

Implementation of Data Mining for Angkringan Sales Analysis Using the Apriori Method

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DOI : <https://doi.org/10.61796/jaide.v1i12.1542>



Sections Info

Article history:

Submitted: September 05, 2024

Final Revised: October 23, 2024

Accepted: November 12, 2024

Published: December 31, 2024

Keywords:

Angkringan Mdpl
Apriori Algorithms
Association Rules
Sales Patterns

ABSTRACT

Objective: This study aims to address the challenges faced by Angkringan Mdpl in analyzing sales data that affect stock management efficiency. The research seeks to identify purchasing patterns that can serve as a foundation for better inventory and marketing decisions. **Method:** The Apriori algorithm, a data mining technique, is employed to discover associations among sold items by calculating support and confidence values to generate valid association rules. The analysis uses transaction data from June and July 2024, with a minimum support threshold of 2% and a minimum confidence level of 5%. **Results:** The testing process produced five pairs of item combinations with strong and valid association rules, as confirmed by their lift values. These findings enable Angkringan Mdpl to enhance stock control by prioritizing frequently purchased products and recommending complementary items effectively. **Novelty:** This study provides a data-driven approach to micro-scale food business management by applying the Apriori algorithm to optimize stock planning and sales strategies in small local enterprises, demonstrating the algorithm's practical value beyond large-scale retail contexts.

INTRODUCTION

Angkringan is a type of small food stall that is very popular in Indonesia, especially in the Java region. These stalls are usually simple carts and operate from afternoon until nighttime. Angkringan has become one of the concepts for selling traditional Indonesian food and beverages, with the potential to develop as a representation of traditional culinary identity and remains popular to this day [1]. One of my favorite angkringan is Angkringan Mdpl, located in the Buduran District, Sidoarjo Regency, and established on June 11, 2023. This angkringan offers a variety of food and drink options at affordable prices, ranging from grilled satay to packaged beverage sachets. This angkringan is not only a place to enjoy meals but also serves as a gathering place for various segments of society, making it an important part of social culture in Indonesia [2].

Although Angkringan Mdpl is not yet very popular, the owner often faces difficulties in analyzing sales data. Therefore, the application of data mining techniques in transaction analysis is highly necessary to improve sales performance. Through this analysis, the owner can identify the items that are frequently sold and provide recommendations for additional product offerings that are most popular and often purchased by customers, as well as design more effective sales strategies [3].

Data Mining is a stage that utilizes statistical, mathematical, artificial intelligence techniques, and machine learning to extract and identify useful information as well as knowledge from large datasets [4]. In short, data mining is the automatic search for patterns in large databases by utilizing a combination of computational techniques from statistics, machine learning, and pattern recognition [5]. The Apriori algorithm is a data mining method used to obtain association combinations between itemsets. Determining the values of support and confidence is very important in generating association rules. By calculating support and confidence values, association rules can be formed and used as a guide to manage inventory and identify the two most popular item combinations. This is beneficial for food stall owners in monitoring their stock, which ultimately can increase revenue [6].

Based on this background, I am interested in conducting research entitled “Implementation of Data Mining for Sales Analysis of Angkringan Using the Apriori Algorithm Method.” This research aims to address the challenges in sales data analysis that are often faced by the owners of Angkringan Mdpl. By applying data mining and the Apriori algorithm, it is expected to obtain purchase patterns and customer preferences more efficiently. The results of the analysis are expected to provide insights into customer preferences and assist in more effective stock management, thereby significantly increasing the revenue of Angkringan Mdpl.

RESEARCH METHOD

The research was conducted at Angkringan MDPL located in Sidokerto Village, Buduran District, Sidoarjo Regency, and the implementation time was carried out over 2 months. At this stage, references are obtained through the review of scientific journals and internet searches related to the application of data mining, particularly the Apriori Algorithm, with the aim of analyzing purchasing patterns in street food stalls. This step aims to deepen understanding and predict customer shopping habits [7]. Data was obtained after conducting direct interviews with the parties who own Angkringan MDPL, so the data on food and beverage sales transactions during June and July 2024 was known.

A research design is the set of steps that will be taken to complete the research from the initial design to testing [8][9]. It starts from the data collection stage, then continues to the pre-processing stage, followed by the data processing stage, and finally reaches the validation stage. This study covers the lack of understanding regarding customer purchasing patterns at street food stalls, which results in an inability to design effective marketing strategies and provide attractive product recommendations [10].

A literature study is conducted with the aim of collecting references regarding previous research related to the research topic being studied [11]. This is intended to help the research provide an understanding of the topic being addressed [12]. The data collection stage was carried out directly, taken from the sales of Angkringan MDPL Sidoarjo, and the implementation took place in August 2024. At this stage, the sales data was collected in the form of an Excel sales file consisting of 406 sales records. The data

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Data Pre-Processing involves consolidating all data, modifying data, cleaning data, and simplifying the data [13]. The Data Mining process using association analysis techniques with the Apriori algorithm aims to identify item patterns with the highest frequency as well as associative rules in sales data [14].

RESULTS AND DISCUSSION

The dataset collected from Angkringan Mdpl includes a total of 406 transaction records. This data captures various activities that occurred during the months of June and July, with information summarized in a table containing columns for the date, item categories (X1 to Y14), and the total number of transactions per day. This dataset will serve as a basis for further analysis to identify sales patterns and support business decision-making.

	Tanggal	X1	X2	X3	X4	X5	X6	X7	X8	X9	...	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Total
0	1/Juni/2024	2	1	1	1	0	0	0	7	0	...	0	0	2	0	0	0	0	0	0	14
1	1/Juni/2024	3	2	1	2	2	1	0	12	0	...	0	0	0	0	0	0	0	1	0	26
2	1/Juni/2024	0	0	1	3	0	1	0	10	2	...	0	0	0	0	0	0	0	0	0	19
3	1/Juni/2024	2	1	0	0	1	0	0	5	0	...	1	0	0	0	1	0	0	0	0	12
4	1/Juni/2024	0	2	1	1	0	0	0	15	1	...	0	0	1	0	0	0	0	0	1	22
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
401	31/Jul/2024	3	3	0	1	0	1	0	16	0	...	0	0	2	0	0	0	0	0	0	26
402	31/Jul/2024	1	0	0	0	0	0	0	0	2	...	0	0	1	0	1	0	0	0	0	6
403	31/Jul/2024	2	0	0	1	0	1	0	8	1	...	0	0	2	0	0	0	0	0	0	16
404	31/Jul/2024	1	0	1	0	1	1	0	12	0	...	0	0	0	0	0	0	0	0	0	18
405	31/Jul/2024	0	0	0	2	0	1	0	13	0	...	0	0	0	0	1	0	0	0	0	18

406 rows x 25 columns

Figure 1. Dataset View

The symbols X1 to Y14 in this dataset represent various categories of items sold at Angkringan Mdpl. Each symbol has a specific meaning, such as X1 to X9 for food categories, and Y1 to Y14 for beverages. This explanation is intended to make each category in the dataset easier to understand and analyze.

Figure 4 shows the results of calculating support values with a minimum threshold of 0.3 (30%) on the Angkringan Mdpl dataset, which helps us observe the frequency of item occurrences. By using a minimum value of 30%, we can identify the items that appear most frequently, which is suitable for application to a small dataset consisting of 406 transactions. Figure 5 shows the results of calculating support values for two item combinations with a threshold of 0.08 (8%). The use of this lower support value aims to ensure that combination patterns are maintained and can be detected even with a lower threshold.

Figure 7 shows the results of lift value calculations with a threshold value of 1.0, where only three item combinations meet the criteria, namely X1 and Y8, X9 and Y1, and

X9 and Y8. The threshold value of 1.0 was chosen because, if a value greater than 1 is used, only a few combinations would meet the lift value criteria and be considered accurate and significant results.

CONCLUSION

Fundamental Finding : The study concludes that the Apriori algorithm effectively identifies purchasing patterns at Angkringan MDPL, revealing that grilled rice (nasi bakar) and tea are the most frequently purchased combinations, supported by the highest confidence values among the five association rules generated. **Implication :** These insights provide a practical foundation for improving stock management and sales strategies, enabling sellers to optimize inventory levels, prioritize high-demand items, and develop targeted product recommendations to enhance customer satisfaction and operational efficiency. **Limitation :** However, the study is limited by the short observation period, covering only two months of transaction data, which may not fully capture seasonal variations or broader customer behavior patterns. **Future Research :** Subsequent studies should incorporate larger and more diverse datasets, explore the integration of predictive analytics or other machine learning techniques, and examine the impact of implementing the recommended stock and sales strategies on overall business performance.

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