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Model of Ict Goods Inventory Clustering Application Using K-Means Method

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Abstract. Inventory of goods is a list that contains all the items belonging to the office. This study aims to produce an inventory clustering application that applies the k-means method to the application. The research site was conducted at the ICT PT PERTAMINA EP ASSET 1 PANGKALAN SUSU FIELD. In this study using the k-means method, which classifies goods data for the last 3 years starting from 2017, 2018 and 2019. This application was built using flowcharts, dfd, and erd. The results of the k-means calculation show that PC & Laptop 2017, PC & Laptop 2019, and cctv 2018 are members of C2 while C1 members are PC & Laptop 2018, Radio HT 2017, Radio HT 2018, Radio HT 2019, Printer 2017, Printer 2018, Printer 2019, CCTV 2017, and CCTV 2019. The conclusion of this study by applying the k-means method, the calculation stops at the second iteration and can produce a clustering application.

Keywords: Application, Clustering, Inventory of Goods, ICT, K-Means.

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INTRODUCTION

The information system is a virtual system that allows management to control the company's physical system. Information systems are very much needed at this time to improve supervision of a job so that it is easier to carry out monitoring. An information system greatly affects the progress of performance because through an established information system it can provide reliable information and accelerate data access, especially in this very advanced era. Technological developments require the existence of an information system as a means of information (Mcloed and George, 2008).

Advances in computer and information technology have had a considerable influence on the performance of data processing and information presentation. Filling data manually is very troublesome and time-consuming and inaccurate data storage, so using a website-based information system can present data accurately and can facilitate work in a short time (Oktavianto, 2016).

Goods inventory is a list that contains all office items that are still in operation. Such a system will make it easier to collect and control goods. Every item collection activity will be easier if it can be controlled anywhere (Siregar, 2018).

Lots of inventory data, requires appropriate data management to present a more accurate data. The method used to divide the data into groups based on the similarities that have been previously determined is clustering. In the clustering method, objects will be grouped into one or more clusters so that the objects in one cluster will have high similarities with one another (Metisen, et, al., 2015).

K-Means is a distance based clustering method which divides data into a number of clusters and this algorithm only works on numerical attributes. The K-Means algorithm includes partitioning clustering that separates the data into separate sub-regions. The K-Means algorithm is well known for its ease and ability to cluster large data and outlier data very quickly (Me4en, et, al., 2015).

Inventory data collection carried out at ICT PT. Pertamina EP Asset 1 Pangkalan Susu Field is currently still being done manually. Officers are still using the excel application to record incoming and outgoing goods. Manual data collection in this way takes a long time when officers collect and monitor data. The large number of requests for goods that enter every year makes it difficult for ICT officers to classify goods annually.

Considering the problems faced by the officers in the inventory management department, the researcher tries to create a system to carry out a more accurate and efficient work process, especially in inventory management at ICT PT. Pertamina EP Asset 1 Pangkalan Susu Field.

LITERATURE REVIEW

Inventory is the process of managing the procurement or inventory of goods owned by an office or company in carrying out its operational activities. Without an inventory, a business activity will not be carried out, therefore the existence of an inventory is very important. Office inventory is very important for the continuity of an agency. If one or more of the equipment is damaged, it will definitely hinder the running of the economy. Companies that are usually in the form of an irregular organization of an office inventory or a lack of a system for inventorying office equipment (Andi and Wahana Komputer, 2010).

Inventory is an activity carried out to record incoming and outgoing goods and arrange them correctly in accordance with the regulations that have been applied (Siswanto and Khambali, 2018). Meanwhile, Kinaswara (2019) said that inventory is a way of recording items that are carried out to register every item owned by the office so that they can be used in carrying out each task.

According to several sources about the definition of inventory:

- a. Inventory is a stock of an item or resource used in a company organization (Assauri, 2016).
- b. Inventory (stock) which is all types of goods owned by a company and is used to support its business processes (Martono, 2015).

Inventories are materials or goods that are stored for certain purposes, including for the production process, if they are raw materials, they will be further processed, if they are components (spare parts), they will be sold back into merchandise (Siagian, 2005).

METHOD

This research on goods inventory application using the k-means method was conducted from July to December 2020. This research was conducted over a period of approximately 6 months.

Research on inventory application using the k-means method was conducted at ICT PT. Pertamina EP Asset 1 Pangkalan Susu Field. This location was taken because it has all the supporting aspects for the application needs to be built so that the research runs well.

Research is an attempt to test carefully and in a crisis in search of facts and principles using systematic steps. Research methods are procedures or steps in obtaining scientific or scientific knowledge. The research method is a systematic way to organize science. While the research technique is a way to carry out research methods. Research methods usually refer to forms of research. (Suryana, 2010).

The steps that the author takes in the process of making this thesis are using the waterfall method, where the first step is analysis of system requirements to system testing.

Research steps carried out are:

- a. Study of literature
- b. Needs Analysis
- c. System planning
- d. System Implementation
- e. System Testing
- f. Conclusion

RESULT AND DISCUSSION

In this study, the authors will implement clustering using the k-means method into the goods inventory application considering the large number of requests for goods that enter the ICT inventory which makes it difficult for officers to group goods annually into several groups of goods. The grouping of goods that has been carried out will essentially become information for the officer to know which goods belong to which group of goods.

System analysis is the earliest stage of system development which is the foundation for determining the success of the resulting information system. System analysis has three stages in describing system development, namely: problem analysis, needs analysis, process analysis.

Every year ICT PT. PERTAMINA EP ASSET 1 PANGKALAN SUSU has a very large demand for goods, these very many items require grouping. The ICT grouping of PT. PERTAMINA EP ASSET 1 PANGKALAN SUSU still performs manual grouping every year which makes it difficult for officers to determine each year the goods fall into groups of goods which by applying the k-means method in the application of inventory of goods the results of this application can be used by ICT officers.

In this section, we will discuss various processes from research carried out from actual data, where the system will be tested by implementing a program design using a programming language. The design of this system starts from analyzing the needs and existing problems to finding practical solutions using computer algorithms and methods, designing processes that will be carried out later, implementing and testing the system.

In this manual calculation, the author uses the goods data starting from 2017 to 2019 as many as 24 data which have been totaled from the data of goods requested and received from 2017 to 2019.

Table 1. *Item Data 2017, 2018 and 2019*

Name & Year	Request	Reception
PC & Laptop 2017	82	39
PC & Laptop 2018	54	33
PC & Laptop 2019	116	81
Radio HT 2017	48	22
Radio HT 2018	46	25
Radio HT 2019	51	26
Printer 2017	40	23
Printer 2018	21	16
Printer 2019	16	12
CCTV 2017	70	36
CCTV 2018	81	57
CCTV 2019	53	38

The steps for grouping goods using the **k-means method** are as follows:

1. Determine the number of clusters you want to specify

Determining the number of clusters you want to form is the first step. From the data that has been obtained, the cluster that you want to form into 2 clusters, namely C1 = is the least received data while C2 = is the most received data. In the data year group table for 2017, 2018 and 2019 above, we can see the data that was received the least, namely the printer data in 2018, therefore we can make the 2018 printer data C1. While the most data received, namely 2019 pc and laptop data, means that 2019 PCs and laptops are C2.

2. Determine the centroid point

The centroid point is taken from the goods data 2017, 2018, and 2019, has 2 centroid points, namely X and Y. Where the X centroid point is demand, while the Y centroid point is acceptance. The centroid point C1 is taken from the least received data, while C2 is taken from the most received data. In the goods data table 2017, 2018, and 2019, X is demand, while Y is revenue. Centroid C1 gets the point values X = 16 and Y = 12 because centroid C1 is the least received 2018 printer data. At centroid C2, point X = 116 and Y = 81 because the C2 centroid contains data for PCs and laptops for 2019 which had 116 requests and 81 receipts. The centroid values can be seen in the table below:

CONCLUSION

The results showed that the ICT inventory clustering application used the k-means method to cluster data for the last 3 years, the three-year data that had been calculated using the cluster resulted in the following calculations:

PC & Laptop 2017 c1 (39,956921247208) c2 (22,825424421027)
 PC & Laptop 2018 c1 (12,133516482134) c2 (46,872166581032)
 PC & Laptop 2019 c1 (90,542193969933) c2 (31,827660925679)
 Radio HT 2017 c1 (5,185449728701) c2 (58,258046654518)
 Radio HT 2018 c1 (1,795054935712) c2 (58,008620049093)
 Radio HT 2019 c1 (6,674994798167) c2 (53,413481444295)
 Printer 2017 c1 (5,088112507491) c2 (64,070273918565)
 Printer 2018 c1 (25,256462319353) c2 (83,862983490930)
 Printer 2019 c1 (31,457201966411) c2 (90,210864090751)

CCTV 2017 c1 (27,668674625930) c2 (32,526911934581)
CCTV 2018 c1 (48,230925993829) c2 (12,165525060596)
CCTV 2019 c1 (15,073892072793) c2 (45,177427992306)

From the c1 and c2 data above, the cluster results are:

PC & laptop 2017, PC & laptop 2019, and cctv 2018 are members of c2 while c1 members are PC & laptop 2018, Radio ht 2017, Radio ht 2019, Printer 2017, Printer 2018, Printer 2019, CCTV 2017, and CCTV 2019. By implementing the k-means method for clustering, the calculation of the k-means method stops at iteration 2.

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