FP GROWTH ALGORITHM MODELING FOR PRODUCT INVENTORY ANALYSIS

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ABSTRACT

Pusaka Tani is a shop that provides agricultural needs such as fertilizers, rice seeds and plant medicines. Sales transactions at the Farmer's Library still use a manual system, namely by using notes as proof of sales transactions. The amount of data that accumulates results in less useful data. So that Pusaka Tani cannot know the products that are often purchased by consumers simultaneously which results in many products being sold out without the knowledge of Pusaka Tani which results when consumers are not going to buy these products and products that are rarely purchased by consumers become unsold. The purpose of this study is to model FP Growt in the analysis of product stock supply. In the research conducted, the support value and confidence value used is a minimum support value of 30% and a minimum confidence value of 70%. The results obtained from the research conducted are for the highest lift ratio value of 1.67 and the lowest is 1.09

KEYWORDS FP Growth, Association Rule, Product Inventory

INTRODUCTION

The rapid progress of the times makes all people want fast information as well. In addition, in terms of information on the progress of the times, it has an impact on the development of community businesses and competition (Gunarsih et al., 2021). The company's ability to provide products that are needed by society is important (Fenny Krisna Marpaung, Markus Willy Arnold S, Asyifa Sofira, 2021). To achieve what is needed by businessmen, there are many ways to do it by increasing products, adding product types and reducing operational costs so that the business becomes more efficient and effective as well as good service (Adani et al., 2019). One of the businesses that has the biggest opportunities is Fertilizers and Agricultural Supplies.

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purchased by consumers simultaneously which results in many products being sold out without the knowledge of Pusaka Tani.

Based on the description of the background above, an analysis of consumer purchasing patterns will be carried out in assisting the provision of products. In the case of analysis for scientific data mining, the rule association for the algorithm applied is the FP Growth algorithm (Musyaffa et al., 2021). The FP-Growth method is one of the methods of the Association Rule technique. Association Rule is a data mining technique for finding associative rules between item combinations (Asana et al., 2020). One alternative algorithm in the Association Rule is FP Growth. The FP-growth algorithm is an alternative algorithm that can be used to determine the most frequently occurring data set (frequent itemset) in a data set (Nasyuha et al., 2021) and is an efficient algorithm for association rules (Wicaksono et al. , 2020).

The purpose of this study is to model FP Growt in the analysis of product stock supply. FP Growth modeling can be used as a reference in system development.

RESEARCH METHOD

Research activities begin with the formulation of the problem and study of literature. The problem solving process requires data collected using observation and documentation methods. After the data is collected, the next stage is the system development process using the software development method, namely Extreme Programing (XP). Extreme Programming (XP) is one of the most widely used agile methods and has become a very popular approach. Extreme Programming (XP) is a methodology used for software development aimed at improving the quality of software to changes and user needs. On XP there are several stages in the development of information systems, namely Planning, Design, Coding, Testing and Software Increment (Supriyatna & Puspitasari, 2021)

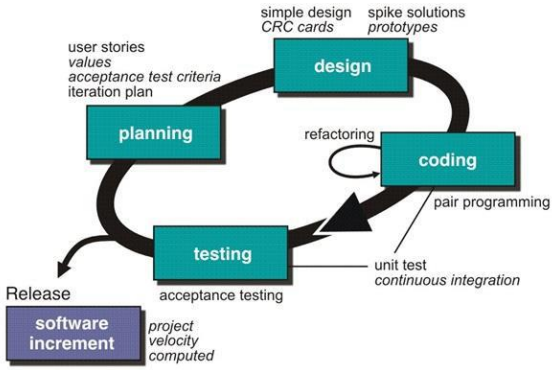


Figure 1. Extreme Programming

The XP stages used in this study only reached the design stage which consisted of 3 stages, namely Planning and Design.

(1) Planning In planning, the scope of application is compiled, the priority of functions and features that must be developed and what must be done for each stage in detail.

(2) Design. The design principles used in the XP method are simplicity, feedback, and allowing incremental changes. Simplicity means that the developer uses the easiest steps to realize a system's functionality.

RESULT AND DISCUSSION

a. Planning

The planning stage is carried out to find out about the concept of FP Growth. The data search process at this stage is carried out directly to Pusaka Tani. Pusaka Tani is a shop that provides agricultural needs such as fertilizers, rice seeds and plant medicines. In this study, to create the FP Growth model, researchers used 113 samples of product sales transaction data with sales transaction attributes. The transaction data used can be seen in table 1.

Table 1. Transaction Data

Transaction Code	Transaction
001	Jaya Seed Cabai, Pupuk Urea, Pupuk NPK Mutiara 16-16-16
002	Jaya Seed Pare, Pupuk Urea, Pupuk Phonska Plus
003	Jaya Seed Pare, Pupuk Urea, Kempo, Boom Flower
004	Regent 50EC, Ares
….	
…..	
……	
113	Jaya Seed Bayam,Pupuk Urea, Pupuk Phonska Plus

b. Design

1. FP Growth Data Modeling

The sales transaction data that has been obtained is then analyzed for each itemset from the existing data. The data will be processed to get the appropriate combination by analyzing sales transactions made by consumers.

Table 2. List of Items

No	Item
1	Jaya Seed Bayam
2	Jaya Seed Cabai
3	Jaya Seed Pare
4	Pupuk Urea
5	Pupuk Phonska Plus
6	Pupuk NPK Mutiara 16-16-16
7	EM4 Kuning
8	Kempo
9	Regent 50EC
10	Gramoxone
11	Kanon
12	Biostar
13	Filia 25SE
14	Score 250EC
15	Seldene
16	Sumo
17	Ripcoro
18	Primasil
19	Boom Flower
20	Gempur
21	BioNasa
22	Nugrass
23	Balistic
24	Ares

No	Item
25	Plenum
26	Pure K
27	Leile 2000

2. Determination of Item Frequency
The results of the transaction data tracing process shown in table 1 are known to be the number of occurrence frequencies of each item in the transaction data and sort them based on the largest number of occurrence frequency items.

Table 3. Item Frequency Determination Results

No	Item	Frekuensi
1	Pupuk Urea	52
2	Plenum	27
3	Pupuk Phonska Plus	21
4	Balistic	21
5	Jaya Seed Cabai	20
6	Pupuk NPK Mutiara 16-16-16	20
7	EM4 Kuning	20
8	Primasil	18
9	Kempo	16
10	Sumo	13
11	Gempur	13
12	Jaya Seed Pare	11
13	Ripcoro	10
14	BioNasa	10
15	Boom Flower	9
16	Pure K	9
17	Leile 2000	9
18	Regent 50EC	7
19	Ares	7
20	Nugrass	5
21	Jaya Seed Bayam	1

After determining the frequency of the item, the steps taken are determining the support value and confidence value.

3. Value Support
Support value is the probability that consumers buy several products simultaneously from a number of transactions (Rismayati et al., 2021). In research, the support value used is at least 30%. The results of the process of determining the support value are shown in Figure 2.

Support ↓	Item 1	Item 2	Item 3
0.825	Jaya Seed Cabai		
0.825	Pupuk NPK Mutiara 16-1...		
0.825	Jaya Seed Cabai	Pupuk NPK Mutiara 16-1...	
0.544	Pupuk Urea		
0.544	Jaya Seed Cabai	Pupuk Urea	
0.544	Pupuk NPK Mutiara 16-1...	Pupuk Urea	
0.544	Jaya Seed Cabai	Pupuk NPK Mutiara 16-1...	Pupuk Urea
0.237	Plenum		
0.193	Jaya Seed Cabai	Plenum	
0.193	Pupuk NPK Mutiara 16-1...	Plenum	
0.193	Jaya Seed Cabai	Pupuk NPK Mutiara 16-1...	Plenum
0.184	Balistic		
0.184	Pupuk Phonska Plus		
0.184	Jaya Seed Cabai	Pupuk Phonska Plus	
0.184	Pupuk NPK Mutiara 16-1...	Pupuk Phonska Plus	
0.184	Jaya Seed Cabai	Pupuk NPK Mutiara 16-1...	Pupuk Phonska Plus

Figure 2. Results Value Support

4. Confidence value

Confidence value is a measure that shows the strong relationship between items in association rules (Dewi Anisa Istiqomah et al., 2022). In the research, the support value used is at least 70%.

5. Association Rule

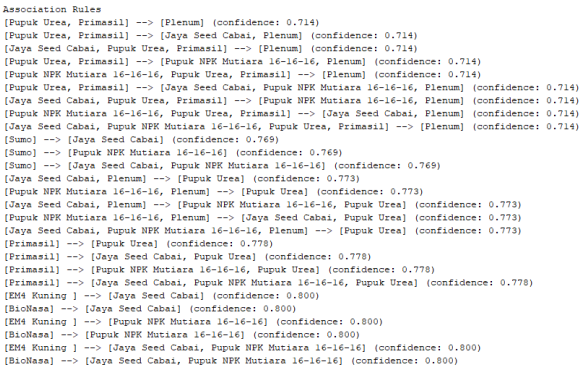
a. Graph

In the Graph results stage, the Association rule results are visualized in graph form. In the visual graph it can be known for the rules and the resulting values. Graph results can be seen in Figure 3.

Figure 3. Association Rule Graph results

b. Association Rules

The results of the association rule using the FP Growth algorithm can be seen in Figure 4



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Association Rules
[Pupuk Urea, Primasil] --> [Plenum] (confidence: 0.714)
[Pupuk Urea, Primasil] --> [Jaya Seed Cabai, Plenum] (confidence: 0.714)
[Jaya Seed Cabai, Pupuk Urea, Primasil] --> [Plenum] (confidence: 0.714)
[Pupuk Urea, Primasil] --> [Pupuk NPK Mutiara 16-16-16, Plenum] (confidence: 0.714)
[Pupuk NPK Mutiara 16-16-16, Pupuk Urea, Primasil] --> [Plenum] (confidence: 0.714)
[Pupuk Urea, Primasil] --> [Jaya Seed Cabai, Pupuk NPK Mutiara 16-16-16, Plenum] (confidence: 0.714)
[Jaya Seed Cabai, Pupuk Urea, Primasil] --> [Pupuk NPK Mutiara 16-16-16, Plenum] (confidence: 0.714)
[Pupuk NPK Mutiara 16-16-16, Pupuk Urea, Primasil] --> [Jaya Seed Cabai, Plenum] (confidence: 0.714)
[Jaya Seed Cabai, Pupuk NPK Mutiara 16-16-16, Pupuk Urea, Primasil] --> [Plenum] (confidence: 0.714)
[Sumo] --> [Jaya Seed Cabai] (confidence: 0.769)
[Sumo] --> [Pupuk NPK Mutiara 16-16-16] (confidence: 0.769)
[Sumo] --> [Jaya Seed Cabai, Pupuk NPK Mutiara 16-16-16] (confidence: 0.769)
[Jaya Seed Cabai, Plenum] --> [Pupuk Urea] (confidence: 0.773)
[Pupuk NPK Mutiara 16-16-16, Plenum] --> [Pupuk Urea] (confidence: 0.773)
[Jaya Seed Cabai, Plenum] --> [Pupuk NPK Mutiara 16-16-16, Pupuk Urea] (confidence: 0.773)
[Pupuk NPK Mutiara 16-16-16, Plenum] --> [Jaya Seed Cabai, Pupuk Urea] (confidence: 0.773)
[Jaya Seed Cabai, Pupuk NPK Mutiara 16-16-16, Plenum] --> [Pupuk Urea] (confidence: 0.773)
[Primasil] --> [Pupuk Urea] (confidence: 0.778)
[Primasil] --> [Jaya Seed Cabai, Pupuk Urea] (confidence: 0.778)
[Primasil] --> [Pupuk NPK Mutiara 16-16-16, Pupuk Urea] (confidence: 0.778)
[Primasil] --> [Jaya Seed Cabai, Pupuk NPK Mutiara 16-16-16, Pupuk Urea] (confidence: 0.778)
[EM4 Kuning ] --> [Jaya Seed Cabai] (confidence: 0.800)
[BioNasa] --> [Jaya Seed Cabai] (confidence: 0.800)
[EM4 Kuning ] --> [Pupuk NPK Mutiara 16-16-16] (confidence: 0.800)
[BioNasa] --> [Pupuk NPK Mutiara 16-16-16] (confidence: 0.800)
[EM4 Kuning ] --> [Jaya Seed Cabai, Pupuk NPK Mutiara 16-16-16] (confidence: 0.800)
[BioNasa] --> [Jaya Seed Cabai, Pupuk NPK Mutiara 16-16-16] (confidence: 0.800)
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Figure 4. Association Rule results

From the results of the association rule, it can be concluded that when a buyer buys Urea and Prismasil Fertilizers, he also buys Plenum. So that the stock of these products can be increased in stock because it is based on an analysis of product consumer purchasing patterns.

CONCLUSION

The conclusion from the research that has been done is that the FP Growth Algorithm can be applied in the case of knowing the pattern of product purchases in farming heritage which can then be used as an analysis of the supply of product stock. The support value and confidence value used is a minimum of 30% for the support value and 70% for the minimum confidence value. The value of the lift ratio in the case of analysis of product stock supply is more than 1, which means it is very valid in product combinations. The highest lift ratio value is 1.67 and the lowest is 1.09

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