Analysis of Royal Prima Hospital service with a comparison between the K-Means Algorithm method and K-Medoids Clustering

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ABSTRACT

This research embarked on a rigorous exploration of clustering techniques, specifically comparing the K-Means and K-Medoids algorithms, using the service questionnaire data from the Royal Prima Hospital. The core objective was to understand and analyze the satisfaction levels of patients and service recipients. The K-Means algorithm yielded five distinct clusters and indicated a satisfaction level of 2.701288. Conversely, the K-Medoids algorithm produced two clusters, suggesting a satisfaction score of 2.71. Both scores aligned with the "satisfied" category, emphasizing the relative effectiveness and value of the hospital's services. A comparative analysis showed that K-Medoids clustering produced fewer clusters than its K-Means counterpart. The study concludes with recommendations suggesting the application of these algorithms for further data analysis, especially in the medical service domain, to facilitate more nuanced and detailed patient feedback.

Keywords: Hospital, Service, K-Means Algorithm, K-Medoids Clustering

1. INTRODUCTION

Hospitals are part of the health system that have a mission to provide comprehensive individual health services. Services include inpatient care, outpatient care, and emergency services. Hospitals must provide high-quality service in line with existing standards and cater to all segments of society (Syaiful. 2022). With data from up to 341 Hospital Service Quality Surveys, Hospital Development enables patients to decide for themselves which hospital meets their care needs. It's a challenge to provide quality service where patient satisfaction is prioritized so that patients can trust the service provided (Parashakti et al., 2020). To be competitive, hospitals need to offer better quality (Fahlevi & Alharbi, 2021), lower prices (Ramadhani et al., 2022), faster delivery, and better service than their competitors, resulting in satisfied patients (Alharbi et al., 2022).

Another factor influencing healthcare quality is the availability of resources and service facilities during the insurance period. A lack of service continuity affects efficiency and the quality of the relationship (Fahlevi & Alharbi, 2021). Healthcare service quality is also greatly influenced by ease of information and timeliness of service (Nandang, 2020). The safety of the public

in the Royal Prima Medan Hospital service plays the most crucial role in insurer safety. Another factor influencing care quality is resource efficiency and service continuity if the insurer provides good service. A lack of service continuity weakens efficiency and the quality of human relationships. Healthcare service quality is also very influenced by the ease and availability of information and the timeliness of service (Nandang, 2020). It shows that reliability, responsiveness, and physical reality have a significant relationship between insurance use at the Royal Prima Medan Hospital and the responsiveness variable, which is the most valuable component of insurance coverage. Research results from the Royal Prima Medan Hospital show that poor empathy is three times more likely to increase dissatisfaction with insurance (Manshuruddin, 2021). Healthcare service quality is the forefront of market service, so without support and guarantees from good service providers, it's challenging to achieve or reach the expected goals or market improvements (Fahlevi, 2020). Even in the increasingly fierce hospital competition today, service components must arouse serious interest (Alharbi et al., 2022). The aim of this study is to determine the influence of responsibility and reliability on insurance company safety.

In previous research or cluster analysis, there was a mistrust in the subject of data mining, where datasets were divided into several

layers based on predetermined similarities. Among the existing clustering, there are two types of clustering that still have related algorithms, namely k-means and k-medoidal clustering. Some pusschematic analyses Ahmad (2017) show that Usman (2018) used the k-medoid and k-means array methods in their research.

2. METHODOLOGY

Type of Research
This research is of the descriptive-analytical type. Descriptive-analytical research is a method tasked with describing or illustrating the subject under analysis using collected data or samples without drawing general conclusions. In other words, it examines or presents the problem as it exists during the research, then discusses and analyzes the findings to draw conclusions.

Research Object
The research object is the Royal Prima Hospital in Medan. The focus of the analysis is on the hospital's services. The research location is the Puskesmas Padang Bulan, located at Jl. Ayahanda No.68A, Sei Putih Tengah, Kec. Medan Petisah, Kota Medan, Sumatera Utara 20118.

Data Collection Methods
Observation: Observing the research subject to determine its effectiveness, development, impact, etc. This can be initiated by direct observation, field immersion, or reviewing literature references. Questionnaire: Data is collected by presenting a series of written questions or statements to respondents. The questions are categorized into two types: open and closed. Interview: A conversation between the interviewer and the informant(s). The objective of the interview is to obtain accurate information from trustworthy sources. The interview involves presenting a set of questions from the interviewer to the informant. Document: Written or printed letters that can serve as proof of information. Literature Review: This data collection technique involves reviewing books, literature, documents, and reports related to the problem being addressed. Information is collected directly from sources like books, theses, magazines, and other related documents.

Research Stages
The research process is illustrated in a flowchart. The steps in this process include: Preparation: This phase involves data processing of the Royal Primary Hospital, defining, and planning the research. Literature Review: This involves reviewing and researching literature associated with the services of the Royal Prima Hospital. Data Collection: Data is collected through accounting, observations, and documentary interviews.

Data Mining Processing: The gathered information is processed based on questions about the quality of patient services at the Royal Prima Hospital. Results and Discussion: This section presents the outcomes from the data mining process, which uses the K-Means Clustering method. Conclusions and Recommendations: Conclusions are drawn from the research findings, and proposals for future company development are made.

Data Mining Processing
Data mining in this research follows the stages in Knowledge Discovery in Database (KDD) to produce information in a predefined sequence. K-Means Clustering Method: This step seeks patterns or interesting information in selected data using the K-means clustering technique. The algorithm involves defining k as the number of clusters to be formed, generating random centroid values, calculating the distance of each input data to each centroid using the Euclidean distance formula, classifying each data based on its proximity to the centroid, and updating the centroid values. K-Medoids Algorithm: Also known as PAM (Partitioning Around Medoid), this algorithm determines the center of a cluster. It uses the center of each group as the cluster center and includes object information such as the medoid as the cluster center. The K-Medoids algorithm aims to eliminate the computational weakness of k-median, which is vulnerable to outliers depending on the object removed. The majority of stored data attributes can distort the average. The steps of the algorithm involve initializing the number of cluster centers, using the Euclidean Distance equation to assign each data object to the nearest cluster, randomly selecting an object from each cluster to represent the new medoid, calculating the distance of each object to each cluster member using the new medoid representation, and repeating these steps until a suitable cluster and cluster alignment is achieved.

3. RESULT AND DISCUSSION

Dataset
This study utilizes the service survey data from RS Royal Prima to propose an analysis of the Royal Prima Hospital's services by comparing the K-means algorithm method and the K-medoid clustering method. The information was obtained from the results of the community service survey of the Royal Prima Hospital. The preprocessing phase of the dataset was carried out by comparing the K-means algorithm method with the K-medoid clustering method.

Table 1. RS Royal Prima Service Questionnaire Data

Resp.	Tangibility					Responsiveness					Empathy:					Assurance			
	X1-1	X1-2	X1-3	...	...	X1-21	X2-1	X2-2	X2-3	X2-4	X2-5	X3-1	X3-2	X3-3	X3-4	X3-5	X4-1	X4-2	X4-3	X4-4
1	3	3	3	...	...	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3
2	2	3	3	...	...	2	3	2	3	3	3	3	2	3	3	3	3	3	3	3
3	3	3	3	...	...	3	3	3	2	3	3	3	3	3	3	3	3	2	3	3
4	1	3	3	...	...	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
5	3	3	3	...	...	3	3	3	3	3	3	1	3	1	2	1	3	3	3	3
6	3	3	3	...	...	3	2	1	3	1	2	3	1	3	3	3	3	3	1	2
7	3	1	2	...	...	3	3	3	1	3	3	2	3	2	3	2	2	1	3	3
8	3	3	3	...	...	3	3	2	3	2	3	3	2	3	3	3	3	3	2	3
9	3	2	3	...	...	3	3	3	2	3	3	3	3	3	3	3	3	2	3	3

10	3	3	3	...	...	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
11	3	3	3	...	...	3	3	3	3	3	3	2	3	2	3	2	3	3	3	3
12	3	3	3	...	...	3	3	2	3	2	3	3	2	3	3	3	3	3	2	3
13	3	2	3	...	...	3	3	3	2	3	3	3	3	3	3	3	3	2	3	3
14	3	3	3	...	...	3	3	3	3	3	3	1	3	1	3	1	3	3	3	3
15	3	3	3	...	...	3	3	1	3	1	3	3	1	3	3	3	3	3	1	3
16	3	1	3	...	...	3	3	3	1	3	3	3	3	3	3	3	1	3	3	3
17	3	3	3	...	...	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
18	3	3	3	...	...	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
19	3	3	3	...	...	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
20	3	3	3	...	...	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21	3	3	3	...	...	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
22	3	3	3	...	...	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
23	3	3	3	...	...	3	3	3	3	3	3	1	3	1	2	1	3	3	3	3
24	3	3	3	...	...	3	2	1	3	1	2	3	1	3	3	3	3	3	1	2
25	3	1	2	...	...	3	3	3	1	3	3	3	3	3	3	3	2	1	3	3
26	3	3	3	...	...	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
27	3	3	3	...	...	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
299	3	3	3	...	...	3	3	3	3	3	3	2	3	2	3	2	3	3	3	3
300	3	3	3	...	...	3	3	2	3	2	3	2	2	2	3	2	3	3	2	3

Research Design

This research involves conducting observations, followed by data collection, which is then entered into Microsoft Excel. Afterward, this data is processed through a series of calculations, adhering to the steps of the multiple linear regression method. The calculation results can be implemented in RapidMiner Studio 9.10.10 to view precise outcomes. Problem Analysis: This entails analyzing issues related to the Royal Prima hospital service analysis by comparing the K-means algorithm method and the K-medoid clustering method. Literature Study: This research must be grounded on several references that can be utilized to acquire information and determine the method for addressing the problem. This study employs the K-means method. Data Collection: Gathering questionnaire data from the Royal Prima hospital service, comparing the K-means algorithm method, and the K-medoid clustering method took place over a month from May 1-30, 2023. The data is then processed using data mining in the K-means and K-medoid clustering methods. Data Testing: Data testing is performed using RapidMiner Studio 9.10.10. Conclusion: The conclusions obtained involve grouping the motorcycle sales results at the Royal Prima hospital.

K-Means Algorithm After value normalization, clustering is executed using the K-means algorithm. From this process, we derive the results of the Royal Prima hospital service questionnaire, based on public opinions from patients who have received treatment at the hospital. The K-means algorithm process is as follows:

Dataset Collection

Below is the dataset table from the Royal Prima hospital service questionnaire. The collected data is used in the following table:

Table 2. Patient Satisfaction Assessment

No.	Statement	Unsatisfied	Less Satisfied	Satisfied
Tangibility (Physical Evidence):				
1	The inpatient room is neatly arranged and clean.			
2	The inpatient room is comfortable.			
...	...			
Responsiveness:				
1	Nurses always ask about the patient's complaints.			

2	Nurses provide opportunities for patients to ask questions.			
3	Nurses provide explanations about the patient's disease.			
4	Nurses are friendly and polite.			
5	Nurses pay attention to the needs and complaints of patients.			
Assurance:				
1	Nurses' behavior instills a sense of security.			
2	Nurses are educated and capable of serving patients.			
3	Treatment costs are affordable.			
4	Patient confidentiality is maintained during their stay in the inpatient room.			
Empathy:				
1	Nurses try to calm patients' anxiety about their illness.			
2	Nurses make special time to communicate with patients.			
3	Nurses always remind about the safety of storing valuable items of patients and their families.			
4	Time to consult with the patient's family is met.			
5	Comforting and giving encouragement to patients to recover quickly and pray for them.			

At this stage, a data normalization process is conducted. The purpose of this is to standardize the data attribute scales within a more specific range, making it easier to process the data using the k-means method with the RapidMiner application.

Testing the K-Means Method Using RapidMiner
The service questionnaire data then proceeds to the k-means clustering phase. In the "Select Attributes" stage, its purpose is to assist in the attribute selection process for the dataset. Following

this, the "Set Role" phase differentiates between the naming rows of coordinate attributes and the prediction positions that will be categorized under 'label'. After these steps, the results are obtained. The application of the predictive model from the Royal Prima hospital's service questionnaire process is depicted in the figure below.
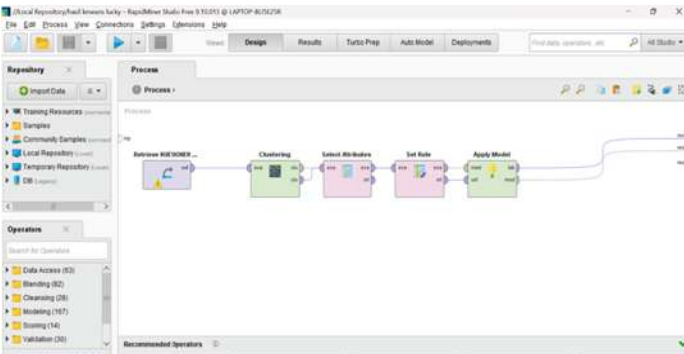
From the import value data processed with the RapidMiner application, the customer questionnaire results were obtained. The data was then processed using the k-means method in the RapidMiner Studio 9.10.10 application to obtain accurate results, as shown in Table 3 below.

Figure 1. Display of Service Questionnaire Data Process for Royal Prima Hospital

Table 3. Cluster Rapidminer

Resp	Cluster	X1-1	X1-2	...	...	X1-22	X2-1	X2-2	...	...	X2-5	x3-1	...	...	x3-5	x3-1	...	...	x3-4
1	cluster_4	1.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
2	cluster_4	2.0	2.0			3.0	2.0	3.0			3.0	3.0			3.0	3.0			3.0
3	cluster_4	3.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
4	cluster_4	4.0	1.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
5	cluster_4	5.0	3.0			3.0	3.0	3.0			3.0	3.0			2.0	1.0			3.0
6	cluster_2	74.0	3.0			2.0	1.0	2.0			1.0	2.0			3.0	3.0			1.0
7	cluster_2	75.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
8	cluster_2	76.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
9	cluster_2	77.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
10	cluster_2	78.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
11	cluster_2	79.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	2.0			3.0
12	cluster_2	80.0	3.0			3.0	2.0	3.0			2.0	3.0			3.0	2.0			2.0
13	cluster_2	81.0	3.0			3.0	2.0	3.0			2.0	3.0			2.0	1.0			2.0
14	cluster_0	145.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
15	cluster_0	146.0	3.0			3.0	3.0	3.0			3.0	3.0			2.0	1.0			3.0
19	cluster_0	150.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	4.0			3.0
20	cluster_1	267.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
21	cluster_1	268.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
22	cluster_1	269.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
23	cluster_1	270.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0
24	cluster_3	285.0	3.0			3.0	3.0	3.0			3.0	3.0			2.0	1.0			3.0
25	cluster_3	286.0	3.0			2.0	1.0	2.0			1.0	2.0			3.0	2.0			1.0
26	cluster_3	287.0	3.0			3.0	2.0	3.0			2.0	3.0			3.0	2.0			2.0
27	cluster_3	288.0	3.0			3.0	2.0	3.0			2.0	3.0			3.0	3.0			2.0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
341	cluster_3	292.0	3.0			3.0	3.0	3.0			3.0	3.0			3.0	3.0			3.0

Below are the final questionnaire results for the Royal Prima Hospital's services. Where: x1 represents Tangibility (Physical Evidence), x2 represents Responsiveness, x3 represents Empathy, x4 represents Assurance.

Table 4. K-Means Cluster Results Data

Attribute	Cluster_0	Cluster_1	Cluster_2	Cluster_3	Cluster_4
x1-1	2.9130434782608696	2.955223880597015	2.9565217391304346	2.955223880597015	2.9130434782608696
x1-2	2.63768115942029	2.6417910447761193	2.550724637681159	2.5522388059701493	2.6231884057971016
x1-3	2.898550724637681	2.925373134328358	2.8840579710144927	2.8955223880597014	2.9130434782608696
x1-4	2.8840579710144927	2.9402985074626864	2.9420289855072466	2.9402985074626864	2.8840579710144927
x1-5	2.608695652173913	2.626865671641791	2.536231884057971	2.537313432835821	2.5942028985507246
x1-6	2.898550724637681	2.925373134328358	2.8840579710144927	2.8955223880597014	2.9130434782608696
x1-7	2.9130434782608696	2.955223880597015	2.9565217391304346	2.955223880597015	2.9130434782608696
x1-8	2.608695652173913	2.626865671641791	2.536231884057971	2.537313432835821	2.5942028985507246
x1-9	2.898550724637681	2.925373134328358	2.8840579710144927	2.8955223880597014	2.9130434782608696
x1-10	2.8840579710144927	2.9402985074626864	2.9420289855072466	2.9402985074626864	2.8840579710144927
x1-11	2.63768115942029	2.6417910447761193	2.550724637681159	2.5522388059701493	2.6231884057971016
x1-12	2.898550724637681	2.925373134328358	2.8840579710144927	2.8955223880597014	2.9130434782608696
x1-13	2.608695652173913	2.626865671641791	2.536231884057971	2.537313432835821	2.5942028985507246
x1-14	2.652173913043478	2.611940298507463	2.536231884057971	2.582089552238806	2.6231884057971016
x1-15	2.898550724637681	2.91044776119403	2.8840579710144927	2.91044776119403	2.9130434782608696
x1-16	2.6231884057971016	2.5970149253731343	2.5217391304347827	2.5671641791044775	2.5942028985507246
x1-17	2.608695652173913	2.626865671641791	2.536231884057971	2.537313432835821	2.5942028985507246
x1-18	2.652173913043478	2.611940298507463	2.536231884057971	2.582089552238806	2.6231884057971016
x1-19	2.898550724637681	2.91044776119403	2.8840579710144927	2.91044776119403	2.9130434782608696
x1-20	2.652173913043478	2.611940298507463	2.536231884057971	2.582089552238806	2.6231884057971016
x1-21	2.898550724637681	2.91044776119403	2.8840579710144927	2.91044776119403	2.9130434782608696
x1-22	2.6231884057971016	2.5970149253731343	2.5217391304347827	2.5671641791044775	2.5942028985507246
x2-1	2.898550724637681	2.91044776119403	2.8840579710144927	2.91044776119403	2.9130434782608696
x2-2	2.6231884057971016	2.5970149253731343	2.5217391304347827	2.5671641791044775	2.5942028985507246
x2-3	2.608695652173913	2.626865671641791	2.536231884057971	2.537313432835821	2.5942028985507246
x2-4	2.652173913043478	2.611940298507463	2.536231884057971	2.582089552238806	2.6231884057971016
x2-5	2.898550724637681	2.91044776119403	2.8840579710144927	2.91044776119403	2.9130434782608696
x4-1	2.63768115942029	2.626865671641791	2.536231884057971	2.537313432835821	2.608695652173913
x4-2	2.652173913043478	2.611940298507463	2.536231884057971	2.5671641791044775	2.608695652173913
x4-3	2.6666666666666665	2.6417910447761193	2.550724637681159	2.5522388059701493	2.63768115942029
x4-4	2.898550724637681	2.91044776119403	2.8840579710144927	2.8955223880597014	2.9130434782608696
x3-5	2.6666666666666665	2.6417910447761193	2.550724637681159	2.5522388059701493	2.63768115942029
x3-1	2.898550724637681	2.925373134328358	2.8840579710144927	2.8955223880597014	2.9130434782608696
x3-2	2.608695652173913	2.626865671641791	2.536231884057971	2.537313432835821	2.5942028985507246
x3-3	2.652173913043478	2.611940298507463	2.536231884057971	2.582089552238806	2.6231884057971016
x3-4	2.898550724637681	2.91044776119403	2.8840579710144927	2.91044776119403	2.9130434782608696

And there are 341 questionnaire data on services. They will be grouped into 5 clusters, namely: cluster_0, cluster_1, cluster_2, cluster_3, and cluster_4. The list and range for the ratings are as follows:

Table 5. Cluster Model Result Image

Attribute	Range
Unsatisfied	1
Satisfied	2
Very Satisfied	3

Table 6. Cluster Model Result

ATTRIBUTE	TOTAL
X1-1	2,904348
X1-2	2,571014
X1-3	2,869565
X1-4	2,884058
X1-5	2,550725
X1-6	2,869565
X1-7	2,904348
X1-8	2,550725
X1-9	2,869565
X1-10	2,884058
X1-11	2,571014
X1-12	2,869565
X1-13	2,550725
X1-14	2,571014
X1-15	2,869565
X1-16	2,550725
X1-17	2,550725
X1-18	2,571014
X1-19	2,869565
X1-20	2,571014
X1-21	2,869565
X1-22	2,550725
X2-1	2,869565
X2-2	2,550725
X2-3	2,550725
X2-4	2,571014
X2-5	2,869565
x3-1	2,55942

Tangibility

Responsiveness

		x3-2	2,565217
Empathy		x3-3	2,57971
		x3-4	2,866667
		x3-5	2,57971
		x3-1	2,869565
		x3-2	2,550725
Assurance		x3-3	2,571014
		x3-4	2,869565
TOTAL			2,701288

Based on the results obtained, the score is 2.7, which indicates that the questionnaire on the Royal Prima Hospital's service falls under the "Very Satisfied" category.

Implementation of K-Medoids Clustering

After obtaining results from the K-Means algorithm, the next step is clustering using K-Means clustering. In this process, a comparison can be observed between the results of the K-Medoids Clustering method and the K-Method. The procedure for the K-Medoids clustering algorithm is as follows:

Testing Steps Using RapidMiner 9.10

Table 7. Results of K-Medoids Clustering in RapidMiner

Resp	Cluster	X1-1	X1-2	...	....	X1-19	X1-20	X1-21	X1-22	X2-1	...	X2-5	x3-1	x3-2	x3-3	x3-4	x3-5	x3-1	x3-2
1	cluster_1	1.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0
2	cluster_1	2.0	2.0	...	....	3.0	3.0	3.0	3.0	2.0	...	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0
3	cluster_1	3.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4	cluster_1	4.0	1.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5	cluster_1	5.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	1.0	3.0	1.0	2.0	1.0	3.0
6	cluster_1	6.0	3.0	...	....	1.0	2.0	1.0	2.0	1.0	...	1.0	2.0	3.0	1.0	3.0	3.0	3.0	3.0
7	cluster_1	7.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	2.0	3.0	2.0	3.0	2.0	2.0
8	cluster_1	8.0	3.0	...	....	2.0	3.0	2.0	3.0	2.0	...	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0
9	cluster_1	9.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
10	cluster_1	10.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
11	cluster_1	11.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0
12	cluster_1	12.0	3.0	...	....	2.0	3.0	2.0	3.0	2.0	...	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0
13	cluster_1	13.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
14	cluster_1	14.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	1.0	3.0	1.0	3.0	1.0	3.0
15	cluster_1	15.0	3.0	...	....	1.0	3.0	1.0	3.0	1.0	...	1.0	3.0	3.0	1.0	3.0	3.0	3.0	3.0
16	cluster_1	16.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
17	cluster_1	17.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
18	cluster_1	18.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
19	cluster_1	19.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
341	cluster_1	26.0	3.0	...	....	3.0	3.0	3.0	3.0	3.0	...	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

The test was conducted using the data mining tool RapidMiner, version 9.10, employing the K-Medoids clustering method. This study focuses on local computer/laptop data storage, as illustrated in Figure 8 below:

Table 8. Final Results of K-Medoids Clustering in RapidMiner

ATRIBUTE	RESULT
X1-1	2,94
X1-2	2,6
X1-3	2,9
X1-4	2,92
X1-5	2,58
X1-6	2,9
X1-7	2,94
X1-8	2,58
X1-9	2,9
X1-10	2,92
X1-11	2,6
X1-12	2,9
X1-13	2,58
X1-14	2,6
X1-15	2,9
X1-16	2,58
X1-17	2,58
X1-18	2,6
X1-19	2,9
X1-20	2,6
X1-21	2,9
X1-22	2,58

TOTAL Tangibility	2,75
X2-1	2,9
X2-2	2,58
X2-3	2,58
X2-4	2,6
X2-5	2,9
TOTAL Responsiveness	2,73
x3-1	2,59
x3-2	2,6
x3-3	2,61
x3-4	2,9
x3-5	2,61
TOTAL Empathy	2,69
x3-1	2,9
x3-2	2,58
x3-3	2,6
x3-4	2,9
TOTAL	2,71

From the results obtained using the K-Medoids Clustering method, only two clusters were identified: cluster_0 and cluster_1. Both clusters were categorized as "satisfied."

4. CONCLUSION

Based on the research results from the two algorithms, after obtaining results from the K-Means algorithm, the subsequent step involved clustering using K-Means Clustering. During this process, a comparison could be observed between the K-Medoids Clustering method and the K-Method. The K-Means algorithm grouped the data into five clusters: Cluster_0, Cluster_1, Cluster_2, Cluster_3, and Cluster_4, with a resulting value of 2.701288, falling under the "satisfied" category. In contrast, the K-Medoids clustering algorithm classified the data into just two clusters: Cluster_0 and Cluster_1, with a resulting value of 2.71, which also denotes the "satisfied" category. A comparative analysis of these methods reveals that the K-Medoids Clustering method produces fewer clusters than the K-Means method.

Several suggestions can be drawn to provide a foundation for further development and improvements, addressing the limitations and weaknesses of this study. The computational methods of the K-Means algorithm and K-Medoids clustering can be employed for data analysis and compared with other algorithms. This can facilitate the analysis of the questionnaire data from the Royal Prima Hospital Service.

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