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Regional Data Mining Implementation Of Contraceptive Equipment Users In The City Of Binjai By Type Using Clustering method

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Abstract

The government of the Binjai City BKKBN Office is one of the institutions responsible for controlling population growth and family planning in Indonesia which has a long-term impact that will occur if the family planning program is not implemented properly, there will be a population explosion and will cause various problems, including declining degree of health, social welfare, economic and cultural issues. Therefore, it is important to understand about contraception which will be useful in assisting the community in regulating birth rates and improving the quality of life, how contraceptives are used in Binjai City and how the levels of their use vary by region. This study aims to identify areas that use contraceptives in Binjai City based on the type of contraceptive used and to provide useful information for the government and health organizations in making policies and programs that benefit the community. Based on the results of the research conducted using a sample of 20 data, the results obtained from the data group are 12 data with the area group of contraceptive users in Binjai City based on their type with Age (X) being 18-25 years, and for the Kelurahan group (Y) is Binjai , and the type of contraception (Z) injection for family planning.

Keywords: *Data Mining, K-Means Algorithm, Contraceptives*

1. Introduction

Contraceptives are a method to help people regulate birth rates and improve quality of life. Therefore, it is important to understand how contraceptives are used in Kota Binjai and how usage rates vary by region. The government of the Binjai City BKKBN Office is one of the institutions responsible for controlling population growth and family planning in Indonesia which has a long-term impact that will occur if the family planning program is not implemented properly, there will be a population explosion and will cause various problems, including declining degree of health, social welfare, economic and cultural issues.

Using data mining methods, such as clustering, can assist the BKKBN in classifying areas of contraceptive use users based on their type and facilitate descriptions of contraceptive use in Binjai City. it also helps the government and health organizations to make policies and programs that are more appropriate and effective to assist the community in managing birth rates and quality of life levels. There are several types of contraceptives, including: Hormonal contraceptives, such as birth control pills, birth control injections, and birth control implants, Mechanical contraceptives, such as condoms and diaphragms, Barrier contraceptives, such as condoms and sperm, Intrauterine contraceptives, such as IUDs, Devices sterilization contraception, such as female sterilization and male sterilization, natural contraceptive methods, such as the observation method of fertility estimation and the rhythm method.
Based on the identification of the problems above, how do researchers implement data mining to identify and classify contraceptive user areas in Binjai City based on the type of contraceptive used using the clustering method.

2. Research Methods

2.1. Definition of Implementation

Implementation is a process or activity to implement or carry out a plan or concept into concrete actions in an appropriate environment or context. Implementation can also be interpreted as the implementation or execution of a policy, program or project with the aim of achieving

the desired results. In the context of information technology, implementation is often used to refer to the process of installing, configuring and testing applications or systems that have been created. (KBBI Web)

2.2. Definition of Data Mining

Data Mining is a process for finding hidden patterns and useful information from large and complex data sets. The main goal of data mining is to extract new knowledge or useful information from existing data, which may not be detected by manual analysis alone. The following is a definition of the meaning of data mining according to experts

Data mining is a step in the KDD process that consists of applying data analysis and discovery algorithms that generate calculations of certain patterns or models through data. (Fromin et al., 2020) in his research explained that there are several steps in the KDD (Knowledge Discovery in Database) process including selection, preprocessing, transformation, data mining, and interpretation/evaluation sequentially.

According to (Ryan et al., 2013a) data mining is the process of obtaining useful information from a large database and needs to be extracted so that it becomes new information and can assist in decision making. Data mining is the process of analyzing data from different sources and concluding it into important information or knowledge or patterns to increase profits, reduce costs, or even both.

2.3. Definition of K-means Algorithm

According to (Ariana, 2016) some of the simplest and most commonly known clustering techniques are k-means clustering. In this technique we want to group objects into k or cluster groups. To do this cluster the value of k must be determined first. The algorithm is:

1. Determine the desired number of clusters (K).
2. Choose K centers at random, each representing the starting point of K clusters.
3. For each data in the dataset, calculate the distance between the data points and each cluster center point.
4. Assign each data to the cluster with the closest central point.
5. Calculate the average data in each cluster to get a new center point.
   The Eunclidean Distance Formula

$$(x,y) = |x - y| = \sqrt{\sum}(\text{xi} - \text{yi})^2 \; n \; i{=}1 \qquad (1)$$

Where:
x: The first data point
y: Second data point
n: Number of characteristics (attributes) in data mining
d(x,y) : Euclidean distance, namely the data distance at point x and point y using mathematical calculations.

2.4. Clustering

The clustering method is a data analysis technique used to group data into several groups or clusters based on similarities between data in the same cluster and differences between data between different clusters. The clustering method can be used to group contraceptive users based on characteristics such as age, education, marital status, number of children, and other factors that influence the choice of contraceptives. With this grouping, we can find patterns in the use of contraceptives and the factors that influence the choice of contraceptives in each cluster. By using clustering, we can identify dense areas, determine overall distribution patterns and find interesting affinities between data attributes. In data mining, efforts are focused on finding methods for clustering on large databases effectively and efficiently. (Ryan, 2019).

2.5. Contraceptive Devices

Contraception is taken from the word contra and conception, where contra means "fight" or "prevent" and conception means meeting a mature egg with sperm which results in pregnancy. So contraception can be interpreted as efforts to prevent pregnancy (Armawati, 2021) Contraception is an effort to prevent pregnancy. these efforts can be temporary and can be permanent (Sari, 2021).
The following are some types of contraceptives that are commonly used:

1. The contraceptive pill: the contraceptive pill is a type of hormonal contraception that contains the hormone progesterone or estrogen. The contraceptive pill works by preventing ovulation or the release of an egg from the ovary.
2. Condom: Condom is a thin shield that is placed on the penis or in the vagina to prevent sperm from entering the vagina or female reproductive tract.
3. Family planning injections: family planning injections are a type of hormonal contraceptive that is given by injection. This injection contains the hormone progesterone and aims to prevent ovulation.
4. Implant: The implant is a hormonal contraceptive in a small, flexible form that is placed under the skin of the upper arm. This implant contains the hormone progesterone and works to prevent ovulation.
5. Intrauterine device (IUD): The IUD is a contraceptive device that is placed in the uterus to prevent pregnancy. The IUD can be made of a material such as copper or plastic and works by making the environment less conducive to sperm.
6. Spiral: Spiral is a type of IUD that is shaped like the letter T and is placed in the uterus to prevent pregnancy.
7. Natural contraceptive methods: Natural contraceptive methods involve monitoring a woman's menstrual cycle and limiting sexual intercourse during the woman's fertile period.
8. The choice of type of contraceptive depends on individual needs and health conditions, so it is best to consult a doctor or health professional before choosing the right type of contraception

3. Results AndDiscussion

3.1. Research Methods

In this research process it is aimed at providing more meaningful results and being able to easily handle groupings so that there are no errors in grouping areas for contraceptive use in Binjai City and overcoming problems in data that occur in the information services provided. The basis of the method in this study can be made a flow of activities as shown below:

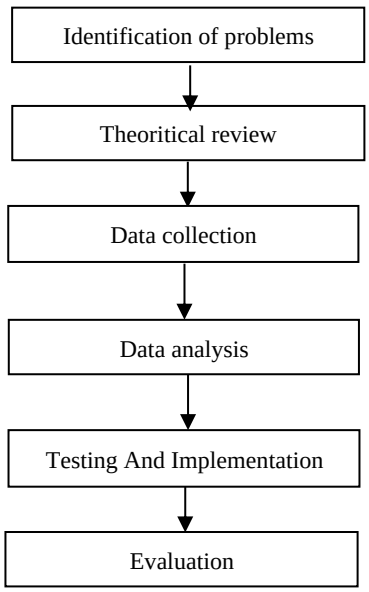

Fig. 1: Research Workflow

Based on the picture above, it can be seen that there are several stages in completing the research, namely:

1. Problem identification, this stage is the initial stage in research, namely determining the background of the problem, the objectives and benefits of the research so that it does not get out of the discussion.
2. Theoretical Study, this stage is to look for information, sources related to the problems faced both from literature studies, journals and the internet as a support and basic basis for thesis writing.
3. Data Collection, this stage is carried out by collecting supporting data and the main data needed in the system design process regarding the data obtained.
4. Data Analysis, this stage is the stage of processing and analyzing the data that has been obtained so that the data can be grouped according to the specified variables.
5. Testing and Implementation, this stage is the stage that tests the validation and implementation of the data that has been previously analyzed and the preparation of the program.
6. Evaluation, this stage is the stage of drawing conclusions and suggestions that can be made in preparing the thesis. With the conclusion, the results of the entire thesis will be known and it is hoped that with suggestions there will be improvements and benefits for others.

3.2. Flowchart Design

The process design that will be built in grouping contraceptive user data using the clustering method will have a flowchart description as follows:

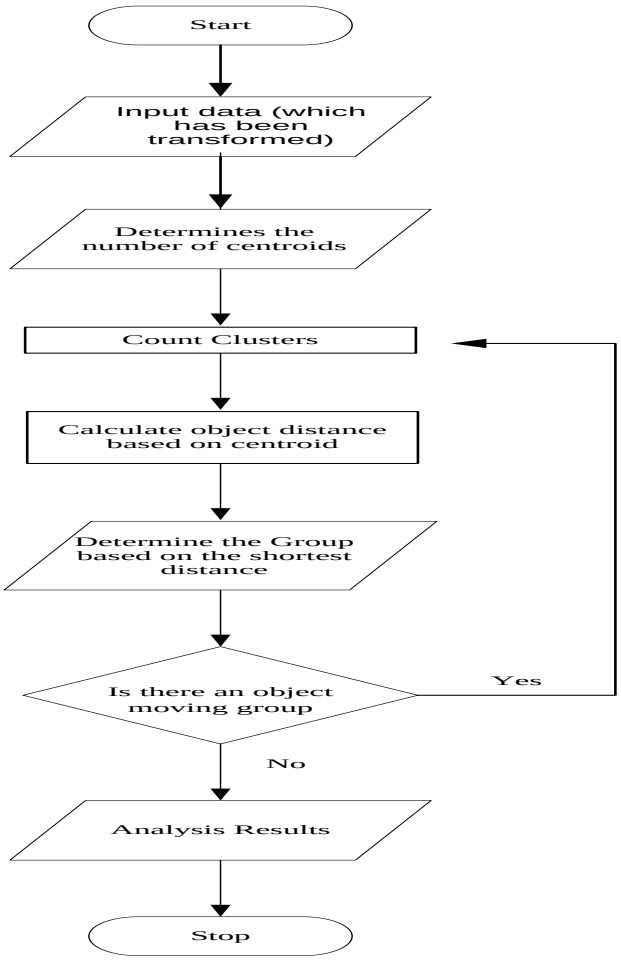

Fig. 2: Flowchart System

3.3. Application of the K-Meands Algorithm Method

To determine the group of one object, the first thing to do is measure the Deuclidean distance between two points or objects or X and Y which are defined as follows:

$$Deuclidean\ (\mathrm{X,Y}) = \sqrt{(X1 - Y2)^2}$$

Table 1: Contraceptive User Data

No.	Name	Age	Ward	Types Of Contraception
1	A	25	Binjai Week	Implant
2	B	22	Knight	Implant
3	C	22	Loyal	IUD
4	D	26	Barracks	IUD
5	E	21	Bergamm	Permanent KB
6	F	27	Barracks	Permanent KB
7	G	29	Binjai	Condom
8	H	23	Loyal	Condom
9	I	39	Kartini	Natural Contraception
10	J	20	Bergamm	Contraceptive Pills
11	K	22	Barracks	Contraceptive Pills
12	L	27	Bergamm	KB injection
13	M	34	Bergamm	KB injection
14	N	21	Kartini	KB injection
15	O	29	Kartini	KB injection
16	P	30	Kartini	KB injection
17	Q	20	Binjai Week	KB injection

18	R	33	Binjai Week	KB injection
19	S	19	Barracks	KB injection
20	T	31	Barracks	KB injection

Table 2: Age

code	Age (X)
1	18-25 year old
2	26-35 year old
3	≥ 36 year old

Table 1: ward

code	ward (Y)
1	Bergamm
2	Binjai
3	Kartini
4	Binjai Week
5	Knight
6	Loyal
7	Barracks

Table 2: Types of Contraception

code	Types of Contraception (Z)
1	Contraceptive Pills
2	Condom
3	KB injection
4	Implant
5	IUD *(Intra-Uterine Device)*
6	Natural Contraception
7	Permanent KB

The next stage is that data of non-nominal data types such as age, address, and type of contraception must first be initialized in the form of numbers. Data on the use of contraceptives can be expressed in an independent variable, namely age (X), village (Y), and type of contraception (Z).

Table 3: Data Transformation

No	Name	Age (x)	Ward (y)	Types of Contraception (z)
1	A	1	4	4
2	B	1	5	4
3	C	1	6	5
4	D	2	7	5
5	E	1	1	7
6	F	2	7	7
7	G	2	2	2
8	H	1	6	2
9	I	3	3	6
10	J	1	1	1
11	K	1	7	1
12	L	2	1	3
13	M	2	1	3
14	N	1	3	3
15	O	2	3	3
16	P	2	3	3
17	Q	1	4	3
18	R	2	4	3
19	S	1	7	3
20	T	2	7	3

The next step is to calculate the data based on the k-means clustering algorithm
Iteration 1
Centroid 1 = (1, 4, 4) is taken randomly from data 1
Centroid 2 = (1, 5, 4) is taken randomly from data 2
Centroid 3 = (1, 6, 5) is taken randomly from data 3
Information:
The centroid value is taken randomly from the transformed data.
Part A (1, 4, 4)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(1-1)^2 + (4-4)^2 + (4-4)^2} = 0$
Distance fromC2 (Y) = $\sqrt{(1-1)^2 + (4-5)^2 + (4-4)^2} = 1$
Distance fromC3 (Z) = $\sqrt{(1-1)^2 + (4-6)^2 + (4-5)^2} = 2.24$

Part B (1, 5, 4)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(1-1)^2 + (5-4)^2 + (4-4)^2} = 1$
Distance fromC2 (Y) = $\sqrt{(1-1)^2 + (5-5)^2 + (4-4)^2} = 0$
Distance fromC3 (Z) = $\sqrt{(1-1)^2 + (5-6)^2 + (4-5)^2} = 1.41$

Part C (1, 6, 5)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(1-1)^2 + (6-4)^2 + (5-4)^2} = 2.24$
Distance fromC2 (Y) = $\sqrt{(1-1)^2 + (6-5)^2 + (5-4)^2} = 1.41$
Distance fromC3 (Z) = $\sqrt{(1-1)^2 + (6-6)^2 + (5-5)^2} = 0$

Part D (2, 7, 5)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(2-1)^2 + (7-4)^2 + (5-4)^2} = 3.32$
Distance fromC2 (Y) = $\sqrt{(2-1)^2 + (7-5)^2 + (5-4)^2} = 2.45$
Distance fromC3 (Z) = $\sqrt{(2-1)^2 + (7-6)^2 + (5-5)^2} = 1.41$

Part E (1, 1, 7)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(1-1)^2 + (1-4)^2 + (7-4)^2} = 4.24$
Distance fromC2 (Y) = $\sqrt{(1-1)^2 + (1-5)^2 + (7-4)^2} = 5$
Distance fromC3 (Z) = $\sqrt{(1-1)^2 + (1-6)^2 + (7-5)^2} = 5.39$

Part F (2, 7, 7)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(2-1)^2 + (7-4)^2 + (7-4)^2} = 4.36$
Distance fromC2 (Y) = $\sqrt{(2-1)^2 + (7-5)^2 + (7-4)^2} = 3.74$
Distance fromC3 (Z) = $\sqrt{(2-1)^2 + (7-6)^2 + (7-5)^2} = 2.45$

Part G (2, 2, 2)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(2-1)^2 + (2-4)^2 + (2-4)^2} = 3$
Distance fromC2 (Y) = $\sqrt{(2-1)^2 + (2-5)^2 + (2-4)^2} = 3.74$
Distance fromC3 (Z) = $\sqrt{(2-1)^2 + (2-6)^2 + (2-5)^2} = 5.10$

Part H (1, 6, 2)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(1-1)^2 + (6-4)^2 + (2-4)^2} = 2.83$
Distance fromC2 (Y) = $\sqrt{(1-1)^2 + (6-5)^2 + (2-4)^2} = 2.24$
Distance fromC3 (Z) = $\sqrt{(1-1)^2 + (6-6)^2 + (2-5)^2} = 3$

Part I (3, 3, 6)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(3-1)^2 + (3-4)^2 + (6-4)^2} = 3$
Distance fromC2 (Y) = $\sqrt{(3-1)^2 + (3-5)^2 + (6-4)^2} = 3.46$
Distance fromC3 (Z) = $\sqrt{(3-1)^2 + (3-6)^2 + (6-5)^2} = 3.74$

Part J (1, 1, 1)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(1-1)^2 + (1-4)^2 + (1-4)^2} = 4.24$
Distance fromC2 (Y) = $\sqrt{(1-1)^2 + (1-5)^2 + (1-4)^2} = 5$
Distance fromC3 (Z) = $\sqrt{(1-1)^2 + (1-6)^2 + (1-5)^2} = 6.40$

Part K (1, 7, 1)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(1-1)^2 + (7-4)^2 + (1-4)^2} = 4.24$
Distance fromC2 (Y) = $\sqrt{(1-1)^2 + (7-5)^2 + (1-4)^2} = 3.61$
Distance fromC3 (Z) = $\sqrt{(1-1)^2 + (7-6)^2 + (1-5)^2} = 4.12$

Part L (2, 1, 3)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(2-1)^2 + (1-4)^2 + (3-4)^2} = 3.32$
Distance fromC2 (Y) = $\sqrt{(2-1)^2 + (1-5)^2 + (3-4)^2} = 4.24$
Distance fromC3 (Z) = $\sqrt{(2-1)^2 + (1-6)^2 + (3-5)^2} = 5.48$

Part M (2, 1, 3)

K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(2-1)^2+(1-4)^2+(3-4)^2} = 3.32$
Distance fromC2 (Y) = $\sqrt{(2-1)^2+(1-5)^2+(3-4)^2} = 4.24$
Distance fromC3 (Z) = $\sqrt{(2-1)^2+(1-6)^2+(3-5)^2} = 5.48$

Part N (1, 1, 3)
K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(1-1)^2+(1-4)^2+(3-4)^2} = 1.41$
Distance fromC2 (Y) = $\sqrt{(1-1)^2+(1-5)^2+(3-4)^2} = 2.24$
Distance fromC3 (Z) = $\sqrt{(1-1)^2+(1-6)^2+(3-5)^2} = 3.61$

Part O (2, 3, 3)
K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(2-1)^2+(3-4)^2+(3-4)^2} = 1.73$
Distance fromC2 (Y) = $\sqrt{(2-1)^2+(3-5)^2+(3-4)^2} = 2.24$
Distance fromC3 (Z) = $\sqrt{(2-1)^2+(3-6)^2+(3-5)^2} = 3.61$

Part P (2, 3, 3)
K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(2-1)^2+(3-4)^2+(3-4)^2} = 1.73$
Distance fromC2 (Y) = $\sqrt{(2-1)^2+(3-5)^2+(3-4)^2} = 2.24$
Distance fromC3 (Z) = $\sqrt{(2-1)^2+(3-6)^2+(3-5)^2} = 3.61$

Part Q (1, 4, 3)
K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(1-1)^2+(4-4)^2+(3-4)^2} = 1$
Distance fromC2 (Y) = $\sqrt{(1-1)^2+(4-5)^2+(3-4)^2} = 1.41$
Distance fromC3 (Z) = $\sqrt{(1-1)^2+(4-6)^2+(3-5)^2} = 2.83$

Part R (2, 4, 3)
K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(2-1)^2+(4-4)^2+(3-4)^2} = 1.41$
Distance fromC2 (Y) = $\sqrt{(2-1)^2+(4-5)^2+(3-4)^2} = 1.73$
Distance fromC3 (Z) = $\sqrt{(2-1)^2+(4-6)^2+(3-5)^2} = 3$

Part S (1, 7, 3)
K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(1-1)^2+(7-4)^2+(3-4)^2} = 3.16$
Distance fromC2 (Y) = $\sqrt{(1-1)^2+(7-5)^2+(3-4)^2} = 2.24$
Distance fromC3 (Z) = $\sqrt{(1-1)^2+(7-6)^2+(3-5)^2} = 2.24$

Part T (2, 7, 3)
K=3, centroid 1 = (1, 4, 4), centroid 2 = (1, 5, 4), centroid 3 = (1, 6, 5)
Distance fromC1 (X) = $\sqrt{(2-1)^2+(7-4)^2+(3-4)^2} = 3.32$
Distance fromC2 (Y) = $\sqrt{(2-1)^2+(7-5)^2+(3-4)^2} = 2.45$
Distance fromC3 (Z) = $\sqrt{(2-1)^2+(7-6)^2+(3-5)^2} = 2.45$

Table 6: Iteration Calculation Results 1

No	Nama	Age (x)	Ward (y)	Types of Contraception (z)	Distance fromC1	Distance fromC2	Distance fromC3	Group
1	A	1	4	4	0	1	2.24	1
2	B	1	5	4	1	0	1.41	2
3	C	1	6	5	2.24	1.41	0	3
4	D	2	7	5	3.32	2.45	1.41	3
5	E	1	1	7	4.24	5	5.39	1
6	F	2	7	7	4.36	3.74	2.45	3
7	G	2	2	2	3.00	3.74	5.10	1
8	H	1	6	2	2.83	2.24	3	2
9	I	3	3	6	3	3.46	3.74	1
10	J	1	1	1	4.24	5	6.40	1
11	K	1	7	1	4.24	3.61	4.12	2
12	L	2	1	3	3.32	4.24	5.48	1
13	M	2	1	3	3.32	4.24	5.48	1
14	N	1	3	3	1.41	2.24	3.61	1
15	O	2	3	3	1.73	2.45	3.74	1
16	P	2	3	3	1.73	2.45	3.74	1
17	Q	1	4	3	1	1.41	2.83	1
18	R	2	4	3	1.41	1.73	3	1
19	S	1	7	3	3.16	2.24	2.24	2
20	T	2	7	3	3.32	2.45	2.45	2

Information:
1. If the centroid 1 is smaller then the cluster results enter group 1.

2. If the centroid 2 is smaller then the cluster results enter group 2.
3. If the centroid 3 is smaller then the cluster results enter group 3
Old group : {0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0}
New group : {1,2,3,3,1,3,1,2,1,1,2,1,1,1,1,1,1,2,2}
There is a group change, then proceed to the next iteration:
For group 1 there are 12 data;
C1 1 = (1+1+2+3+1+2+2+1+2+2+1+2)/12 = 1.66
C1 2 = (4+1+2+3+1+1+1+3+3+3+4+4)/12 =2.50
C1 3 = (4+7+2+6+1+3+3+3+3+3+3+3)/12 = 3.41
For group 2 there are 5 data;
C1 1 = (1+1+1+1+2)/5 = 1.20
C1 2 = (5+6+7+7+7)/5 = 6.40
C1 3 = (4+2+1+3+3)/5 = 2.60
For group 2 there are 3 data;
C1 1 = (1+2+2)/3 = 1.66
C1 2 = (6+7+7)/3 = 6.66
C1 3 = (5+5+7)/3 = 5.66

Iterasi 2

Centroid 1 = (1.66, 2.50, 3.41)
Centroid 2 = (1.20, 6.40, 2.60)
Centroid 3 = (1.66, 6.66, 5.66)

Part A (1, 4, 4)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(1-1.66)^2+(4-2.50)^2+(4-3.41)^2}$ = 1.71
Distance fromC2 (Y) = $\sqrt{(1-1.20)^2+(4-6.40)^2+(4-2.60)^2}$ = 2.79
Distance fromC3 (Z) = $\sqrt{(1-1.66)^2+(4-6.66)^2+(4-5.66)^2}$ = 3.20

Part B (1, 5, 4)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(1-1.66)^2+(5-2.50)^2+(4-3.41)^2}$ = 2.65
Distance fromC2 (Y) = $\sqrt{(1-1.20)^2+(5-6.40)^2+(4-2.60)^2}$ = 1.99
Distance fromC3 (Z) = $\sqrt{(1-1.66)^2+(5-6.66)^2+(4-5.66)^2}$ = 2.644

Part C (1, 6, 5)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(1-1.66)^2+(6-2.50)^2+(5-3.41)^2}$ = 3.90
Distance fromC2 (Y) = $\sqrt{(1-1.20)^2+(6-6.40)^2+(5-2.60)^2}$ = 2.44
Distance fromC3 (Z) = $\sqrt{(1-1.66)^2+(6-6.66)^2+(5-5.66)^2}$ = 1.14

Part D (2, 7, 5)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(2-1.66)^2+(7-2.50)^2+(5-3.41)^2}$ = 4.78
Distance fromC2 (Y) = $\sqrt{(2-1.20)^2+(7-6.40)^2+(5-2.60)^2}$ = 2.60
Distance fromC3 (Z) = $\sqrt{(2-1.66)^2+(7-6.66)^2+(5-5.66)^2}$ = 0.82

Part E (1, 1, 7)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(1-1.66)^2+(1-2.50)^2+(7-3.41)^2}$ = 3.95
Distance fromC2 (Y) = $\sqrt{(1-1.20)^2+(1-6.40)^2+(7-2.60)^2}$ = 6.97
Distance fromC3 (Z) = $\sqrt{(1-1.66)^2+(1-6.66)^2+(7-5.66)^2}$ = 5.85

Part F (2, 7, 7)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(2-1.66)^2+(7-2.50)^2+(7-3.41)^2}$ = 5.77
Distance fromC2 (Y) = $\sqrt{(2-1.20)^2+(7-6.40)^2+(7-2.60)^2}$ = 4.51
Distance fromC3 (Z) = $\sqrt{(2-1.66)^2+(7-6.66)^2+(7-5.66)^2}$ = 1.42

Part G (2, 2, 2)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(2-1.66)^2+(2-2.50)^2+(2-3.41)^2}$ = 1.53
Distance fromC2 (Y) = $\sqrt{(2-1.20)^2+(2-6.40)^2+(2-2.60)^2}$ = 4.51
Distance fromC3 (Z) = $\sqrt{(2-1.66)^2+(2-6.66)^2+(2-5.66)^2}$ = 5.94

Part H (1, 6, 2)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(1-1.66)^2+(6-2.50)^2+(2-3.41)^2}$ = 3.83
Distance fromC2 (Y) = $\sqrt{(1-1.20)^2+(6-6.40)^2+(2-2.60)^2}$ = 0.75
Distance fromC3 (Z) = $\sqrt{(1-1.66)^2+(6-6.66)^2+(2-5.66)^2}$ = 3.78

Part I (3, 3, 6)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)

Distance fromC1 (X) = $\sqrt{(3-1.66)^2+(3-2.50)^2+(6-3.41)^2}$ = 2.96
Distance fromC2 (Y) = $\sqrt{(3-1.20)^2+(3-6.40)^2+(6-2.60)^2}$ = 5.13
Distance fromC3 (Z) = $\sqrt{(3-1.66)^2+(3-6.66)^2+(6-5.66)^2}$ = 3.91

Part J (1, 1, 1)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(1-1.66)^2+(1-2.50)^2+(1-3.41)^2}$ = 2.91
Distance fromC2 (Y) = $\sqrt{(1-1.20)^2+(1-6.40)^2+(1-2.60)^2}$ = 5.64
Distance fromC3 (Z) = $\sqrt{(1-1.66)^2+(1-6.66)^2+(1-5.66)^2}$ = 7.36

Part K (1, 7, 1)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(1-1.66)^2+(7-2.50)^2+(1-3.41)^2}$ = 5.15
Distance fromC2 (Y) = $\sqrt{(1-1.20)^2+(7-6.40)^2+(1-2.60)^2}$ =1.72
Distance fromC3 (Z) = $\sqrt{(1-1.66)^2+(7-6.66)^2+(1-5.66)^2}$ = 4.72

Part L (2, 1, 3)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(2-1.66)^2+(1-2.50)^2+(3-3.41)^2}$ = 1.59
Distance fromC2 (Y) = $\sqrt{(2-1.20)^2+(1-6.40)^2+(3-2.60)^2}$ = 5.47
Distance fromC3 (Z) = $\sqrt{(2-1.66)^2+(1-6.66)^2+(3-5.66)^2}$ = 6.26

Part M (2, 1, 3)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(2-1.66)^2+(1-2.50)^2+(3-3.41)^2}$ = 1.59
Distance fromC2 (Y) = $\sqrt{(2-1.20)^2+(1-6.40)^2+(3-2.60)^2}$ = 5.47
Distance fromC3 (Z) = $\sqrt{(2-1.66)^2+(1-6.66)^2+(3-5.66)^2}$ = 6.26

Part N (1, 3, 3)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(1-1.66)^2+(3-2.50)^2+(3-3.41)^2}$ = 0.92
Distance fromC2 (Y) = $\sqrt{(1-1.20)^2+(3-6.40)^2+(3-2.60)^2}$ = 3.43
Distance fromC3 (Z) = $\sqrt{(1-1.66)^2+(3-6.66)^2+(3-5.66)^2}$ = 4.57

Part O (2, 3, 3)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(2-1.66)^2+(3-2.50)^2+(3-3.41)^2}$ = 0.73
Distance fromC2 (Y) = $\sqrt{(2-1.20)^2+(3-6.40)^2+(3-2.60)^2}$ = 3.52
Distance fromC3 (Z) = $\sqrt{(2-1.66)^2+(3-6.66)^2+(3-5.66)^2}$ = 4.54

Part P (2, 3, 3)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(2-1.66)^2+(3-2.50)^2+(3-3.41)^2}$ = 0.73
Distance fromC2 (Y) = $\sqrt{(2-1.20)^2+(3-6.40)^2+(3-2.60)^2}$ = 3.52
Distance fromC3 (Z) = $\sqrt{(2-1.66)^2+(3-6.66)^2+(3-5.66)^2}$ = 4.54

Part Q (1, 4, 3)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(1-1.66)^2+(4-2.50)^2+(3-3.41)^2}$ = 1.69
Distance fromC2 (Y) = $\sqrt{(1-1.20)^2+(4-6.40)^2+(3-2.60)^2}$ = 2.44
Distance fromC3 (Z) = $\sqrt{(1-1.66)^2+(4-6.66)^2+(3-5.66)^2}$ = 3.82

Part R (2, 4, 3)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(2-1.66)^2+(4-2.50)^2+(3-3.41)^2}$ = 1.59
Distance fromC2 (Y) = $\sqrt{(2-1.20)^2+(4-6.40)^2+(3-2.60)^2}$ = 2.56
Distance fromC3 (Z) = $\sqrt{(2-1.66)^2+(4-6.66)^2+(3-5.66)^2}$ = 3.78

Part S (1, 7, 3)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(1-1.66)^2+(7-2.50)^2+(3-3.41)^2}$ = 4.57
Distance fromC2 (Y) = $\sqrt{(1-1.20)^2+(7-6.40)^2+(3-2.60)^2}$ =0.75
Distance fromC3 (Z) = $\sqrt{(1-1.66)^2+(7-6.66)^2+(3-5.66)^2}$ = 2.76

Part T (2, 7, 3)

K=3, centroid 1 = (1.66, 2.50, 3.41), centroid 2 = (1.20, 6.40, 2.60), centroid 3 = (1.66, 6.66, 5.66)
Distance fromC1 (X) = $\sqrt{(2-1.66)^2+(7-2.50)^2+(3-3.41)^2}$ = 4.53
Distance fromC2 (Y) = $\sqrt{(2-1.20)^2+(7-6.40)^2+(3-2.60)^2}$ = 1.08
Distance fromC3 (Z) = $\sqrt{(2-1.66)^2+(7-6.66)^2+(3-5.66)^2}$ = 2.70

Table 7: Iteration Calculation Results 2

No	Name	Age (x)	Ward (y)	Types of Contraceptio (z)	Distance from C1	Distance fromC2	Distance fromC3	Group
1	A	1	4	4	1.74	2.79	3.20	1
2	B	1	5	4	2.65	1.99	2.44	2
3	C	1	6	5	3.90	2.44	1.14	3
4	D	2	7	5	4.78	2.60	0.82	3
5	E	1	1	7	3.95	6.97	5.85	1
6	F	2	7	7	5.77	4.51	1.42	3
7	G	2	2	2	1.53	4.51	5.94	1
8	H	1	6	2	3.83	0.75	3.78	2
9	I	3	3	6	2.96	5.13	3.91	1
10	J	1	1	1	2.91	5.64	7.36	1
11	K	1	7	1	5.15	1.72	4.72	2
12	L	2	1	3	1.59	5.47	6.26	1
13	M	2	1	3	1.59	5.47	6.26	1
14	N	1	3	3	0.92	3.43	4.57	1
15	O	2	3	3	0.73	3.52	4.54	1
16	P	2	3	3	0.73	3.52	4.54	1
17	Q	1	4	3	1.69	2.44	3.82	1
18	R	2	4	3	1.59	2.56	3.78	1
19	S	1	7	3	4.57	0.75	2.76	2
20	T	2	7	3	4.53	1.08	2.70	2

Old group :{1,2,3,3,1,3,1,2,1,1,2,1,1,1,1,1,1,2,2}
New group : {1,2,3,3,1,3,1,2,1,1,2,1,1,1,1,1,1,2,2}
Because in the 1st and 2nd iterations the cluster positions have not changed or there are similarities, the iteration calculations are stopped and the final results can be concluded as follows:

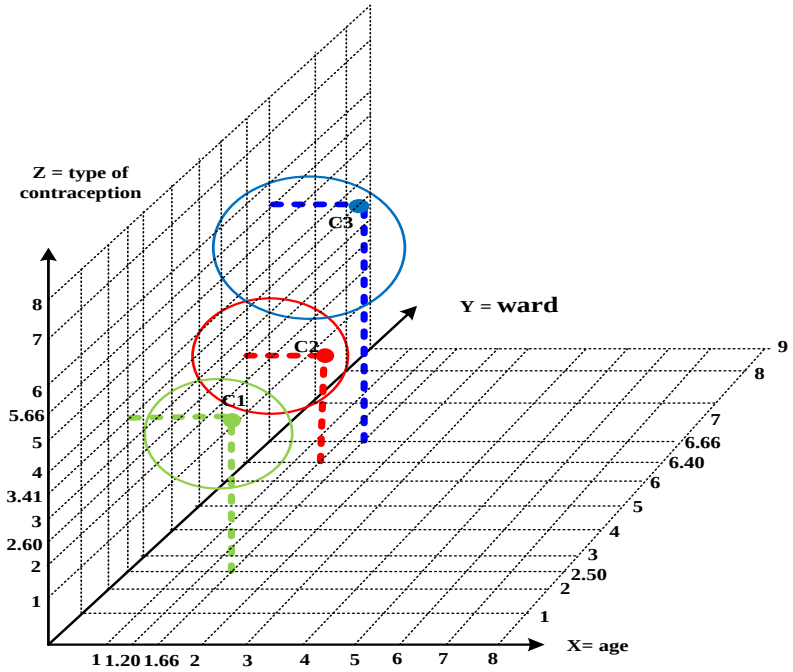

Fig. 3: Graph of contraceptive use

		x	y	z
	Centroid 1 :	(1.66),	(2.50),	(3.50)
	Centroid 2 :	(1.20),	(6.40),	(2.60)
	Centroid 3 :	(1.66),	(6.66),	(5.66)

4. Conclusion

From the 20 data, there are 3 groups, namely group 1 has 12 data and group 2 has 5 data and group 3 has 3 data. The explanations for the 3 groups are as follows:

1. Cluster 1 There are 12 Data (1.66; 2.50; 3.50;); Based on the calculation above, it can be seen that in cluster 1 the regional group of contraceptive users in Binjai city based on the type with Age (X) is 18-25 years, and for the Kelurahan group (Y) is Binjai, and the Type of Contraception (Z) is Injection KB.
2. Cluster 2 There are 5 Data (1.20; 6.40; 2.60;); Based on the calculation above, it can be seen that in cluster 2 the regional group of contraceptive users in Binjai City based on their type with Age (X) is 18-25 years, and for the Kelurahan group (Y) is Faithful, and Type of Contraception (Z) Condoms.
3. Cluster 3 There are 3 Data (1.66; 6.66; 5.66;); Based on the calculation above, it can be seen that in cluster 3 the regional group of contraceptive users in Binjai city based on the type with Age (X) is 18-25 years, and for the Kelurahan group (Y) is Faithful, and Type of Contraception (Z) IUD (Intra- Uterine Device).

References

[1] Amelia, R., Martanto, M., & Bahtiar, A. (2022). Penerapan Algoritma K-Means Clustering Pada Pengelompokkan Pasangan Usia Subur Peserta Kb Di Kabupaten Cirebon. *Jurnal Teknologi Technos cientia*, 9–14. https://doi.org/10.34151/technoscientia.v15i1.3849

[2] Anggiat, Y., Rizal Hermawan, J., Widianto, T. C., Anggraeni, S., & Saraswati, S. D. (2022). Data Mining Clustering Penyebaran Virus Covid-19 Berdasarkan Provinsi Di Indonesia Metode K-Means. *Jurnal Sistem Informasi Kaputama (JSIK)*, *6*(2).

[3] Ansori. (2015). Tahapan Data Mining. *Paper Knowledge. Toward a Media History of Documents*, *3*(April), 49–58.

[4] Ariana, R. (2016). Algoritma K-Means. Surabaya: Airlangga.

[5] Armawati. (2021). Gambaran penggunaan kontrasepsi pada pasangan usia subur (pus) di kota makassar. *Skripsi*.

[6] Fromin, M. A. P., Widowati, R., & Indrayani, T. (2020). Analisis Faktor Yang Mempengaruhi Konsistensi Penggunaan Kondom Pada Wanita Pekerja Seksual Di Yayasan Kusuma Buana Jakarta Selatan. *Jurnal Kesehatan Dan Kebidanan (Journal of Health and Midwifery)*, *9*(2), 1–8.

[7] Gustrianda, R., & Mulyana, D. I. (2022). Penerapan Data Mining Dalam Pemilihan Produk Unggulan dengan Metode Algoritma K-Means Dan K-Medoids. *Jurnal Media Informatika Budidarma*, *6* (1), 27. https://doi.org/10.30865/mib.v6i1.3294

[8] Hutagalung, J., Hendro Syahputra, Y., Pertiwi Tanjung, Z., Triguna Dharma, S., & Pintu Air, J. I. (2022). Pemetaan Siswa Kelas Unggulan Menggunakan Algoritma K-Means Clustering. *Jurnal Teknik Informatika Dan Sistem Informasi*, *9*(1). http://jurnal.mdp.ac.id

[9] Hasyim, F., & Muafi. (2022). Implementasi Data Mining Dalam Menentukan Strategi Promosi Program KB Menggunakan Algoritma K-Means Clustering. *Jurnal Kecerdasan Buatan, Komputasi Dan Teknologi Informasi*, *3*(1). https://ejournal.unuja.ac.id/index.php/core

[10] Mayona, Y., Buaton, R., & Simanjutak, M. (2022). Data Mining Clustering Tingkat Kejahatan Dengan Metode Algoritma K-Means (Studi Kasus : Kejaksaan Negeri Binjai). *Jurnal Informatika Kaputama (JIK)*, *6*(3).

[11] Muslihudin, muhammad, & oktafianto. (2016). *Analisis dan Perancangan Sistem Informasi* (A. Pramesta, Ed.; 1st ed.). CV. Andi Offset.

[12] Otong Kadang, M. (2021). *Algoritma dan Pemrograman* (Abd. K. Muzakir, Ed.; Pertama). Humanities Genius.

[13] Pa, P., Manaor Hara Pardede, A., & Rahmadani, S. (2022). Pengelompakan Data Pencari Kerja Terdaftar Berdasarkan Umur Dan Pendidikan Menggunakan Metode K-means Clustering Di Dinas Tenaga Kerja Dan Perindustrian Perdagangan Kota Binjai. *Jurnal Informatika Kaputama (JIK)*, *6*(3).

[14] Ryan Ahmadi Putra. (2019), "Implementasi Cluster Server Pada Raspberry Pi Dengan Menggunakan Metode Load Balancing," Komputika: Jurnal Sistem Komputer, vol. Vol.8, no. 1, pp. 37 - 43, April 2019.

[15] Sari, M. I. (2021). *Determinan Penggunaan Alat Kontrasepsi di Kelurahan Kalegowa Kabupaten Gowa Tahun 2021*.

[16] Sari, R. G., Agustina, E., and Riski, M. 2021. Hubungan Pendidikan, Usia dan Status Pekerjaan dengan Pemakaian Alat Kontrasepsi dalam Rahim (AKDR) di Puskesmas Pedamaran Kecamatan Pedamaran Kabupaten Oki Tahun 2019. Jurnal Ilmiah Universitas Batanghari Jambi, 21(1), p. 378. doi: 10.33087/jiubj.v21i1.1204.

[17] Tjolleng, A. (2017). *Pengantar pemrograman MATLAB* (M. S. A. Tjolleng, Ed.; 1st ed.). PT. Elex Media Komputindo. https://www.researchgate.net/publication/334945947

[18] https://kbbi.web.id/