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Implementation of K-Means for Analysis of Factors Causing Consumer Satisfaction at Madani Hotel Medan City

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ABSTRACT

Madani Hotel is one of the hotels located in Medan City which is a place of lodging for regional, national and international tourists, because this Madani Hotel is very strategically located close to the City Center, Grand Mosque, and Maimun Palace, some of which have become city icons. own field. This study uses data mining techniques using the k-means cluster method with the rapidminer application to visualize the pattern of causes of guest satisfaction with Hotel Madani both from service, facilities, comfort and price at Madani Hotel Medan City, the purpose of this research is to support and provide presentations for owners and Madani Hotel manager so that it can be used to assess how to increase the number of visits or guests at Madani Hotel Medan City. Based on research conducted, Madani Hotel's guest satisfaction score for comfort = 11, service = 14, facilities = 13, and price = 12.

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1. INTRODUCTION

Companies or entities in all disciplines carry out various administrative activities to support the running of the organization. This management activity is carried out to achieve organizational goals or goals that have been set by senior management. Company management activities include the management of the company's human resources, materials, and the management of machines used in the manufacturing process. Management of work methods, market management, financial management to achieve maximum results. It is of course important to know and manage losses and profits so that your company's spending money is effective and efficient. Marketing is one of the most important activities of manufacturers of companies that produce both goods and services. This is an implementation of market management or marketing management. Through the trading calendar, the costs or benefits generated are offered to the customer or customer cadre, adding various methods and methods, as well as adding various strategies. The trading location or market spectrum is also seen to reach opportunities to trade the burden or goodness generated. This trade management carries out supervision that must fulfill the company's official interest because it is with marketing interest that the company can continue to produce and can pocket the sales tail which acts as a marker of whether the company is pocketing profits or making losses.

Hotel or Hospitality, making one mistake, is a helping hand that leads to the presence of value and its production provides a good share of the number of guest saplings that occur with people or family or corners who need to cross the facilities that exist in the presence of a tucked away motel. To pocket guests, who provide customers with tucked away motels, motel or hotel corner stories

must not merely beg to fight on the inside of the hall, but must find a trade calendar whose main objective is to cultivate the presence of motels together with the whole body of conveniences that come with salary. worn before the guest who will use or cross the facilities found in the motel tucked away. Marketing carried out by a company requires the application of strategies to make marketing activities effective. Adress Thompson (1995, Sandra Oliver, 2001) defines strategy as a way to achieve income. Revenue affects the goals and objectives of the organization. There is an overall strategy for the entire organization and a competitive strategy for each activity. Sofyan Assouri (2000:154) explains that marketing strategy is a set of goals, objectives, guidelines, and rules that direct the company's marketing activities, references, and assignments at all levels, especially as the company's response. We are faced with an ever-changing competitive environment and conditions.

For this reason, marketing and marketing strategies are two important things related to the company's activities to attract consumers. Madani Hotel Medan is one of the hotels in the city of Medan and has not been open for a long time. Marketing activities and strategies are the main activities in its operations and it is important to develop hotels so that they are known to the wider community, not only in the city of Medan but also in North Sumatra, both nationally and internationally. Currently, Madani Hotel in Medan is very well known and has many customers. This is indicated by the high occupancy rate and occupancy rate for both staying guests and consumers who use the different facilities available for different activities. One of the advantages of Madani Hotel Medan City is that this hotel does not have recreational facilities commonly found in typical hotels such as bars, discotheques, karaoke rooms and swimming pools, as well as the absence of drinks and alcoholic beverages. For sale at the hotel. For this reason, this hotel is known for its high Islamic atmosphere. In addition, it is supported by the right location opposite the Almashun Grand Mosque which is the Great Mosque of Medan and one of the historic and protected buildings. For this reason, hoteliers are considering highlighting the characteristics and privileges of Madani Hotel Medan which are not owned by other hotels in Medan to carry out marketing activities. "What is Madani Hotel Medan's marketing strategy in marketing guest rooms and all available hotel facilities?" right.

Knowledge discovery (KDD) in a database is defined as the extraction of potential, implicit and unknown information from a data set. Knowlegde Discovery in the database process contains the results of the data mining process (the process of extracting trends in data patterns) and accurately converts the results into easy-to-understand information. Knowledge discovery (KDD) in databases is the process of identifying useful information and patterns in your data. This information is contained in a large, potentially useful database that was previously unknown. Data mining is one step in a series of iterative KDD processes. K-means clustering is a method of grouping or grouping groups of objects into several groups (the number of positive integers) according to the same attributes or characteristics. A cluster is defined by its mass, which is the average of the clusters. In data mining, a common cluster analysis is K-means. This is a vector quantization method. This is consistent with identifying the problems I found in this area based on convenience, service, equipment and even price. The data mining method competes with the k-means clustering algorithm and is suitable for collection and classification. We classify building materials into several categories: service, equipment, convenience and price. In this study, a data processing method is proposed for data clustering using the K-Means clustering algorithm from the survey results in the form of a questionnaire given to Madani Hotel guests via Google Forms. The observation results are compared with identification using the K-means clustering algorithm, so it is expected that the stock bias will increase and the bias will decrease. The K-Means algorithm is probably the first clustering algorithm proposed and is based on a very simple idea. Given the initial set, each point is assigned to one of them and the center of each cluster is replaced by the mean point above. Each cluster.

These two simple steps are repeated until they meet. Points are assigned to clusters that are close to the Euclidean distance from that point. The K-Means algorithm is one of the most commonly used algorithms in cluster analysis. You need to be aware of the inefficiencies that K-Means uses to process larger data. As the data set being processed increases, the single CPU-based host approach becomes ineffective. In this paper, the authors aim to realize a parallel universal k-means algorithm that can handle larger data sets. Implemented by CUDA. The author mainly pays attention to the flexibility and scalability of the algorithm, but its implementation may not be the most efficient

method. Data mining, also known as Knowledge Discovery (KDD) in databases, is an activity that involves collecting and using historical data to find regularities, patterns, or relationships in large data sets. The results of data mining can be used to improve decision making in the future. Data mining is an iterative and interactive process of finding perfect, useful and easy-to-understand new patterns and models in very large databases. A K-means clustering algorithm is used to solve this problem. The K-Means algorithm is the simplest clustering algorithm compared to other clustering algorithms. This algorithm has the advantages of being easy to implement and run, relatively fast, easy to customize, and most widely used in data mining tasks.

2. RESEARCH METHOD

This study uses the k-Medoids method in a cluster system. The processed data is the result of a questionnaire-style survey filled out by Hotel Madani guests, and the mapping process is carried out using the k-Medoids method combined with Davis to determine the number of clusters. The Bouldin-Index (DBI) method is one of the internal scoring methods to measure the scores of the clusters formed. The optimal number of clusters is indicated by a small DBI value. The research flow of the k-medoid method is as follows.

K-Means is an algorithm commonly used for document clustering. The main principle of K-Means is to arrange k prototypes or centers of centroid of a set of dimensional data. Before applying the algorithm process K-means, the document will be preprocessed first. Then the document is represented as a vector that has a term with a certain value. The k-means algorithm is an algorithm that requires input parameters as many as k and divide a set of n objects into k clusters so that the level the similarity between members in one cluster is high, while the level of similarity with members in other clusters is very low. Member similarity to the cluster measured by the closeness of the object to the mean value in the cluster or it can be called as cluster centroids.

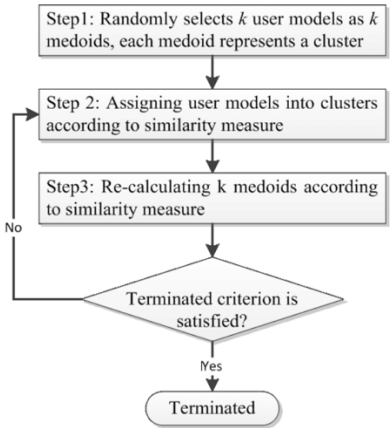

Figure 1. Research flow using K-Medoids

$$c_{kj} = \frac{\sum_{h=1}^{p} y_{hj}}{p}; y_{hj} = x_{hj} \in clusterke - k$$

K-Means Algorithm :

- Determine the number of clusters (K), set the cluster center arbitrary.
- Calculate the distance of each data to the center of the cluster.
- Group data into clusters with the shortest distance.
- Calculate cluster center.
- Repeat steps 2 - 4 until there is no more data to move to other clusters.

The stages of this research are as follows:

a) Input datasets;
b) Establishing a cluster center;
c) Calculation of distance;
d) Choose a new medoid at random;

e) Distance calculation;
f) Determine the total deviation (S);
g) Repeat steps 3-5 until there is no medoid change;
h) Output in the form of clusters consisting of clusters determined based on the best results of the DBI assessment.

3. RESULTS AND DISCUSSION

The dataset of the number of guests at Hotel Madani is presented in Table 1 following the study, and the analysis process using the RapiMiner software.

Table 1. Results of Guest/Hotel Customer Questionnaire

No	Name	Cluster Satisfaction			
		Convenience	Service	Facility	Price
1	Riyan	4	3	3	4
2	Aris	3	2	4	2
3	Munandar	4	4	4	4
4	Bayo	3	1	2	4
5	Hutapea	1	3	4	1
6	Siregar	4	2	2	4
7	Anggi	4	4	4	4
8	Smarin	1	3	3	4
9	Tomat Pahite	4	4	3	4
10	Jamarin	3	3	4	4
11	Sirambe	1	1	2	3
12	Sistimin	2	2	3	3
13	Maria	1	1	1	1
14	Siti Rahma	4	4	3	1
15	Mika	3	4	3	4
16	Jumadi	1	2	3	4
17	Eto	1	2	2	4
18	Eris	3	2	1	4
19	Leli	2	1	3	4
20	Yurni	1	1	1	4
21	Misbah	2	3	4	4
22	Irma	2	3	3	4
23	Eka	1	2	3	4
24	laila	2	2	2	3
25	Suryani	1	1	1	1
26	Hasibuan	4	4	4	4
27	Manis Siregar	4	4	3	1
28	Tukimin	2	1	1	1
29	Maria	4	3	2	1
30	Karina	1	2	3	3
31	Lobe Harahap	3	4	4	3
32	Jambang	3	3	2	4
33	Sandar	2	3	4	3
34	Rudin	1	1	3	2
35	Masni	3	4	3	4
36	Nani	2	3	2	2
37	Rini Srg	2	3	4	1
38	Sorip Hasayangan	1	2	3	3
39	Amin	3	4	4	3
40	Raja Lingga	3	2	3	4
41	Tongku Habiaran	3	4	4	4
42	Sutan Simanggur	3	3	4	4
43	Tongku Alam	3	4	4	3
44	Rina Oktaviani	4	4	4	4
45	Simarimbun	1	2	1	3
46	Miskarina Srg	3	3	3	3
47	Tiurna	1	1	2	2
48	Pahutar	2	2	3	4
49	Sirambe	3	4	3	4
50	Tuntungan	2	3	4	4

When building a system, you need to create a blueprint. The design of this system is intended so that the formation of the system can create a system that functions optimally and provides user comfort. Details of the analysis of the system to be built are shown in the following flow chart in the figure.

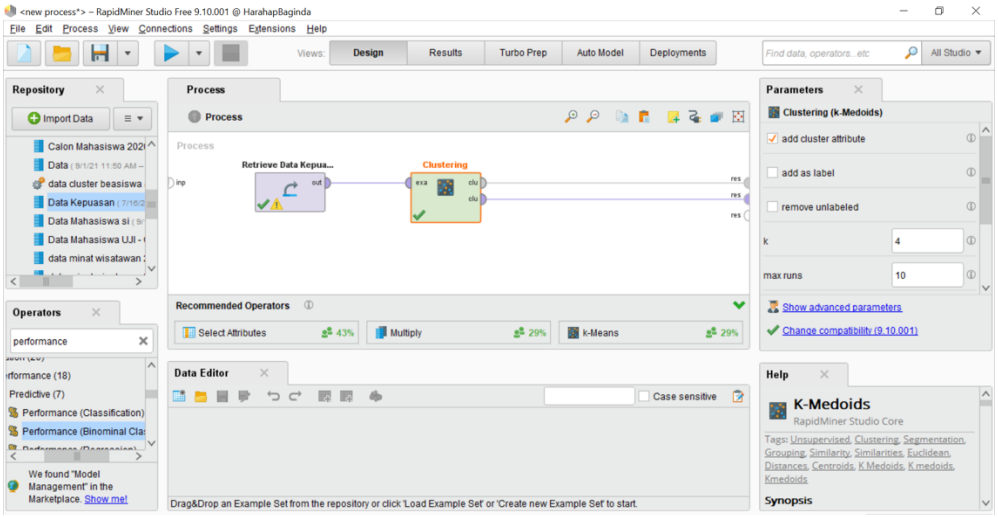

Figure 2. The design of k-medoid in determining the value of k

Figure 2 shows the model used to calculate the value of k using clusters. Power distance operator". The Davies-Bouldin index is used to define the Evaluation by this operator (DBI) cluster. Parameters to determine the value of k Use two types of measurements, "numeric measurement" and "Bregman divergence" As shown in Figure 3 below.

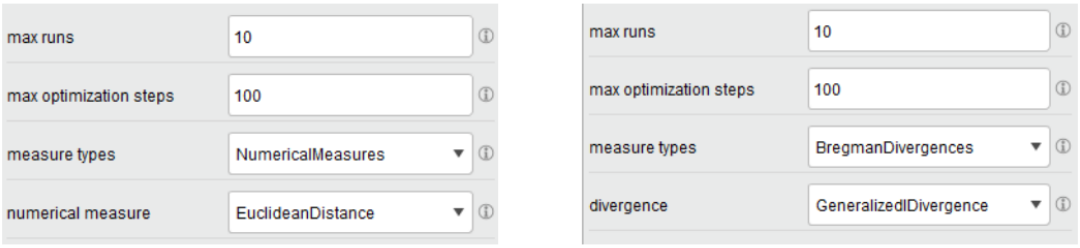

Figure 3. Comparison of parameters in determining the value of k

The test results using the two measurements have different k values. Where the convenience deviation value = 1.108, the service deviation value = 1.081, the facility deviation value = 0.995, and the price deviation value = 1.125.

Figure 4 shows the results of the cluster model of convenience, service, facilities and price, in implementing the RapidMiner application we give the meaning of convenience = cluster 0, service = cluster 1, facilities = cluster 2, and price = cluster 3.

Figure 4. Cluster Model and Folder View

Based on the picture above, the value of Madani Hotel guest satisfaction on comfort = 11, service = 14, facilities = 13, and price = 12.

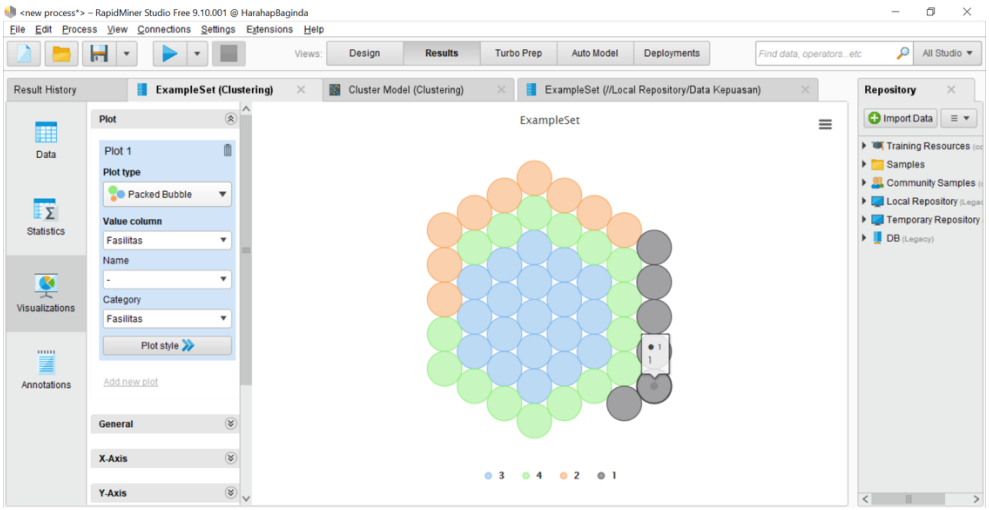

Figure 5. Forms of Visualizations

Table 2. Final centroid value

Attribute	cluster_0	cluster_1	cluster_2	cluster_3
Nama	47	10	45	44
Kenyamanan	2	3	1	3
Layanan	3	4	1	3
Fasilitas	4	3	2	3
Harga	4	4	2	3

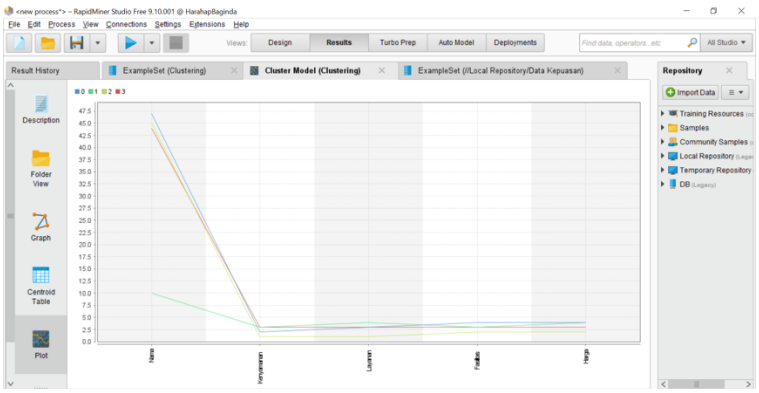

Figure 6. Plot Display

4. CONCLUSION

According to research findings, the application of the k-medoids method in the case of cluster mapping of the number of guests staying at Madani Medan who are satisfied both with comfort, service, facilities, and price can be done by forming four clusters. So, the results of the implementation of the RapidMiner application with the k-means cluster method that comfort is a priority for guests why should stay at Hotel Madani, of course this result will be a suggestion and input even a decision for the director or manager of Hotel Madani to make a decision to increase the sense of comfort to guests in order to increase the potential of hotel customers or guests who will stay at Hotel Madani, Medan City. Based on research conducted, Madani Hotel's guest satisfaction score for comfort = 11, service = 14, facilities = 13, and price = 12.

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quality of services and infrastructure as well as the convenience of customers or consumers of madani hotels in the city of Medan.

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