# Marketplace Entrepreneur Sorgum Menggunakan Klastering K Medoid

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# Marketplace Entrepreneur Sorgum Menggunakan Klastering K Medoid

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*Abstract*—Marketplace is a virtual market where the market is a meeting place for buyers and sellers to make transactions. Wijaya Kusuma University Surabaya has established an Entrepreneurship Sorghum Unit (UES) starting in 2009 and is collaborating with Sorghum Entrepreneurs in several areas in East Java. The objectives of this research are: (1) creating a marketplace for Sorghum Entrepreneurs who have joined UES, (2) Classifying using the K-Medoid method to group Sorghum Entrepreneurs based on the income that has been obtained by UES, (3) Conducting mapping based on clustering results so that UES can provide assistance to sorghum entrepreneurs. From the results of the questionnaire, obtained data on the level of desire for UES for each variable from 35 sorghum entrepreneurs as respondents. Quantitative data obtained is then entered and then proceed with the clustering stage. The data is divided into several clusters based on the type of sorghum, products sold and sales results. After that, the cluster performance calculation is carried out by calculating the k-fold value. analysis of the results of testing the effect of the k-fold value is the best percentage found in the k-fold value = 6 with an accuracy value of 34.597%.

*Index Terms*— entrepreneur sorgum; clustering; k-medoid; marketplace.

*Abstrak*—Marketplace merupakan sebuah pasar virtual dimana pasar tersebut menjadi tempat bertemunya pembeli dan penjual untuk melakukan transaksi. Universitas Wijaya Kusuma Surabaya telah mendirikan Unit Entrepreneurship Sorghum (UES) mulai tahun 2009 dan berkolaborasi dengan Entrepeneur Sorgum di beberapa daerah di Jawa Timur. Tujuan penelitian ini yaitu: (1) pembuatan marketplace untuk Entrepeneur Sorgum yang telah bergabung di UES, (2) Melakukan klasifikasi menggunakan metode K-Medoid untuk mengelompokkan Entrepeneur Sorgum berdasarkan pendapatan yang telah didapatkan oleh UES, (3) Melakukan pemetaaan berdasarkan hasil klastering agar UES dapat memberikan bantuan kepada entrepreneur sorgum. Dari hasil kuesioner, didapatkan data tingkat keinginan UES untuk tiap-tiap variabel dari 35 entrepreneur sorgum sebagai responden. Data kuantitatif yang diperoleh kemudian dimasukan dan selanjutnya dilanjutkan dengan tahap pengklasteran. Data dibagi menjadi beberapa klaster yaitu berdasarkan jenis sorgum, produk yang dijual dan hasil penjualan. Setelah itu dilakukan perhitungan performansi klaster dengan menghitung nilai k-fold. analisis hasil pengujian pengaruh nilai k-fold adalah persentase terbaik terdapat pada nilai k-fold=6 dengan nilai akurasi 34,597%.

*Kata Kunci*— entrepreneur sorgum; klastering; k-medoid; marketplace.

## I. INTRODUCTION

Marketplace is an electronic product marketing online that brings many sellers and buyers to transact with each other [1]. Marketplace is a virtual market where the market is a meeting place for buyers and sellers to make transactions. Marketplaces have the same function as a traditional market, the difference is that marketplaces are more computerized by using the help of a network to support a market so that it can be carried out efficiently in providing updated information and services for different sellers and buyers [2].

The problem that happens is that there are still many entrepreneurs who are reluctant to enter digital platforms, because they find it difficult to access and partner with marketplaces [3]. Only 13% of culinary entrepreneurs have gone online, the remaining 87% have not yet gone online [4]. Entrepreneurs are still faced with several challenges, including: (1) Digital knowledge, where sellers must understand new online features to be able to use them properly, (2) From an operational standpoint, namely suitable facilities for the production and storage of goods in a larger size in order to maintain product quality, and (3) Prepare competent human resources [5]. Digitalization is one of the solutions to the problems faced by Entrepreneurs today. Therefore, strong collaboration between the government and digital platforms is

needed to revive Entrepreneurs in Indonesia. The government must prepare a national economic recovery scheme, including for Entrepreneurs [6].

Universitas Wijaya Kusuma Surabaya has established an Entrepreneurship Sorghum Unit (UES) starting in 2009 and is collaborating with Sorghum Entrepreneurs in several areas in East Java. Table 1 describes the number of UES from 2020 – 2022.

Table 1 Amount of UES From 2020 – 2022

| No | Processed Sorghum | 2020 | 2021 | 2022 |
|----|-------------------|------|------|------|
| 1  | Red Sorghum Seed   | 1    | 3    | 4    |
| 2  | Sorghum Flour      | 16   | 18   | 19   |
| 3  | White Sorghum Seed | -    | 2    | 6    |
| 4  | Sorghum Souvenir   | 2    | 4    | 4    |
| 5  | Sorghum Noodles    | 1    | 1    | 1    |
| 6  | Sorghum Soy Sauce  | -    | 1    | 1    |

UES has several activities such as seminars, talk shows, training, workshops, Entrepreneurship Expo. UES also helps Entrepreneurs to grow and develop in support of training and community service activities. The number of Entrepreneurs at UES is increasing day by day as well as the types of sorghum processed products which are increasingly diverse. If they don't have electronic version, the following styles and sizes must be used:

Clustering is a tool in data mining which has the goal of grouping objects into clusters. A cluster is a collection of data objects that are similar to one another in the same cluster and are dissimilar to objects that are in different clusters. Objects can be grouped into clusters so that objects in one cluster have high similarity to one another [7]. Clustering is the process of grouping records, observations, or those that have the same object. Clustering and classification have differences, namely the absence of a target variable in the clustering process [8].

The objectives of this research are: (1) creating a marketplace for Sorghum Entrepreneurs who have joined UES, (2) Classifying using the K-Medoid method to group Sorghum Entrepreneurs based on the income that has been obtained by UES, (3) Conducting mapping based on clustering results so that UES can provide assistance to sorghum entrepreneurs.

## II. METHOD

This study used data from Sorghum Entrepreneurs from UES 2022. The sorghum Entrepreneurs who have joined are from the cities of Sumenep, Kediri, Malang, Sidoarjo, Nganjuk, Tulungagung, Blitar, Lamongan, Tuban, Jombang. The data collected was 35 sorghum entrepreneurs.

Mulai

Memasukkan data Entrepreneur Sorgum

Sample Representatif

Penentuan jumlah klaster

Analisa klaster k-medoid

Hasil klastering

Selesai

Fig. 1. Research Method

K-Medoids Clustering is a variation of the K-Means method. The difference between this method compared to k-means is that the use of medoids is not based on the average of each cluster object [9]. K-Medoids were used to reduce the sensitivity of the partitions to outlier values in the data set. The purpose of K-Medoids Clustering is to overcome the drawbacks of K-Means Clustering from its sensitivity to outlier data which can affect data distribution [10]. K-Medoids Clustering is a partitioning method of clustering that combines n objects into k clusters. Objects in a group of objects that represent a cluster are called medoids [11].

The stages use the K-Medoids algorithm as follows [12]:

1. Determine the number of clusters as much as k with theoretical and conceptual considerations.
2. Finding the distance of each object to the nearest cluster using the Euclidean distance measure.

$$d_{ab} = \sqrt{\sum_{k=1}^{p}(x_{ak} - x_{bk})^2} \tag{1}$$

with:

$p$ : The number of variables

$dab$ : The distance between object a and object b

$xak$ : The value of object a from variable k

$xbk$ : The value of object b from variable k

3. Then randomly determine the new cluster centre to be used as a non-medoids candidate for each object.
4. Calculate the distance between each object in each cluster to the non-medoids candidates.
5. Calculating between the number of deviations (S) with the number of new distances – the number of old distances. If S < 0, then replace the object with non-medoids cluster data to form a new collection of k objects called medoids.
6. Next, repeat steps 3 – 5 until the medoids don't change. Then obtained the cluster and each member of the cluster

## III. RESULTS AND DISCUSSION

The marketplace in this study is intended for sorghum entrepreneurs who have joined the Sorghum Entrepreneur Unit (UES). Marketplace features are adapted to marketplace features in general where sorghum entrepreneurs as sellers can display products that can be purchased, as seen in Figure 2.
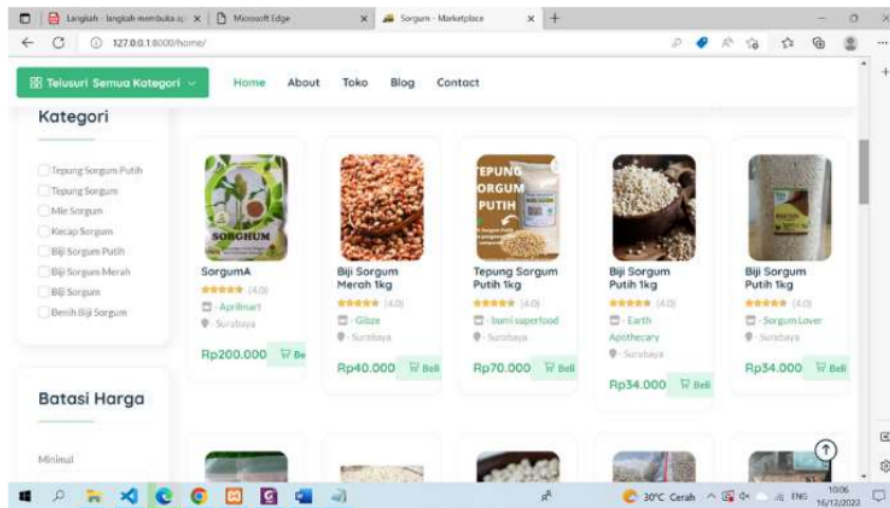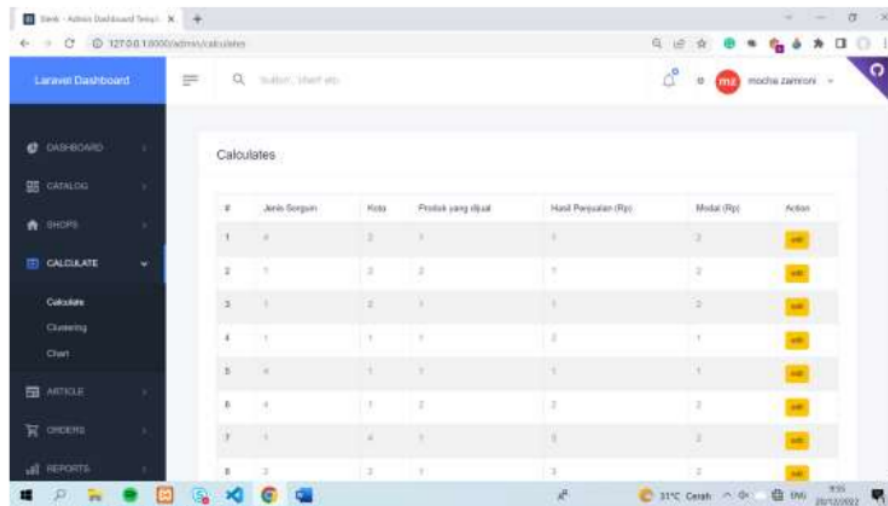


Fig. 2. Marketplace Entrepreneur Sorghum

Fig. 3. Clustering Calculation Process in Sorghum Entrepreneur Marketplace

In this study, the clustering method used was K-Medoid clustering. The purpose of K-Medoid clustering is to separate the data into a certain number of "k" clusters. The concept of this cluster is based on the level of data similarity based on the Euclidean distance. The result of this K-Medoid clustering is that each respondent has a data label according to the class formed. From the results of the questionnaire, obtained data on the level of desire for UES for each variable from 35 sorghum entrepreneurs as respondents. Quantitative data obtained is then entered and then proceed with the clustering stage. The data is divided into several clusters based on the type of sorghum, products sold and sales results. After that, the cluster performance calculation is carried out by calculating the k-fold value. In the K-Medoids algorithm, the most important aspects are the number of classes determined, the cluster center, and the number of iterations. For the clustering calculation process, it can be seen in Figure 3.

Testing the effect of the k-fold value is carried out using the value of k-fold = 2 to k-fold = 10. At each k-fold, input the values K=1 to K=10. The results of testing the effect of the k-fold value produce different accuracy values so that the average value is calculated to determine the best accuracy. The conclusion from the analysis of the results of testing the effect of the k-fold value is that the best percentage is found in the k-fold value = 6 with an accuracy value of 34.597%. In this test, the best k-fold value is not in one particular value because the graph results show that the percentage of accuracy has a value that fluctuates for each k-fold. The average result of testing the effect of the k-fold value can be seen in Figure 4. Based on the test of the effect of the K value and the effect of the k-fold value, there is no significant difference because the data is in the form of binary numbers. In addition, the symptoms in the training data do not show the dominant symptom equation even though the training data are in the same class. Conversely, the training data has many similarities in symptoms while the training data are in different classes

Fig. 4. Effect testing graph k-fold value

Clustering results can be used by UES to provide assistance to sorghum entrepreneurs based on the type of sorghum, products sold and sales proceeds, as can be seen in Figure 5.
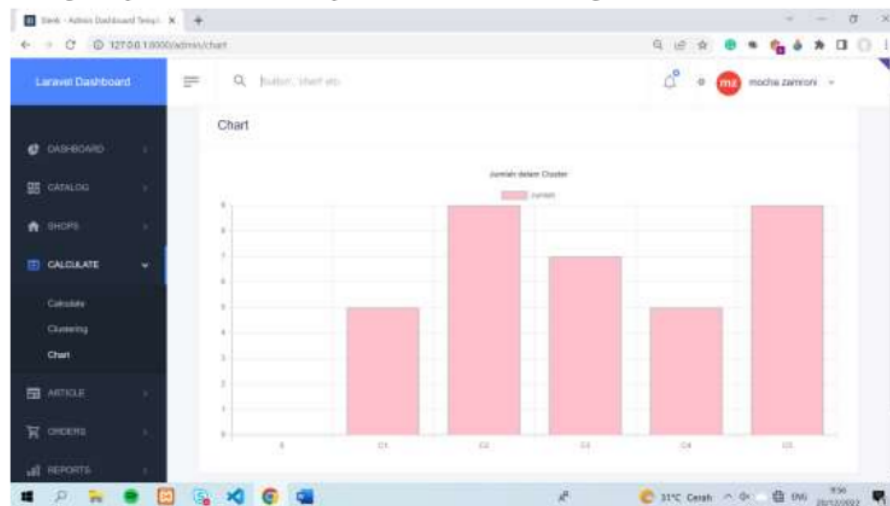

Fig. 5. Clustering Results in Sorghum Entrepreneur Marketplace

## IV. CONCLUSION

- The existence of a marketplace as a place of buying and selling, can facilitate and provide facilities for Sorghum Entrepreneurs in several cities in East Java Province in carrying out the process of buying and selling sorghum products to the wider community. This marketplace can also save costs because sorghum entrepreneurs get facilities to promote the sorghum products they sell. In addition, the presence of this marketplace can make it easier for the public to find out information on sorghum products and make the sorghum purchase process easy and real-time, thereby saving time in transactions.

- This Marketplace can provide information on classification results using the K-Medoid method to classify Sorghum Entrepreneurs based on the income that UES has earned.
- There is mapping information based on clustering results from sales of sorghum entrepreneurs so that it helps UES to provide assistance to sorghum entrepreneurs.

## ACKNOWLEDGMENT

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