Jawa Pekalongan	Batik Gentongan
1	1	0	0	1
2	0	0	0	0
3	0	0	0	0
4	0	0	1	1
5	0	0	0	0
6	1	0	0	0
7	0	0	0	0
8	0	1	0	0
9	0	0	0	0
10	0	0	0	0
Support	2	1	1	2

Information:

Table 1.2 is the process of removing unnecessary data on sales transaction data. This system is needed so that only important data is taken when testing.

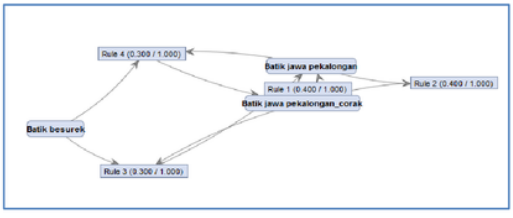
Table 1.3 Test results with algorithms

```
Step 1: Jumlah Mengikut Item
Array
(
    [
] => 5
    [Batik besurek
] => 0
    [Batik jambi
] => 0
    [Batik jawa pekalongan
] => 0
    [Batik Gentongan
] => 0
    [batik Tuban corak
] => 0
    [batik Tuban
] => 0
    [Batik Solo
] => 0
    [Batik Cianjur
] => 1
)
```

Information:

Table 1.3 is the testing process using rapid miner tools. The data tested is the result of batik sales transactions. In the test, the value of support and confidence will be made between 50 to 90%, which means to see the total number of items that are in demand with a presentation calculation of 50 to 90%. In this system, a pattern of data linkages will be generated in the number of rules, the rule will differ depending on the combination of products purchased.

Table 1.4 Testing with FP-GROWTH



Information:

Table 1.4 is the testing process and calls for the FP-Growth algorithm method and a priori using the PHP programming language directly on the sales transaction data.

Table 1.5 Testing with rapid miner

No.	Premises	Conclusion	Support	Confid...
1	Batik jawa pekalongan_corak	Batik jawa pekalongan	0.400	1
2	Batik jawa pekalongan	Batik jawa pekalongan_corak	0.400	1
3	Batik desurek, Batik jawa pekalongan_corak	Batik jawa pekalongan	0.300	1
4	Batik desurek, Batik jawa pekalongan	Batik jawa pekalongan_corak	0.300	1

Information:

Table 1.5 is the process of using rapid miner software by using a circuit scheme and recording the number of related items purchased simultaneously from a combination of 2 itemset items and 3 itemset items.

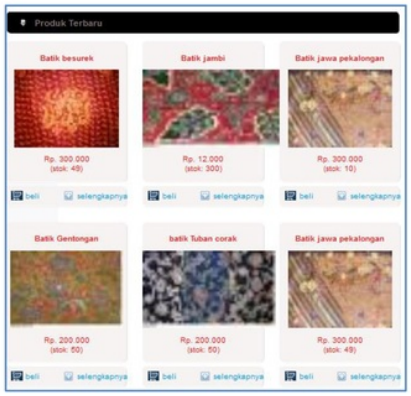


Figure 1.1 Display of the main page of the website

Information:

Figure 1.1 is the main page display of batik sales. The page will be seen most often by the customer. Web pages are systematically designed not to use many menus to make it easier for customers and do not eliminate the element of beauty and interaction between humans and computers.

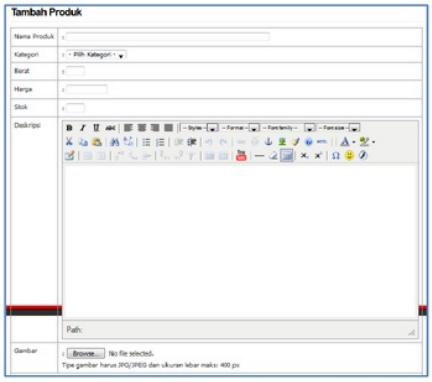


Figure 1.2 Display the website admin page

Information:

Figure 1.2 is the main page in the admin settings, on that page can be accessed by the shop owner and has a level of access rights to add transaction data. Data that can be added include item data, customer data, data of adding product categories and recommendations.

No	Produk	Nama Produk	Berat(Kg)	Qty	Harga	Sub Total	Hapus
1		Batik Solo	0.00	1	40.000	40.000	
2		Batik Cianjur	0.00	1	125.000	125.000	
3		Batik Gentongan	0.00	1	200.000	200.000	

Total: Rp. 365.000

Figure 1.3 Display of purchase transaction data

Information:

Table 1.3 is a sample data of purchases made over several months, the data will be processed automatically to see how much and what type of item is most purchased. The system will then display recommendation data that has been calculated previously using a priori and Fp-Growth algorithms.

NO	NAMA KATEGORI	AKSI
1	Batik Aceh	Edit | Hapus
2	Batik sumatra	Edit | Hapus
3	Batik Jawa	Edit | Hapus
4	Batik Daerah	Edit | Hapus

Figure 1.4 Display of products sold

Information:

Figure 1.5 is the process of adding product data that has been updated by the admin, with estimates of the cost and amount of stock and product description.

Figure 1.5 Display of product recommendations page

Information:

Figure 1.5 is the process of implementing product recommendations that can be categorized as a best seller product, the product will appear directly on the main page of the website, product recommendations will change according to needs.

5. Conclusion

From this research, it can be concluded that the application of a product recommendation system on e-commerce websites selling batik can be implemented. The system is able to display data on some of the best-selling products. The product is temporary and will always change according to the presentation and type of batik sold or promoted at a certain time.

The suggestion for further research is to add a larger data storage system. This is done so that the storage data becomes larger and can be used for a long time. The system of maintenance and repair of hardware and software is very necessary because the web is online so it needs to be monitored because the transaction process will last for 24 hours. The products offered in the future must be more creative in promoting their products to make them more attractive.

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