

Frequent Pattern Growth for Predicting the Pattern of Office Stationery Needs

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ABSTRACT

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One of the supporters of operational activities from the agency is ATK (Office Stationery), work will be constrained if these components are not available, as well as STMIK Pelita Nusanantara requires ATK to be used every day starting from study programs, institutions, finance and other units. The problem in this research is that the accumulation of ATK purchase data has never been used or analyzed. With this problem, the researcher wants to perform an extraction on the available data so that knowledge is found in the form of predictions in the form of patterns of ATK needs. For the problem solving process, Frequent Pattern-Growth (FP-Growth) is used. FP-Growth is an alternative algorithm that can be used to determine the data set that appears most frequently (frequent itemset) in a data set. The FP-Growth algorithm is an algorithm that is very efficient in searching for frequent itemset. FP-Growth uses a different approach from the algorithm that is often used, namely the a priori algorithm. This algorithm stores information about frequent itemset in the form of FP-Tree. The FP-Tree that is formed can take advantage of transaction data that has the same item so that it can reduce repeated database scans in the mining process and can take place more quickly. FP-Growth uses a different approach from the algorithm that is often used, namely the a priori algorithm. This algorithm stores information about frequent itemset in the form of FP-Tree. The FP-Tree that is formed can take advantage of transaction data that has the same item so that it can reduce repeated database scans in the mining process and can take place more quickly. FP-Growth uses a different approach from the algorithm that is often used, namely the a priori algorithm. This algorithm stores information about frequent itemset in the form of FP-Tree. The FP-Tree that is formed can take advantage of transaction data that has the same item so that it can reduce repeated database scans in the mining process and can take place more quickly..

1. Introduction

Current technological developments have an impact on data storage that is getting bigger and has accumulated in databases with an unlimited reach, so many researchers carry out an experiment or research to extract by exploring the potential of the pile of data or big data and produce information that can be used. used both for prediction, description and classification or what is often called Data Mining. (Post Marto Hasugian et al., 2021a, 2021b). Data mining is related to other disciplines, such as database systems, data warehousing, statistics, machine learning, information retrieval, and high-level computing. In addition, data mining is supported by other sciences such as neural networks, pattern recognition, spatial data analysis, image databases (Hidayati & Hasugian, 2020). Data mining is defined as the process of finding patterns in data. This process is automatic or often semi-automatic (Ardianto & Fitriyah, 2019). The pattern found must be meaningful and the pattern provides benefits, usually economic benefits. The data required is large and sometimes declared useless (Hartomo et al., 2020).

The problem that is used as a reference in this research is how to dig up information from a collection of data on stationery purchases in the STMIK Pelita Nusanantara environment which has never been analyzed and only stored as files and of course used for reporting purposes only. From the topics that have been described in this research, it is in the study of predictions on the Prediction of Patterns for Office Stationery Needs by utilizing the FP-Growth Algorithm. This algorithm is part of the association technique in data mining. The FP-Growth itself is an alternative algorithm that can be used to determine the data set that

appears most frequently (frequent itemset) in a data set. (Simanjuntak & Windarto, 2020). The characteristic of the FP-Growth algorithm is the data structure used in the tree called FP-Tree. By using FP-Tree, FP-Growth algorithm can directly extract frequent itemset from FP-Tree. (Ardianto & Fitriyah, 2019).

Several related studies that have developed predictions by utilizing data mining are Ririanti presents research by implementing the FP-Growth algorithm on a motorcycle inventory prediction application by utilizing the sales report data of PT. Deli Labumas Pillar. By utilizing existing sales reports, researchers can predict the amount of motorcycle inventory that must be provided in the future based on the number of motorcycles sold. The researcher implemented the FP-Growth algorithm on the motorcycle inventory application by looking at the number of items sold, then made a series of trees with fp-trees to find out the number of frequent itemset that occurred. From the frequent itemset obtained, the Support and Confidence values can be calculated. The result of this research is a motorcycle inventory prediction system (Sapitri & Purnomo, 2018).

Research conducted by Asrul Abdullah in 2018 applied the FP-Growth method to compile product package recommendations to increase sales. Researchers developed desktop-based applications to provide appropriate recommendations for sellers or decision makers. Determination of product package recommendations is calculated based on the level of frequency of items purchased by consumers by taking into account the minimum support that has been set. The results of this study were found two pairs of goods items, namely coffee, sugar and tea, milk which had 30% support and 70% confidence. From the results obtained, the two pairs of items can be recommended to be sold together (Abdullah, 2018).

Study Dicky and Sriani in 2015 who applied the FP-Growth Algorithm using the concept of FP-Tree development in searching for Frequent Itemsets to find variable data that will be used as strategies in promoting education at universities. With the process of forming the FP-Tree from this research, it produces rules from the new student sample data. Determination of variable data greatly determines the level of accuracy of the FPGrowth that is made and the amount of percentage in determining the minimum support and minimum confidence. Minimum support and minimum confidence are used to search for interconnected frequent itemsets to find variable data that will be used as strategies for education promotion. Information relating to the implementation of the promotion can be made available quickly. (Ikhwan et al., 2015).

From this description, it provides information that the FP Growth algorithm is feasible to use to make predictions by utilizing the principles of data mining, by generating knowledge of the ATK Inventory in the STMIK Pelita Nusantara environment.

2. Method

The research method is a set of systematic efforts and methods applied by researchers in order to obtain answers to the research questions. Research methods are directly related to how to know something. Research activities by following the following stages of information search:

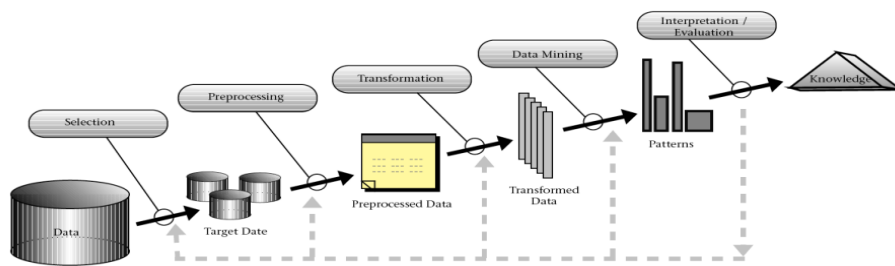


Figure 1. Information Mining Activities (PM Hasugian et al., 2021)

For the research process by following the following work steps:

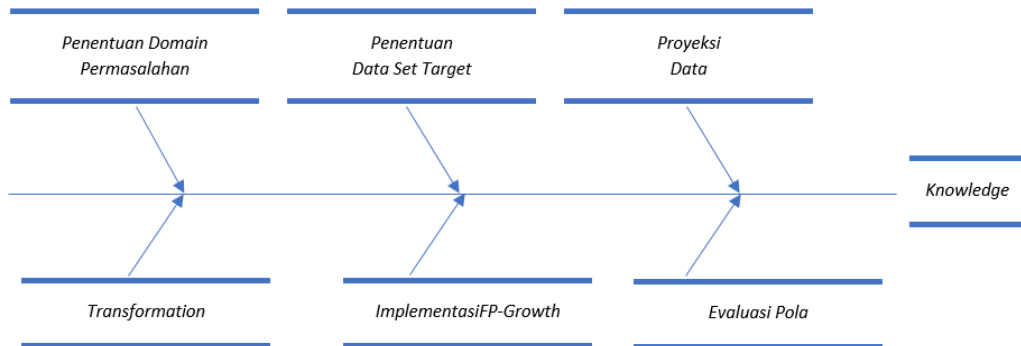


Figure 2. Research Work Steps

Description of research work in Figure 2. with the following job descriptions:

1. Determination of the Problem domain
The initial step in this research is to determine the problem domain by identifying the problem and formulating the problem and determining the data used in the research, the research conducted by identifying that data about ATK in the STMIK Pelita Nusantara environment accumulates.
2. Determination of Target Data Set
Involves data homogeneity, dynamics and change, sampling strategy, degree of freedom
3. Data Projection
Get data representation both in tables, records and Merge tables resulting from data collection that has been carried out.
4. Transformation
The search for useful features for presenting data depends on the goal to be achieved.
5. FP Growth Implementation
Applying working steps to the FP Growth algorithm
6. Pattern Evaluation
The evaluation stage is a research activity to ensure the results of the algorithms used lead to the expected goals
7. Presentation of Research Results
The final stage is to present the results leading to a predetermined formulation.

3. Result and Discussion

The problem in this study is the accumulation of data on stationery purchases that have never been used or analyzed. With these problems the researcher wants to perform an extraction on the available data so that knowledge is found in the form of predictions in the form of patterns of ATK needs. The data used in designing the application for determining the pattern of ordering ATK needs by collecting transactions from January to December with the following data:

Table 1. Transaction Data for January 2021

No	Available Items
1	A4 Paper, HVS Paper, Lack Black Tires, Lack Brown Tires, Envelopes, Penggaris
2	A4 Paper, Printer Ink, Stepler, Penggaris, Pen
3	Pencil, CD-R, CD-RW, Paper Clip, Puncher, duct tape
4	Cutter Knife, Small Battery, Eraser, Ink Marker, Scissors, Mop
5	Air Freshener, Plastic Bucket, Paper Glue, Sharpener, Receipt Book
6	Stop Map, Blank Bon, Flashdisk
7	LX-300 Printer Ribbon, Plastic Ruler, Stamp Ink
8	Marker, X-Type, Handsoap
9	CD-RW, HVS Paper, Envelopes, Scissors, Receipt Book, Plastic Ruler
10	Plastic Ruler, Printer Ink, Small Battery, Scissors, masking tape
11	Flashdisk, Handsoap, Blank Bon, Stop Map, Paper Glue

12	Air Freshener, Marker Pen Ink, Cutter Knife, Puncher, Paper Clip, CD-R
13	LX-300 Printer Ribbon, CD-RW, Eraser, MOP, duct tape, X-Type
14	Stamp Ink, Plastic Ruler, Marker, Receipt Book, Pencil Sharpener
15	Scissors, Printer Ink, Small Battery, Pencil, Stepler
16	Penggaris, Envelope, Duster, Lack Black Tire, Plastic Bucket
17	HVS Paper, A4 Paper, Flashdisk, duct tape, MOP, Eraser
18	Envelope, CD-R, Paper Clip, Air Freshener, Paper Glue
19	Pecila Sharpener, Receipt Book, Plastic Ruler, Penggaris, Stepler
20	Small Battery, Scissors, Printer Ink, LX-300 Printer Ribbon, Markers

From Table 1 there are 20 transactions, each transaction containing several ATK or items available by . For this reason, the Available items are given an ATK code to make it easier to search for rules as shown in the following table:

Table 2. ATK data

NO	Item_Set	Number_item
1	A4 paper	39
2	HVS Kertas paper	36
3	Plastic Bucket	24
4	Lack of Black Tires	28
5	Duster	24
6	Envelope	42
7	Penggaris	42
8	Stapler	36
9	Pencil	30
10	Small Battery	36
11	Printer ink	48
12	Scissor	54
13	Pecil Sharpener	36
14	Receipt Book	48
15	Marker	30
16	Plastic Ruler	48
17	Johnson's Baby Powder	24
18	Cossons Baby	24
19	masking tape	42
20	MOP	30
21	Eraser	30
22	CD-RW	36
23	LX-300 . Printer Ribbon	36
24	CD-R	42
25	Paper Clip	36
26	Paper Hole	30
27	Knife Cutter	30
28	Marker Ink	24
29	Air freshener	24
30	Paper glue	36
31	Stop Map	30
32	Blank Bon	30
33	Handsoap	30
34	Flashdisk	36

3.1 High Frequency Pattern Search Analysis

From Table 2, suppose that the minimum support value = 1% (out of 20 transactions) and then search for the support value for each item with the formula:



$$\text{Support (A)} = \frac{\text{jumlahTransaksiA}}{\text{Totaltransaksi}} \times 100 \%$$

Step 1: Generating conditional pattern base Looking for C1 (Candidate 1-itemset) as follows:

Table 3. C1 (1-itemset Candidate)

Item Set	Support
A4 paper	39/20* 100 = 1.95%
HVS Kertas paper	36/20* 100 = 1.8%
Plastic Bucket	24/20* 100 = 1.2%
Lack of Black Tires	28/20* 100 = 1.4%
Duster	24/20* 100 = 1.2%
Envelope	42/20* 100 = 2.1%
Penggaris	42/20* 100 = 2.1%
Stapler	36/20* 100 = 1.8%
Pencil	30/20* 100 = 1.5%
Small Battery	36/20* 100 = 1.8%
Printer ink	48/20* 100 = 2.4%
Scissor	54/20* 100 = 2.7%
Pecil Sharpener	36/20* 100 = 1.8%
Receipt Book	48/20* 100 = 2.4%
Marker	30/20* 100 = 1.5%
Plastic Ruler	48/20* 100 = 2.4%
Johnson's Baby Powder	24/20* 100 = 1.2%
Cussons Baby	24/20* 100 = 1.2%
masking tape	42/20* 100 = 2.1%
MOP	30/20* 100 = 1.5%
Eraser	30/20* 100 = 1.5%
CD-RW	36/20* 100 = 1.8%
LX-300 . Printer Ribbon	36/20* 100 = 1.8%

Step 2: Generating FP-Tree conditionals

Based on the table containing the items with their support, then look for L1={large 1-itemset} by selecting items that meet the minimum support value of 1% as shown in table 5.17

Table 4. L1 (Large 1-itemset)

Item set	Support
A4 paper	1.95%
HVS Kertas paper	1.8%
CD-RW	1.8%
Lack of Black Tires	1.4%
Duster	1.2%
Envelope	2.1%
Penggaris	2.1%
Stapler	1.8%
Pencil	1.5%
Small Battery	1.8%
Printer ink	2.4%

The next process is to produce 2-itemsets or C2 candidates, by going through the join stage, namely by combining ATK or items in the table, it will produce Table 5 Support_count is the number of item combinations in the ATK Inventory transaction, which means how often the combination the item appears on the transaction.

Table 5. C2 (Candidate item set)

No	Item 1	Item 2	Support
1	A4 paper	HVS Kertas paper	$1/20 * 100 = 0.05$
2	A4 paper	CD-RW	$0/20 * 100 = 0$
3	A4 paper	Lack of Black Tires	$1/20 * 100 = 0.05$
4	A4 paper	Duster	$1/20 * 100 = 0.05$
5	A4 paper	Envelope	$1/20 * 100 = 0.05$
6	A4 paper	Penggaris	$2/20 * 100 = 0.1$
7	A4 paper	Stapler	$1/20 * 100 = 0.05$
8	A4 paper	Pencil	$0/20 * 100 = 0$
9	A4 paper	Small Battery	$0/20 * 100 = 0$
10	A4 paper	Printer ink	$1/20 * 100 = 0.05$
11	HVS Kertas paper	A4 paper	$1/20 * 100 = 0.05$
12	HVS Kertas paper	CD-RW	$0/20 * 100 = 0$
13	HVS Kertas paper	Lack of Black Tires	$0/20 * 100 = 0$
14	HVS Kertas paper	Duster	$0/20 * 100 = 0$
15	HVS Kertas paper	Envelope	$0/20 * 100 = 0$
16	HVS Kertas paper	Penggaris	$0/20 * 100 = 0$
17	HVS Kertas paper	Stapler	$0/20 * 100 = 0$
18	HVS Kertas paper	Pencil	$0/20 * 100 = 0$
19	HVS Kertas paper	Small Battery	$0/20 * 100 = 0$
20	HVS Kertas paper	Printer ink	$0/20 * 100 = 0$
21	CD-RW	A4 paper	$0/20 * 100 = 0$
22	CD-RW	HVS Kertas paper	$1/20 * 100 = 0.05$
23	CD-RW	Lack of Black Tires	$0/20 * 100 = 0$
24	CD-RW	Duster	$0/20 * 100 = 0$
25	CD-RW	Envelope	$1/20 * 100 = 0.05$
26	CD-RW	Penggaris	$0/20 * 100 = 0$
27	CD-RW	Stapler	$0/20 * 100 = 0$
28	CD-RW	Pencil	$0/20 * 100 = 0$
29	CD-RW	Small Battery	$0/20 * 100 = 0$
30	CD-RW	Printer ink	$0/20 * 100 = 0$
31	Penggaris	A4 paper	$0/20 * 100 = 0$
32	Penggaris	HVS Kertas paper	$0/20 * 100 = 0$
33	Penggaris	CD-RW	$0/20 * 100 = 0$
34	Penggaris	Lack of Black Tires	$0/20 * 100 = 0$
35	Penggaris	Duster	$1/20 * 100 = 0.05$
36	Penggaris	Envelope	$1/20 * 100 = 0.05$
37	Penggaris	Stapler	$0/20 * 100 = 0$
38	Penggaris	Pencil	$0/20 * 100 = 0$
39	Penggaris	Small Battery	$0/20 * 100 = 0$
40	Penggaris	Printer ink	$0/20 * 100 = 0$

Step 3: Search frequent itemset

After calculating and finding support for each candidate 2-itemsets in the table, then the pruning stage (prune) is eliminating items that do not meet the minimum support value of 0.05% can be generated in table 6.

Table 6. (Large 2-itemset)

Item 1	Item 2	Support
A4 paper	HVS Kertas paper	0.05
A4 paper	Lack of Black Tires	0.05
A4 paper	Duster	0.05
A4 paper	Envelope	0.05
A4 paper	Penggaris	0.1



A4 paper	Stapler	0.05
A4 paper	Printer ink	0.05
HVS Kertas paper	A4 paper	0.05
HVS Kertas paper	Envelope	0.05
Penggaris	Duster	0.05
Penggaris	Envelope	0.05
Small Battery	Printer ink	0.05
Pencil	CD-RW	0.05

The next process is to produce candidate 3-itemsets or C3, by going through the join stage, namely by combining ATK or items in Table 7, it will produce Table 7 Support_count is the number of item combinations in ATK Inventory transactions, which means how often the item combination appears on the transaction.

Table 7. C3 (Candidate item set)

No	Item 1	Item 2	Item 3	Support
1	A4 paper	HVS Kertas paper	CD-RW	$0/20 * 100 = 0$
2	A4 paper	Lack of Black Tires	Duster	$1/20 * 100 = 0.05$
3	A4 paper	Envelope	Penggaris	$1/20 * 100 = 0.05$
4	A4 paper	Stapler	Pencil	$0/20 * 100 = 0$
5	A4 paper	Small Battery	Printer ink	$0/20 * 100 = 0$
6	A4 paper	HVS Kertas paper	Lack of Black Tires	$1/20 * 100 = 0.05$
7	A4 paper	HVS Kertas paper	Duster	$1/20 * 100 = 0.05$
8	A4 paper	Stapler	Penggaris	$1/20 * 100 = 0.05$
9	A4 paper	Pencil	Small Battery	$0/20 * 100 = 0$
10	A4 paper	Duster	Printer ink	$0/20 * 100 = 0$
11	HVS Kertas paper	A4 paper	Lack of Black Tires	$0/20 * 100 = 0$
12	HVS Kertas paper	Envelope	CD-RW	$1/20 * 100 = 0.05$
13	HVS Kertas paper	Stapler	Small Battery	$0/20 * 100 = 0$
14	HVS Kertas paper	Pencil	A4 paper	$0/20 * 100 = 0$
15	HVS Kertas paper	Duster	Lack of Black Tires	$0/20 * 100 = 0$
16	HVS Kertas paper	Penggaris	Envelope	$0/20 * 100 = 0$
17	HVS Kertas paper	Printer ink	Small Battery	$0/20 * 100 = 0$
18	HVS Kertas paper	CD-RW	Lack of Black Tires	$0/20 * 100 = 0$
19	HVS Kertas paper	Lack of Black Tires	Stapler	$0/20 * 100 = 0$
20	HVS Kertas paper	Penggaris	A4 paper	$0/20 * 100 = 0$
21	CD-RW	HVS Kertas paper	Envelope	$1/20 * 100 = 0.05$
22	CD-RW	A4 paper	Lack of Black Tires	$0/20 * 100 = 0$
23	CD-RW	Duster	Printer ink	$0/20 * 100 = 0$
24	CD-RW	Envelope	Small Battery	$0/20 * 100 = 0$
25	CD-RW	Penggaris	Pencil	$0/20 * 100 = 0$
26	CD-RW	Stapler	Penggaris	$0/20 * 100 = 0$
27	CD-RW	Pencil	Stapler	$0/20 * 100 = 0$
28	CD-RW	Small Battery	Envelope	$0/20 * 100 = 0$
29	CD-RW	Printer ink	Duster	$0/20 * 100 = 0$
30	CD-RW	A4 paper	HVS Kertas paper	$0/20 * 100 = 0$
31	Penggaris	Envelope	Duster	$1/20 * 100 = 0.05$
32	Penggaris	Duster	Lack of Black Tires	$1/20 * 100 = 0.05$
33	Penggaris	CD-RW	A4 paper	$0/20 * 100 = 0$
34	Penggaris	Lack of Black Tires	HVS Kertas paper	$0/20 * 100 = 0$
35	Penggaris	Duster	CD-RW	$0/20 * 100 = 0$
36	Penggaris	Envelope	Lack of Black Tires	$0/20 * 100 = 0$
37	Penggaris	Stapler	Duster	$0/20 * 100 = 0$
38	Penggaris	Pencil	Envelope	$0/20 * 100 = 0$
39	Penggaris	Small Battery	Stapler	$0/20 * 100 = 0$

40	Penggaris	Printer ink	Pencil	$0/20 * 100 = 0$
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Frequent itemset search:

After calculating and finding support for each candidate 3-itemsets in the table, then the pruning stage (prune) is eliminating items that do not meet the minimum support value of 0.05% can be generated in table 8

Table 8. L3 (Large 3-itemset)

Item 1	Item 2	Item 3	support
A4 paper	Lack of Black Tires	Duster	0.05
A4 paper	Envelope	Penggaris	0.05
A4 paper	HVS Kertas paper	Lack of Black Tires	0.05
A4 paper	HVS Kertas paper	Duster	0.05
A4 paper	Stapler	pragma	0.05
Kinidin	Envelope	CD-RW	0.05
CD-RW	HVS Kertas paper	Envelope	0.05
Penggaris	Envelope	Duster	0.05
Penggaris	Duster	Lack of Black Tires	0.05
Pencil	CD-RW	Lack of Black Tires	0.05

3.2 Formation of Association Rules

To find the association rules from iteration to the steps taken previously, the confidence value of each item will then be calculated as follows:

Table 9. Formation of ATK . Correlation

Item 1	Item 2	Confidence
A4 paper	HVS Kertas paper	0.25
A4 paper	Lack of Black Tires	0.25
A4 paper	Duster	0.25
A4 paper	Envelope	0.25
A4 paper	Penggaris	0.5
A4 paper	Stapler	0.25
A4 paper	Printer ink	0.25
HVS Kertas paper	A4 paper	0.25
HVS Kertas paper	Envelope	0.25
Penggaris	Duster	0.25
Penggaris	Envelope	0.25
Small Battery	Printer ink	0.25
Pencil	CD-RW	0.25

Assuming 25% confidence, the rules formed are:

Table 10. Formation of Association Rules

No	Rule (ATK Correlation)	Support	Confidence
1	If you buy A4 Paper, then buy HVS Paper	25%	0.25
2	If you buy A4 paper, then buy Lack Tires Black	25%	0.25
3	If you buy HVS Paper, then buy A4 Paper	25%	0.25
4	If you buy A4 paper, then buy an Penggaris	50%	0.5
5	If you buy an Penggaris, then buy an envelope	25%	0.25
6	If you buy a Small Battery, then buy Printer Ink	25%	0.25
7	If you buy a Pencil, you buy a CD-RW	25%	0.25

3.3 Data Analysis with FP-Growth

The results of the most frequent or most available ATK Inventory transaction data are as shown in the table below.



Table 11. ATK Inventory Data

No	Item_set	Number of Items
1	A4 paper	39
2	HVS Kertas paper	36
3	Envelope	42
4	Penggaris	42
5	Stapler	36
6	Small Battery	36
7	Printer ink	48
8	Scissor	54
9	Pencil Sharpener	36
10	Receipt Book	48
11	Plastic Ruler	48
12	masking tape	42
13	CD-RW	36
14	CD-R	42
15	Paper Clip	36
16	Paper glue	36
17	Flashdisk	36

The final result of the FP-Growth algorithm analysis is as shown below.

Table 12. ATK data

Item 1	Item 2	Support
A4 paper	HVS Kertas paper	0.05
A4 paper	Lack of Black Tires	0.05
HVS Kertas paper	A4 paper	0.05
A4 paper	Penggaris	0.1
Penggaris	Envelope	0.05
Small Battery	Printer ink	0.05
Pencil	CD-RW	0.05

Confidence = minimum support value * 5% = 0.05 * 5 % = 0.25

So those who buy A4 Paper and HVS Paper are

Support = confidence * 100% = 0.25 * 100% = 25%

Confidence = minimum support value * 5% = 0.05 * 5 % = 0.25

So those who buy A4 Paper and Lack Black Tires are

Support = confidence * 100% = 0.25 * 100% = 25%

Confidence = minimum support value * 5% = 0.05 * 5 % = 0.25

So those who buy HVS Paper and A4 Paper are

Support = confidence * 100% = 0.25 * 100% = 25%

Confidence = minimum support value * 5% = 0.1 * 5 % = 0.5

So those who buy A4 Paper and Penggaris are

Support = confidence * 100% = 0.5 * 100% = 50%

Confidence = minimum support value * 5% = 0.05 * 5 % = 0.25

So those who bought the Penggaris and Envelope were

Support = confidence * 100% = 0.25 * 100% = 25%

Confidence = minimum support value * 5% = 0.05 * 5 % = 0.25

So those who buy Small Batteries and Printer Ink are

Support = confidence * 100% = 0.25 * 100% = 25%

At this stage, to make it easier to create a tree, the name ATK is made using the alphabet.

Table 13. ATK data

No	Item_Set	Item Code
1	A4 paper	Yes

2	HVS Kertas paper	Ki
3	Plastic Bucket	Po
4	Lack of Black Tires	Ol
5	Duster	pr
6	Envelope	Pl
7	Penggaris	Pg
8	Stapler	in
9	Pencil	An
10	Small Battery	Vit
11	Printer ink	Su
12	Scissor	Ne
13	Pecila Sharpener	ta
14	Receipt Book	Kx
15	Marker	De
16	Plastic Ruler	Ki
17	Johnson's Baby Powder	Jo
18	Cossons Baby	Co
19	masking tape	Be
20	MOP	Sg
21	Eraser	BB
22	CD-RW	px
23	LX-300 . Printer Ribbon	Ice
24	CD-R	Bo
25	Paper Clip	Da
26	Paper Hole	Hi
27	Knife Cutter	An
28	Marker Ink	Pd
29	Air freshener	dv
30	Paper glue	Ct
31	Stop Map	ff
32	Blank Bon	Sa
33	Handsoap	elementary school
34	Flashdisk	Pb

Table 14. Transaction Table

TID	Items
1	Yes, Ko, Ol, Pa, Pn, Pr
2	Yes, Su, In, Pr, Bo
3	An, Bo, Px, Da, Hi, Be
4	Am, Vit, Bb, Pd, Ne, Sg
5	Dv, Po, Ct, Ta, Kx
6	Ff, Sa, Pb

At this stage, data samples of 2 transactions are taken. Given a minimum limit of 0.2 support and 0.75 confidence. From the data in table 14 a tree is formed for the data mining process. For the first stage by reading the TID (Transaction ID).

4. Concolusion

The Association Rule method using the FP-Growth Algorithm with support and confidence parameters can obtain a correlation between ATK needs and existing supplies. This research can be developed by using a similar algorithm



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