Utilization of Apriori Algorithm for Book Layout Design in UNTAR Library

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Abstract. The library is an important tool in supporting students in teaching and learning activities at various levels of education. The library provides various sources and information that serve as guidelines in the distribution of knowledge that can be applied in social life. Not only for students, library is also beneficial for the wider community as a learning tool that can be useful for daily life. This is not immune from the proper application of book literature. Placement of book literature which is used as a guide for information sources greatly influences the application of these sources.
Along with the rapid development of technology, it facilitates activities and jobs that can support human life, one of which is library facilities. The development of technology in placing book literature which is commonly used as a guideline for information sources is based on a combination of book literature which is often used. Placement of book literature utilizes methods that can help determine the right combination of book literature such as the Apriori Algorithm. The use of Apriori Algorithm in determining the right combination of book literature will facilitate the design of book layout in the UNTAR Library.
The combined results of the book literature from the Apriori Algorithm serve as a guide in designing book layouts in the UNTAR Library. Apriori algorithm produces 100% confidence value. This proves that the use of Apriori Algorithm is very effective in designing the layout of books in the UNTAR Library.

1. Introduction

This study aims to facilitate staff in managing the layout of the book so that borrowers do not need to be confused in finding the desired book. The method used in structuring the layout of the book is data mining by applying the association rule method and a priori algorithm. Data mining is the process of finding interesting patterns or information in selected data using certain techniques or methods. Apriori algorithm is a method for finding patterns of relationships between one or more items in a dataset based on the analysis of book lending transaction data in order to explore information that is useful for determining the better layout of books in a library.

2. Formulation of the problem

Using the Apriori Algorithm to display book loan data reports,
Implementation of the results of a combination of book lending transaction data in the UNTAR library in data mining.

3. Research objectives

Build a system that can adjust the layout patterns of books in the library,
Application of a priori algorithm in managing the layout of books in the library.

4. Results and Discussion

The test results are as follows:

At this stage, testing is done by comparing manual calculations and calculations in the program to be compared with data lending books in the library. The data used as a reference are 30 books borrowing data in the UNTAR library from December 2, 2019 to February 19, 2020. Data testing can be seen in Appendix IX.

Based on testing the data in Appendix IX, testing is carried out using a minimum value of support = 2 and minimum support = 2. In testing with a minimum value of support = 2, the results of the manual calculation are the same as the results of the program calculation. In testing with a minimum value of support = 3, the results of the manual calculation can be seen in Appendix II and the results of the manual calculation are the same as the results of the program calculation.

The initial step in the Apriori Algorithm is to determine the minimum percentage of support and the minimum percentage of confidence. The determination of the value of the minimum percentage of support and the minimum percentage of confidence depends on the user's wishes. It has been determined the minimum support percentage and the minimum confidence percentage of 10%. To determine the value of minimum support, use the following formula:

$S = M \times T$

Information :

S = Minimum support value

M = Percentage of minimum support

T = Amount of data

So we get the following values:

$S = 10/100 \times 30 = 3$

The function of the minimum support is to determine the limits of each itemset which will then be eliminated if the value is less than the minimum support.

After finding the value of the minimum support, we will get a value like Table 1 1-itemset.

Tabel 1 *1-itemset*

1-itemset	Quantity
A global history of architecture	3
A Guide to Visual Presentation	3
A History of Southeast Asia : critical crossroads	1
A pattern language: towns, buildings, constructions	2
Advanced calculus	4
Akustik lingkungan	1
Algorithms in C++ Vol I : fundamentals, data structures, sorting, searching. 3rd.ed.	1
Anak desa : biografi Presiden Soeharto	1
Analisa dan desain pondasi. Vol. 2	1
Analisa matriks untuk struktur rangka	2
Analisa vector	2
Analisis tapak : pembuatan diagram informasi bagi perancangan arsitektur	1
Analysis and Design of FRP Reinforced Concrete Structures	3
Architects data	1
Architecture and philosophy: phenomenology, hermeneutics, deconstruction	2
Arsitektur : bentuk, ruang, dan tatanan 3rd ed	1
Arsitektur tradisional Tionghoa dan perkembangan kota	2
Basics interior design 01: retail design	1

Being and time	1
Brand identity essentials : 100 principles for designing logos and building brands	1
Building construction illustrated 4th ed.	1
Buku pedoman tentang bekisting (kotak cetak)	4
Cities of the world : world regional urban development	2
City transformed urban architecture at the begining of the 21st century	1
Construction materials for interior design : principles of structure and properties of materials	1
Contemporary / Surabaya / architecture vol.1	1
Dasar perencanaan dan pemilihan elemen mesin	1
Desaim kemasan : perencanaan merk produk yang berhasil mulai dari konsep sampai penjualan	1
Design Portfolios: Moving from Traditional to Digital	2
Design portfolios: presentation and marketing for interior designers	3

The next step is to eliminate the value in Table 6 1-itemset whose value is less than the minimum support that is 3. The results of elimination can be seen in Table 2 1-itemset elimination.

Table 2 Elimination *1-itemset*

1-itemset	Quantity
A global history of architecture	3
A Guide to Visual Presentation	3
Advanced calculus	4
Analysis and Design of FRP Reinforced Concrete Structures	3
Buku pedoman tentang bekisting (kotak cetak)	4
Design portfolios: presentation and marketing for interior designers	3
Designing interiors	4
Green building illustrated	3
History of urban form: before the industrial revolutions, 2nd edition	5
Ilmu konstruksi bangunan 2	3
Ilustrasi konstruksi bangunan 3rd.ed	6
Interior design visual presentation : a guide to graphics models, and presentation techniques	3
Interior design. 4th.ed	7
Motion and time study design and measurement of work	3
Pengantar perencanaan kota	5
Perpindahan kalor : heat transfer	4
Prinsip-prinsip perpindahan panas	3
The Architecture of towns and cities, urban design	3
The Retail store: design and construction, 2nd edition	4
Theory and problems of Calculus differential and integral	3

After elimination, the next step is to combine 2-itemset from the results obtained in Table 7 1-itemset elimination, the result of the combination comes from the total frequency that contains both facilities. The 2-itemset combination can be seen in Table 3 2-itemset.

Table 3 *2-itemset*

2-itemset	Quantity
A global history of architecture,A Guide to Visual Presentation	2
A global history of architecture,Design portfolios: presentation and marketing for interior designers	1
A global history of architecture,Green building illustrated	1
A global history of architecture,Ilmu konstruksi bangunan 2	1

A global history of architecture,Ilustrasi konstruksi bangunan 3rd.ed	2
A global history of architecture,Interior design visual presentation : a guide to graphics models, and presentation techniques	1
A global history of architecture,Pengantar perencanaan kota	1
A global history of architecture,The Architecture of towns and cities, urban design	2
A global history of architecture,The Retail store: design and construction, 2nd edition	1
A Guide to Visual Presentation,Design portfolios: presentation and marketing for interior designers	2
A Guide to Visual Presentation,Green building illustrated	1
A Guide to Visual Presentation,History of urban form: before the industrial revolutions, 2nd edition	1
A Guide to Visual Presentation,Ilustrasi konstruksi bangunan 3rd.ed	1
A Guide to Visual Presentation,Interior design visual presentation : a guide to graphics models, and presentation techniques	1
A Guide to Visual Presentation,The Architecture of towns and cities, urban design	1
A Guide to Visual Presentation,The Retail store: design and construction, 2nd edition	1
Advanced calculus,Ilustrasi konstruksi bangunan 3rd.ed	1
Advanced calculus,Pengantar perencanaan kota	1
Buku pedoman tentang bekisting (kotak cetak),Motion and time study design and measurement of work	3
Buku pedoman tentang bekisting (kotak cetak),Theory and problems of Calculus differential and integral	1
Design portfolios: presentation and marketing for interior designers,Green building illustrated	1
Design portfolios: presentation and marketing for interior designers,History of urban form: before the industrial revolutions, 2nd edition	2
Design portfolios: presentation and marketing for interior designers,Interior design visual presentation : a guide to graphics models, and presentation techniques	1
Design portfolios: presentation and marketing for interior designers,The Retail store: design and construction, 2nd edition	1
Designing interiors,Green building illustrated	1
Designing interiors,Interior design visual presentation : a guide to graphics models, and presentation techniques	2
Designing interiors,Interior design. 4th.ed	2
Designing interiors,Pengantar perencanaan kota	1
Designing interiors,The Retail store: design and construction, 2nd edition	2
Green building illustrated,Interior design visual presentation : a guide to graphics models, and presentation techniques	2
Green building illustrated,Interior design. 4th.ed	1
Green building illustrated,Pengantar perencanaan kota	1
Green building illustrated,The Retail store: design and construction, 2nd edition	2
Ilmu konstruksi bangunan 2,Ilustrasi konstruksi bangunan 3rd.ed	2
Ilmu konstruksi bangunan 2,Interior design. 4th.ed	1
Ilmu konstruksi bangunan 2,Pengantar perencanaan kota	1

Ilmu konstruksi bangunan 2,The Architecture of towns and cities, urban design	1

The next step is to eliminate values that are less than the minimum support, the same as before. The results of elimination can be seen in Table 4 2-itemset elimination.

Table 4 Elimination *2-itemset*

2-itemset	Quantity
Motion and time study design and measurement of work,Buku pedoman tentang bekisting (kotak cetak)	3
The Retail store: design and construction, 2nd edition,Interior design visual presentation : a guide to graphics models, and presentation techniques	3

The final step is to look for the confidence value of the 2-itemset above. The confidence value can be found using the following formula:

$$Confidence = \frac{3}{3} = 1$$

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The table of confidence value results can be seen in Table 5 Confidence Value.

Table 5 Confidence Values

2-itemset	*Confidence*	*Confidence %*
Motion and time study design and measurement of work,Buku pedoman tentang bekisting (kotak cetak)	3 / 3 = 1	100%
The Retail store: design and construction, 2nd edition,Interior design visual presentation : a guide to graphics models, and presentation techniques	3 / 3 = 1	100%

Can be seen from Table 10 Confidence Value that the combination of books that are often borrowed is the book "Motion and time study design and measurement of work", "Handbook about formwork (print box)" with a value of 100% confidence and "The Retail store: design and construction, 2nd edition "," Interior design visual presentation: a guide to graphics models, and presentation techniques "with a confidence value of 100%.

5. Conclusion

The conclusions obtained from the design, manufacture and testing of the web application "Utilization of Apriori Algorithms for Book Layout Design in the UNTAR Library" are as follows:

1. The use of Apriori Algorithm provides accurate outputs in obtaining book titles that are often borrowed by students.
2. The acquisition of frequently borrowed book titles can be used as a guide for book layout in the UNTAR library.

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