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Application of Data Mining on Mobile Phone Sales Data Using the Apriori Algorithm (Case Study: Sentral Phone Store)

Maida Indrayani[1], Muhammad Iqbal[2]
[1,2]Master of Information Technology, Universitas Pembangunan Panca Budi

ABSTRACT

Mobile Phone is an electronic device used to communicate, transact digitally and as a medium for exchanging data and information. Mobile Phone is one of the secondary needs that must be owned by the community. In its development, there are various types of mobile phone brands that are sold and the prices offered also vary. The community can buy mobile phones according to their needs and financial capabilities. To see the mobile phone brands that are most in demand by the community, data mining is used using the apriori algorithm to analyze the sales of the most sold mobile phones. So that with the use of the apriori algorithm, it avoids the accumulation of unsold mobile phones.

Keyword : Data Mining, Apriori Algorithm, Tanagra

Corresponding Author:
Maida Indrayani,
Master of Information Technology
Universitas Pembangunan Panca Budi
Jl. Gatot Subroto KM. 4,5, Indonesia.
Email : maida.indrayani92@gmail.com

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Introduction

Sentral phone Store is located in one of the stores in the city of Medan. Sentral Phone Store sells various types of mobile phones ranging from iPhone, Samsung, Oppo, Vivo, Real Me and Xiaomi. In the sales process, sometimes there is an increase and decrease according to the interest of buyers both in terms of models and competitive prices. To reduce the accumulation of unsold goods, a data processing process is carried out, namely data mining, to help the store find out the data on mobile phones that have sold well as a whole.

Data Mining is a process used for data processing to obtain information. There are various algorithms in data mining, including the Apriori Algorithm which is often used for e-commerce stores to analyze purchasing patterns so that it can optimize the inventory of Hand Phone products to be sold. It is hoped that by using the Apriori Algorithm at Sentral Phone Store, it can optimize Hand Phone stock and find out which Hand Phones are most in demand by the public. So that there is no accumulation of unsold Hand Phone stock at Sentral Phone Store.

Research methods

1) Stages of Research Methods

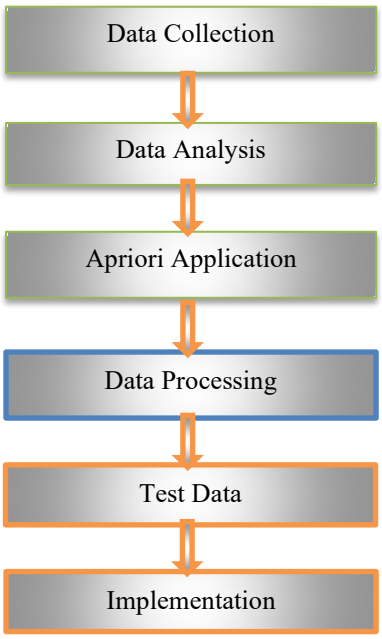

Figure 1. Research Framework

The steps of the Apriori Algorithm are:

a) Determine k, which is the closest distance
b) Calculating distance with Euclidean
Formula : $\sqrt{\sum_{I=1}^{K}(X1-Y1)^2+(X2-Y2)^2}$
Xi = Value in the training data
Yi = Value in the testing data
k = Attribute dimension
c) Sort the results in ascending order to rank from the largest to the lowest doll sales data.
2) Data Analysis
The training data used is the cellphone sales transaction data for the last 1 month taken in November 2024.

No	HP Brand	Product Transactions											
		Jan	Feb	Mar	Apr	May	June	Jul	August	Sep	Oct	Nov	Des
1	Iphone	11	15	7	6	20	4	14	5	5	3	10	9
2	Samsung	10	4	9	9	5	2	15	12	3	10	9	20
3	Oppo	3	1	10	4	15	1	11	8	1	5	3	7
4	Vivo	5	0	6	9	3	9	10	1	1	4	2	2
5	Xiaomi	6	4	7	3	1	1	8	2	4	2	1	1
6	Infinix	2	7	6	10	2	9	5	2	8	1	1	3
7	Sony	0	2	0	1	0	1	0	2	1	1	3	0

8	Realme	2	6	9	4	7	0	2	8	2	1	0	1
9	Huawei	3	1	0	1	2	5	1	0	0	2	2	0
10	Asus	0	1	1	0	0	0	1	3	0	1	0	0

Table 1. Transaction Table

Information:

a) The most sold cellphone brands in January were iPhone, Samsung and Xiaomi.
b) The most sold cellphone brands in February were iPhone, Infinix and Realme.
c) The most sold cellphone brands in March were Oppo, Samsung and Realme.
d) The most sold cellphone brands in April were Infinix, Samsung and Vivo.
e) The most sold cellphone brands in May were iPhone, Oppo and Realme.
f) The most sold cellphone brands in June were Oppo, Infinix and Huawei.
g) The most sold cellphone brands in July were Samsung, iPhone and Vivo.
h) The most sold cellphone brands in August were Samsung, Oppo and Realme.
i) The most sold cellphone brands in September were Infinix, iPhone and Xiaomi.
j) The most sold cellphone brands in October were Samsung, Oppo and Vivo.
k) The most sold cellphone brands in November were iPhone, Samsung and Oppo.
l) The most sold cellphone brands in December were Samsung, iPhone and Oppo.

Results and Discussion

1) Total Mobile Phone Transactions, the following is the total results of mobile phone sales, the data of which was taken from January to December.

No	HP Brand	Product Transactions												Total Product Sales
		Jan	Feb	Mar	Apr	May	June	Jul	August	Sep	Oct	Nov	Dec	
1	Iphone	11	15	7	6	20	4	14	5	5	3	10	9	109
2	Samsung	10	4	9	9	5	2	15	12	3	10	9	20	108
3	Oppo	3	1	10	4	15	1	11	8	1	5	3	7	69
4	Vivo	5	0	6	9	3	9	10	1	1	4	2	2	52
5	Xiaomi	6	4	7	3	1	1	8	2	4	2	1	1	40
6	Infinix	2	7	6	10	2	9	5	2	8	1	1	3	56
7	Sony	0	2	0	1	0	1	0	2	1	1	3	0	11
8	Realme	2	6	9	4	7	0	2	8	2	1	0	1	42
9	Huawei	3	1	0	1	2	5	1	0	0	2	2	0	17
10	Asus	0	1	1	0	0	0	1	3	0	1	0	0	7

2) Sales Transactions, the following is the accumulation of the best-selling mobile phone sales transactions each month taken from 3 mobile phone brand items, namely as follows:

Table 2. Accumulated Mobile Phone Sales Transactions

No.	Month	Product Items
1	January	iPhone, Samsung, Xiaomi
2	February	Iphone, Infinix and Realme.
3	March	Oppo, Samsung and Realme.
4	April	Infinix, Samsung and Vivo.
5	May	Iphone, Oppo and Realme.
6	June	Oppo, Infinix and Huawei.
7	July	Samsung, Iphone and Vivo.
8	August	Samsung, Oppo and Realme.
9	September	Infinix, Iphone and Xiaomi.
10	October	Samsung, Oppo and Vivo.
11	November	Iphone, Samsung and Oppo.
12	December	Samsung, iPhone and Oppo.

3) Transaction Tabular Format, namely determining the tabular format of monthly cellphone sales transaction data:

Table 3. Transaction Tabular Format

No.	Month	Iphone	Samsung	Oppo	Vivo	Xiaomi	Infinix	Sony	Realme	Huawei	Asus
1	January	1	1	0	0	1	0	0	0	0	0
2	Februari	1	0	0	0	0	1	0	1	0	0
3	Maret	0	1	1	0	0	0	0	1	0	0
4	April	0	1	0	1	0	1	0	0	0	0
5	Mei	1	0	1	0	0	0	0	1	0	0
6	Juni	0	0	1	0	0	1	0	0	1	0
7	Juli	1	1	0	1	0	0	0	0	0	0
8	Agustus	0	1	1	0	0	0	0	1	0	0
9	September	1	0	0	0	1	1	0	0	0	0
10	Oktober	0	1	1	1	0	0	0	0	0	0
11	November	1	1	1	0	0	0	0	0	0	0

12	Decembe r	1	1	1	0	0	0	0	0	0	0

4) Here is the creation of an item set using the Tanagra application obtained from the results of selling cellphones at Sentral Phone Store for one year.

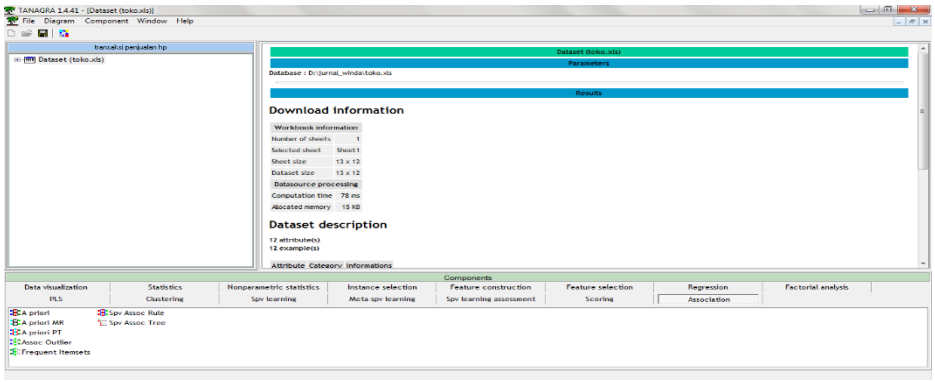

Figure 1. HP Sales Data Set

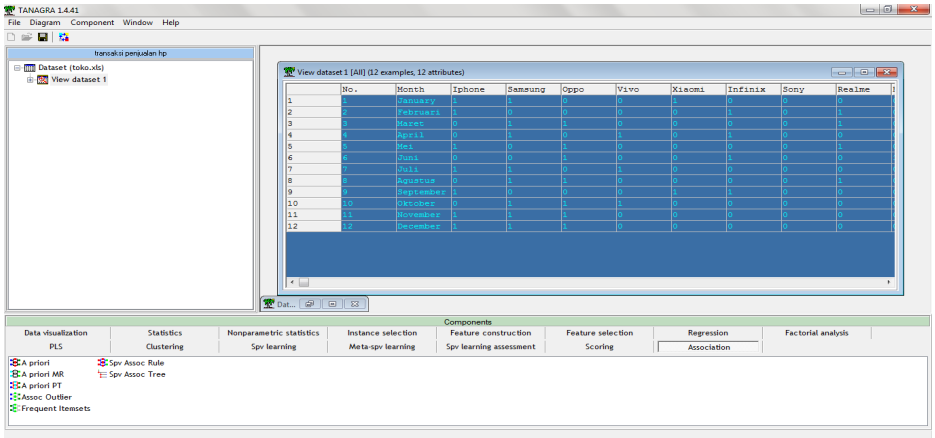

Figure 2. View HP Sales Data Set

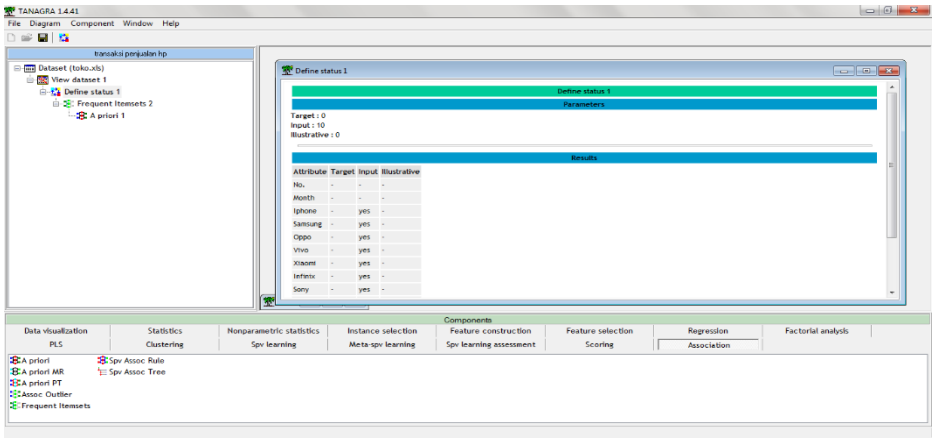

Figure 3. Define HP Sales Status

5) The following are the results of the frequency of itemsets for mobile phone sales at Sentral Phone Store with a minimum support parameter value of 20%, maximum support of 100%, minimum length of 2 and maximum length of 4.

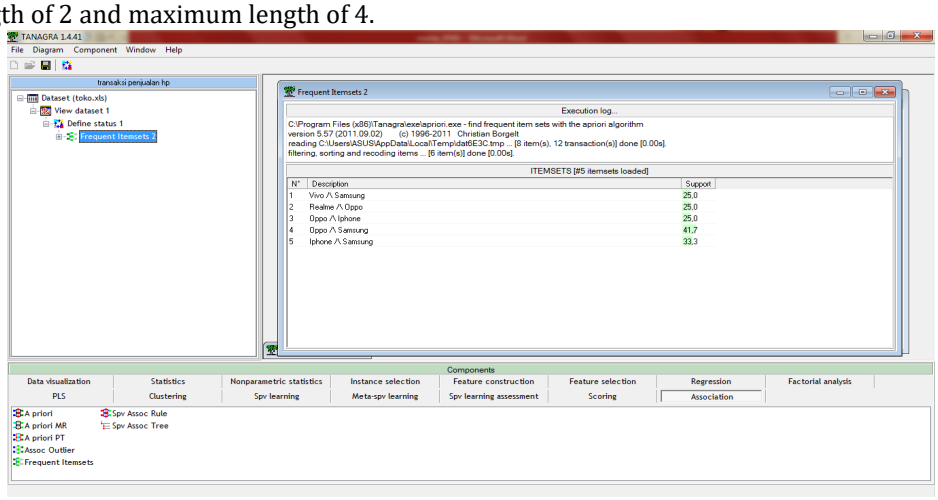

Figure 4. HP Sales Itemsets Frequency Data

6) The following are the results of the Apriori Rule for mobile phone sales at Sentral Phone Store with a support parameter value of 20%, confidence 0.6, max card itemsets 4 and lift 1.1.

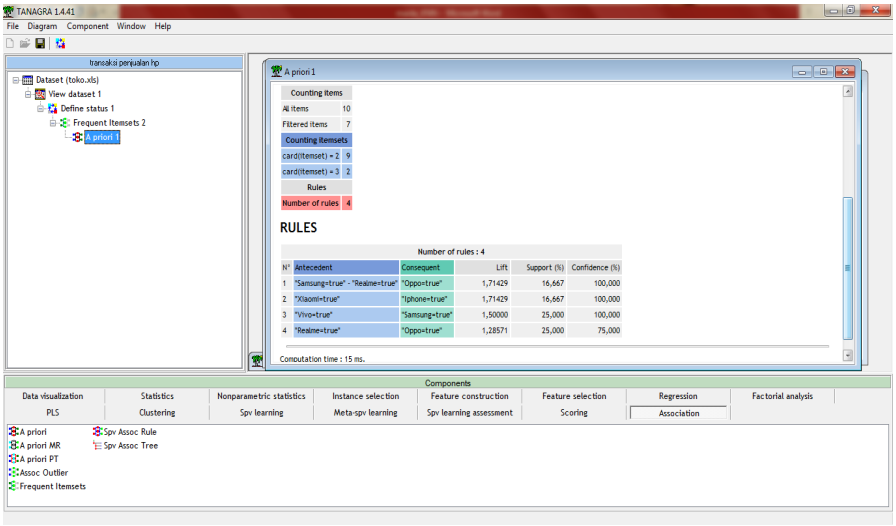

Figure 5. Apriori Rule Results

Conclusion

From the results of the tests carried out using the Tanagra application, it was found that the most sold mobile phone brands were Vivo and Samsung with a support value of 25% and a confidence value of 100%.

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