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Batik sales product recommendation system on E-Commerce Website using FP-Growth Algorithm

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Abstract

The study aims to investigate the Batik sales product recommendation system on E-Commerce Website using the FP-Growth Algorithm. In this case, the sale of batik cloth is website-based. The website system is made in the PHP programming language. As a result, 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. From this research, it can be concluded that the application of a product recommendation system on e-commerce websites selling batik can be implemented.

Keywords: Batik, Product recommendation system, E-Commerce.

Sistema de recomendación de productos de ventas de
Batik en el sitio E-Commerce Website utilizando el
algoritmo de crecimiento FP

Resumen

El estudio tiene como objetivo investigar el sistema de recomendación de productos de ventas de Batik en el sitio web de

comercio electrónico utilizando el algoritmo FP-Growth. En este caso, la venta de tela batik se basa en el sitio web. El sistema del sitio web está hecho en el lenguaje de programación PHP. Como resultado, el proceso de implementación de recomendaciones de productos que pueden clasificarse como un producto más vendido, el producto aparecerá directamente en la página principal del sitio web, las recomendaciones del producto cambiarán según las necesidades. A partir de esta investigación, se puede concluir que se puede implementar la aplicación de un sistema de recomendación de productos en sitios web de comercio electrónico que venden batik.

Palabras clave: Batik, Sistema de recomendación de productos, Comercio electrónico.

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 overtime and costs, so that customer and buyer meetings are virtual and transactions are carried out in cyberspace. This system can 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 the 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 bestseller 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 (AHMAD & AHMAD, 2019). FP-Growth will record the value of support and confidence. Support is the frequency of the number of goods purchased while confidence 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 can 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. LITERATURE REVIEW

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 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 (AHMAD & AHMAD, 2019; Arinin et al, 2019).

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 data that often appears in a transaction or called the frequency of item sets.

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 apriori algorithm will produce some rule methods to read and pay attention to the total number of goods transactions. This calculation is taken from a data item set that is different in each sales transaction (JAZAYERIY, H., MOHAMMADI, S., & SHAMSHIRBAND, 2018).

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 item set 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 confidence. The confident measurement itself is influenced by the connection of two types of goods, for example, buyers '1' buy goods '2' seen in a transaction (AHMAD & AHMAD 2019).

The function of data mining is used to analyze a form of a pattern or rule on a set of data using software or software that can be used to identify data inputted by the user (SUMATHI, KANNAN, & NAGARAJAN, 2016).

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 general data mining techniques are implemented in a large database (MAHESHWARI, DAVENDRALINGAM, & DELAURENTIS, 2018).

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 (ALIYU & KISSINGER, 2017).

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 to use MySQL, and transaction data stored in a database maintains data security faster and is multi-user and open source (SUN, ZHANG, XIONG, & ZHU, 2014).

3. METHODOLOGY

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. For the system to work, software and hardware support are needed as follows:

3.1. 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.

3.2. 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 'A' priority and FP-Growth algorithms to record sales results and display them 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 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. RESULTS

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: Testing of transaction data patterns

No.	Product Name	Weight (Kg)	Price	Stock	Entry Date
1	Batik Besurek	0	300	49	January 13, 2019
2	Batik Jambi	0	12	300	January 13,

					2019
3	Batik Jawa Pekalongan	0	300	10	January 13, 2019
4	Batik Gentongan	0	200	50	January 13, 2019
5	Batik Tuban Corak	0	200	50	January 13, 2019
6	Batik Jawa Pekalongan	0	300	49	January 13, 2019
7	Batik Tuban	0	0	50	January 13, 2019
8	Batik Solo	0	40	40	January 13, 2019
9	Batik Gentongan	0	300	20	January 13, 2019
10	Batik Cianjur	0	125	20	January 13, 2019

Table 1 is a data weighting pattern taken from transaction data. This system is used to determine the value of support and confidence that there are batik sales transaction data.

Table 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

Table 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.

```
Step 1: Total List Of 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
)
```

Table 3: Test results with algorithms

Table 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.

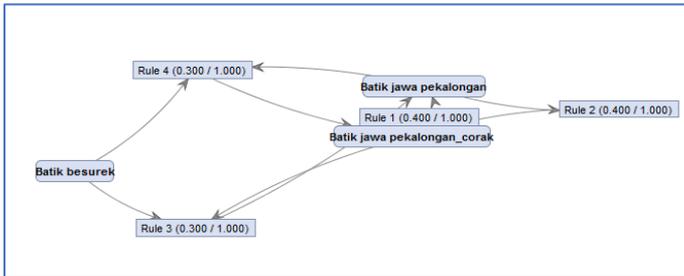


Table 4: Testing with FP-GROWTH

Table 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.

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 besurek, Batik jawa pekalongan_corak	Batik jawa pekalongan	0.300	1
4	Batik besurek, Batik jawa pekalongan	Batik jawa pekalongan_corak	0.300	1

Table 5: Testing with rapid miner

Table 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 item set items and 3 item set items.

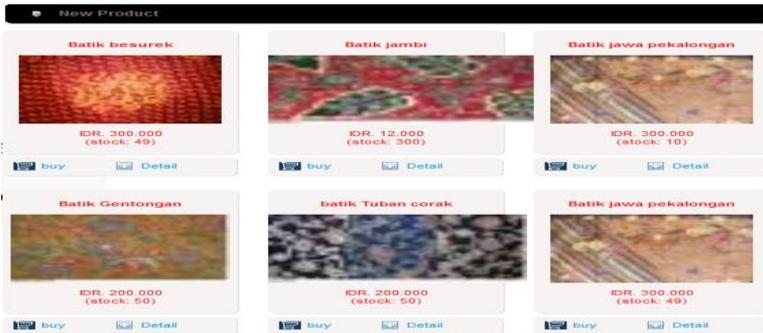


Figure 1: Display of the main page of the website

Figure 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.

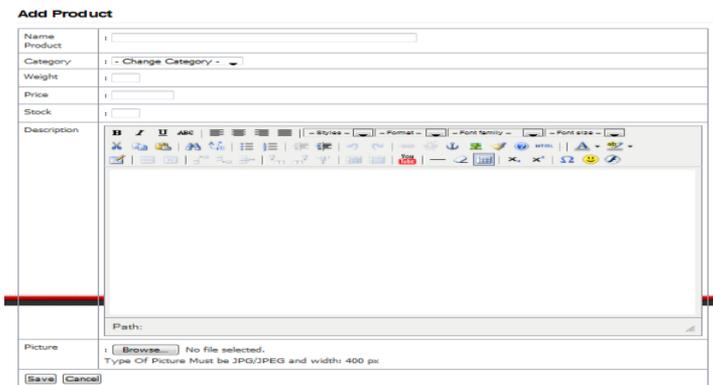


Figure 2: Display the website admin page

Figure 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	Product	Name Product	Weight(Kg)	Qty	Price	Sub Total	Delete
1		Batik besurek	0.00	<input type="text" value="1"/>	300.000	300.000	
2		Batik jambi	0.00	<input type="text" value="1"/>	12.000	12.000	
3		Batik Gentongan	0.00	<input type="text" value="1"/>	200.000	200.000	
4		Batik jawa pekalongan	0.00	<input type="text" value="1"/>	300.000	300.000	
5		batik Tuban corak	0.00	<input type="text" value="1"/>	200.000	200.000	

Total: IDR. 1.012.000

Figure 3: Display of purchase transaction data

Figure 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.

Category

Add Category

NO	CATEGORY	ACTION
1	Batik Aceh	Edit Delete
2	Batik sumatra	Edit Delete
3	Batik Jawa	Edit Delete
4	Batik Daerah	Edit Delete

Figure 4: Display of products sold

Figure 4 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 5: Display of product recommendations page

Figure 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 can 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 stored 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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