Performance Analysis of the K-Medoids Algorithm in Clustering Able and Disabled Students at MAN 1 Panyabungan

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ABSTRACT

In implementing the Smart Indonesia Program (PIP), the problem faced at MAN 1 Panyabungan was that the school had difficulty in determining students who were entitled to receive the Smart Indonesia Program (PIP), this was due to the many criteria that had to be considered in determining aid recipients. The large amount of student data and the many variables used in determining recipients of the Smart Indonesia Program (PIP) have become an obstacle for MAN 1 Panyabungan. Classifying student data is very important because the process of determining scholarship recommendations involves various criteria that need to be considered and takes quite a long time, but the results do not necessarily provide the right and accurate decision. Implementing applications and systems can be a solution to speed up correct and fast decision making, and can provide the best results in selecting students according to the criteria set by the school. In grouping capable and incapable students, the K-Medoids algorithm is used. The criteria used in the data mining process are the average report card score, parents' occupation, income and number of parents' dependents.

Keyword : K-Medoids Algorithm, Data Mining, Students

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1. INTRODUCTION

The implementation of education in Indonesia has many challenges and obstacles, one of which is poverty. The problem of poverty is the main factor of the many factors that cause children to drop out of school. In fact, they have great potential to become the next generation of the nation. This is certainly very unfortunate. Therefore, the government has launched many assistance programs, one of which is the Smart Indonesia Program (PIP). PIP is a program that aims to eliminate obstacles for poor students to participate in school by helping poor students gain access to decent education, preventing dropouts, attracting poor students to return to school. Through this PIP program, it is hoped that school-age children from poor families can continue to go to school and enjoy education like other children.

In the implementation of the Smart Indonesia Program (PIP), the problem that occurred at MAN 1 Panyabungan was that the school had difficulty in determining recipients of the Smart Indonesia Program (PIP), this was due to the many criteria that had to be considered in determining recipients of assistance, for example the number of students, which amounted to hundreds of students, parents' income, parents' burden of responsibility, travel distance, and average grades on students' report cards. The large number of student data and the many variables used in determining recipients of the Smart Indonesia Program (PIP) became a separate obstacle for MAN 1 Panyabungan. Classifying student data has an important role, because in determining scholarship recommendations, the criteria that need to be considered and take a long time but do not necessarily get the right and accurate decision, so the school needs an effective and efficient system in a short time and an assessment is carried out by considering various criteria.

Then the school can group/cluster students who are able and unable, making it easier for the school to select recipients of PIP assistance. Clustering is the process of grouping data that has the same characteristics into one cluster. The hundreds of student data will later be divided into 2 groups or 2 clusters, namely the capable student cluster and the unable student cluster.

To solve this problem, a computerized system is needed that can dig up new information, namely using data mining. Data mining searches for new, valuable and useful information in a set of data by involving computers and humans and is iterative either through automatic or manual processes (Putri Mai et al., 2022). Data mining is a process that aims to extract and identify useful information and related knowledge from various large databases using statistics, mathematics, and machine learning. The application of data mining has been widely carried out in various fields of life including in the fields of health, information technology, industry and so on.

In this study, one of the data mining methods used is K-Medoids. K-Medoids is part of partitioning clustering. The K-Medoids method is quite efficient in small datasets. The initial step of K-Medoids is to find the most representative points (medoids) in the dataset by calculating the distance from the group in all possible combinations of medoids so that the distance between points in a cluster is small while the distance between points between clusters is large (Ivana Indriani et al., 2019). One of the advantages of the K-Medoids algorithm is that it overcomes the sensitivity to noise and outliers in K-Means, which can cause large objects to deviate from the data distribution (Gabriella, 2022).

2. RESEARCH METHOD

Research using quantitative methods means research that has met scientific principles, namely concrete/empirical, objective, measurable, rational, and systematic. Quantitative methods are also called discovery methods, because with this method it can be discovered and developed as new science and technology with research data in the form of numbers and statistical analysis. The types of data used in this study are primary data and secondary data. Primary data is the main data used in this study. Primary data was obtained through interviews and direct observation to MAN 1 Panyabungan to obtain information related to the clustering of able and unable students. As for secondary data, a dataset was collected in the form of a list of students along with criteria attributes such as parents' jobs, parents' income, and dependents and student report card scores. This dataset is needed as input data to build an analysis model and calculation of the data mining clustering application. This clustering data also functions as test data that will be classified by the system to produce optimal student grouping recommendation output.

3. RESULTS AND DISCUSSION

A. Data Description

Data collection is carried out to collect the data and information needed. The student data obtained will be tested using the K-Medoids Method, determining the grouping of capable and incapable students at MAN 1 Panyabungan. The following is a sample of research data used in the calculation of the K-Medoids method.

Table 1. Variable Initialization

No	Kode Kriteria	Nama Kriteria
1.	V1	Rata-rata nilai rapot
2.	V2	Pekerjaan orang tua
3.	V3	Penghasilan orang tua
4.	V4	Jumlah tanggungan

In this study, 2 classes of student data samples were used to be assessed using the K-Medoids method. The following are sample data presented in the study.

Table 2. Student Data Sample

No	Nama siswa	NISN	Rata2 nilai rapot	Pekerjaan	Penghasilan	Jlh tanggungan
1	Mhd faiz badillah	68868619	92.05	Dosen swasta	3,000,000	5
2	Roihan algifari lintang	86113752	94.26	Pegawai swasta	4,500,000	6
3	Sufyan sauri lubis	64738570	93	Pegawai swasta	4,726,100	3
4	Nurul ilmi	77877634	93.89	Wiraswasta	2,500,000	4

5	Mutiah	69780193	93.15	Wiraswasta	3,000,000	3
6	Sampe halimah	78659371	92.78	Petani	800,000	2
7	Sri wahyuni ramadani	65476139	93.21	Petani	1,000,000	6
8	Ipra hayati	74683928	93.52	Wiraswasta	2,500,000	3
9	Naimah jogina	62904493	93.57	Petani	3,000,000	3
10	Annisa auliani	78531107	93.42	Wiraswasta	4,000,000	6
11	Khodijah nasution	76882804	94.68	Petani	1,500,000	5
12	Abidah lubis	72460336	93.57	Pegawai swasta	5,000,000	2
13	Nazwa syakira	72479810	93.68	Wiraswasta	2,500,000	5
14	Riadotul jannah	79294560	93.68	Petani	1,500,000	4
15	Elsa kahairani	78545457	93.21	Wiraswasta	1,500,000	4
16	Zaitun azizah	72540708	93.4	Wiraswasta	1,500,000	3
17	Dina rumondang lubis	77751243	93.84	Pns	3,000,000	2
18	Robiatul adawiyah	63737872	93.78	Wiraswasta	1,000,000	3
19	Rizky hidayah	75910723	93.78	Petani	1,500,000	5
20	Riski muhusna nst	77191576	93.52	Wiraswasta	2,000,000	3
21	Anggina sri rahayu	30797404	93.63	Petani	1,500,000	2
22	Siti rahma	79688054	93.53	Pedagang	1,500,000	6
23	Mhd ihsan rangkuti	71151373	93.47	Wiraswasta	1,500,000	8
24	Nabila azzahra lubis	76467385	93.1	Wiraswasta	6,000,000	2
25	Ahmad rayhan parinduri	68729586	95	Perawat	10,000,000	3
26	Salsabila malayu	68730652	93.47	Berkebun	800,000	4
27	Muhd faiz badillah	68868619	92.05	Dosen swasta	3,000,000	5
28	Nazua syakira	72479818	93.68	Wirausaha	2,500,000	5
29	Abidah lubis	72460333	93.57	Pegawai swasta	5,000,000	2
30	Nisrah eyita	79460162	93.26	Wiraswasta	1,800,000	2
31	Rafli hakim	78788625	92.78	Wiraswasta	1,000,000	3
32	Syifa alilla hsb	74946636	92.68	Wiraswasta	1,500,000	4
33	Aldi rifki batubara	74087737	93.87	Pns	3,000,000	4
34	Ainin kholilah	78061979	93.42	Petani	2,000,000	3
35	Firja ariqo nst	71796308	92.42	Wiraswasta	3,000,000	3
36	Mawaddah	75501234	94.57	Wiraswasta	2,000,000	4
37	Annisa fitri	69816599	93.10	Petani	2,500,000	3
38	Kayla putri qanita	74339557	95.52	Wiraswasta	3,000,000	3
39	Fitri nabila	62433586	93.21	Petani	800,000	4

40	Pitri wahyuni	61155789	93.50	Wiraswasta	1,500,000	5
41	Nur adilah nst	77920498	94.00	Wiraswasta	3,000,000	2
42	Ananda riski apriliani	72456916	93.34	Pns	6,800,000	2
43	Putri sahra nasution	75651336	92.78	Pns	9,000,000	1
44	Ainin syakiah	71244915	94.54	Petani	2,000,000	6
45	Aulia sinta	74099626	94.23	Buruh harian lepas	1,200,000	3
46	Andra fitrah abdullah	73059866	93.90	Wiraswasta	10,000,000	5
47	Wilda masturoh nst	66109418	92.79	Pensiunan	2,000,000	5
48	Amaliyah madani	73646434	94.10	Asn	3,000,000	5
49	Imelda putri	61500949	94.10	Petani	1,500,000	5
50	Ulfa sari rumondang	73659485	93.36	Wirausaha	4,000,000	4
51	Nur laili	68676428	92.76	Petani	2,000,000	6
52	Audy aulila riski	75737779	93.23	Petani	1,000,000	5
53	Salsabila nst	64202618	93.78	Petani	2,000,000	5
54	Difa haninsyakila	30776904	94.52	Pns	3,000,000	4
55	Nur sakinah	79297806	92.78	Petani	3,000,000	6

B. K-Medoids Method Calculation

For the criteria of parental employment, the assessment rules are taken based on the range of parental employment, below is the data on the range of parental employment that will be used as the assessment range as stated in the table below:

Table 3. Parental Work Assessment Rules Table

Pekerjaan	**Konversi**
Petani/ Buruh	1
Pedagang/Wiraswasta	2
Dosen	3
ASN/ Pegawai	4
Perawat	5

For the Income criteria, the assessment rules are taken based on the Income value range, below is the Income range data that will be used as the assessment range as shown in the table below:

Table 4. Parental Income Assessment Rules Table

Range Penghasilan	**Konversi**
< Rp. 1.000.000	1
Rp. 1.000.000 - Rp. 2.000.000	2
Rp. 2.100.000 - Rp. 4.000.000	3
Rp. 4.100.000 - Rp. 6.000.000	4
> Rp. 6.000.000	5

Then the student data in Table 4 which is still in the form of original data is changed into a weighted form according to the table above, resulting in the Initial Medoid as follows:

Table 5. Student Data After Conversion

No	Nama Siswa	NISN	V1	V2	V3	V4
1	Mhd faiz badillah	68868619	92.05	3	3	5
2	Roihan algifari lintang	86113752	94.26	4	4	6

3	Sufyan sauri lubis	64738570	93	4	4	3
4	Nurul ilmi	77877634	93.89	2	3	4
5	Mutiah	69780193	93.15	2	3	3
6	Sampe halimah	78659371	92.78	1	1	2
7	Sri wahyuni ramadani	65476139	93.21	1	2	6
8	Ipra hayati	74683928	93.52	2	3	3
9	Naimah jogina	62904493	93.57	1	3	3
10	Annisa auliani	78531107	93.42	2	3	6
11	Khodijah nasution	76882804	94.68	1	2	5
12	Abidah lubis	72460336	93.57	4	4	2
13	Nazwa syakira	72479810	93.68	2	3	5
14	Riadotul jannah	79294560	93.68	1	2	4
15	Elsa kahairani	78545457	93.21	2	2	4
16	Zaitun azizah	72540708	93.4	2	2	3
17	Dina rumondang lubis	77751243	93.84	4	3	2
18	Robiatul adawiyah	63737872	93.78	2	2	3
19	Rizky hidayah	75910723	93.78	1	2	5
20	Riski muhusna nst	77191576	93.52	2	2	3
21	Anggina sri rahayu	30797404	93.63	1	2	2
22	Siti rahma	79688054	93.53	2	2	6
23	Mhd ihsan rangkuti	71151373	93.47	2	2	8
24	Nabila azzahra lubis	76467385	93.1	2	4	2
25	Ahmad rayhan parinduri	68729586	95	5	5	3
26	Salsabila malayu	68730652	93.47	1	1	4
27	Muhd faiz badillah	68868619	92.05	3	3	5
28	Nazua syakira	72479818	93.68	2	3	5
29	Abidah lubis	72460333	93.57	4	4	2
30	Nisrah eyita	79460162	93.26	2	2	2
31	Rafli hakim	78788625	92.78	2	2	3
32	Syifa alilla hsb	74946636	92.68	2	2	4
33	Aldi rifki batubara	74087737	93.87	4	3	4
34	Ainin kholilah	78061979	93.42	1	2	3
35	Firja ariqo nst	71796308	92.42	2	3	3
36	Mawaddah	75501234	94.57	2	2	4
37	Annisa fitri	69816599	93.10	1	3	3
38	Kayla putri qanita	74339557	95.52	2	3	3
39	Fitri nabila	62433586	93.21	1	1	4
40	Pitri wahyuni	61155789	93.50	2	2	5
41	Nur adilah nst	77920498	94.00	2	3	2
42	Ananda riski apriliani	72456916	93.34	4	5	2
43	Putri sahra nasution	75651336	92.78	4	5	1
44	Ainin syakiah	71244915	94.54	1	2	6
45	Aulia sinta	74099626	94.23	1	2	3
46	Andra fitrah abdullah	73059866	93.90	2	5	5

47	Wilda masturoh nst	66109418	92.79	4	2	5
48	Amaliyah madani	73646434	94.10	4	3	5
49	Imelda putri	61500949	94.10	1	2	5
50	Ulfa sari rumondang	73659485	93.36	2	3	4
51	Nur laili	68676428	92.76	1	2	6
52	Audy aulila riski	75737779	93.23	1	2	5
53	Salsabila nst	64202618	93.78	1	2	5
54	Difa haninsyakila	30776904	94.52	4	3	4
55	Nur sakinah	79297806	92.78	1	3	6

C. Interface Implementation

1. Admin Login Form

This form is a login form display to enter the main form by filling in the username and password. Here is the login form display below.

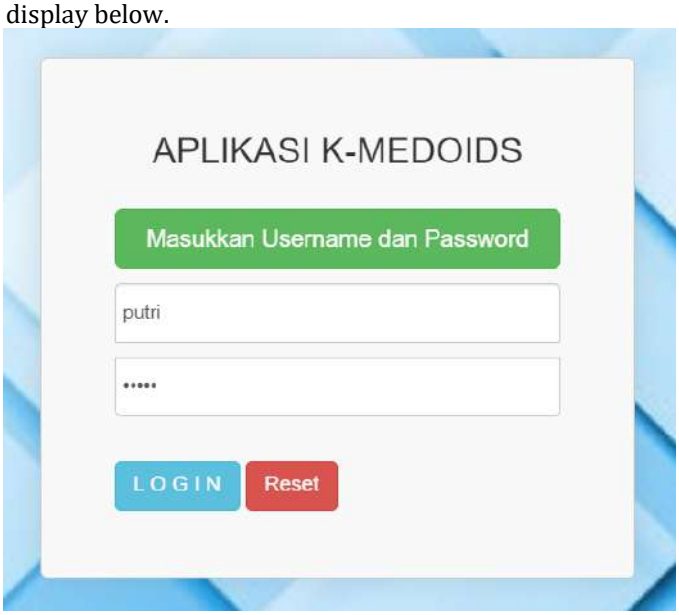


Fig 1. Admin Login Form

2. Home Page

The main page is the initial display of the decision support system application website page. On this page there are several navigation menus. Below is the display of the main page form.

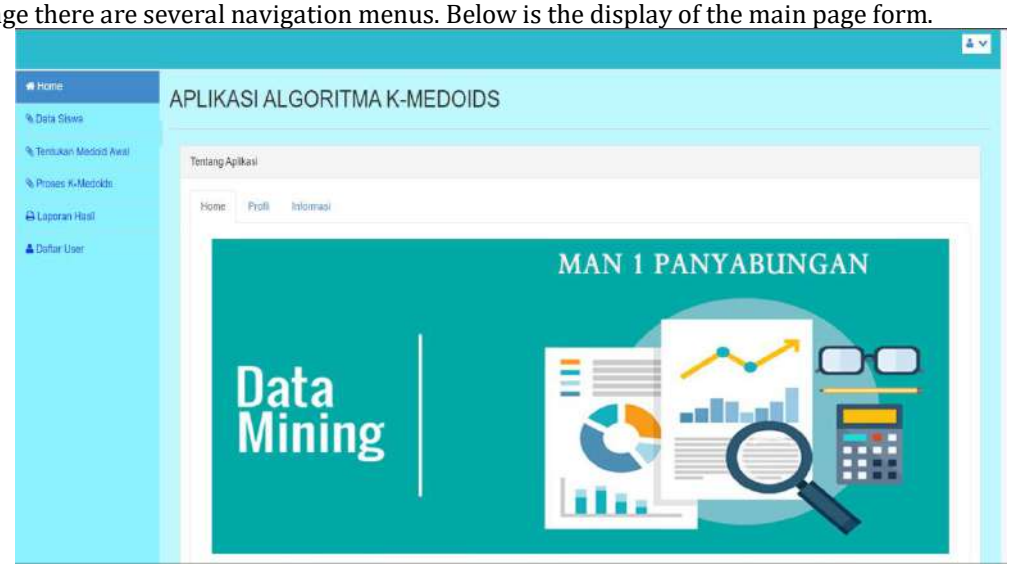


Fig 2. Home Page Display

3. Student Data Form

This display contains student data that functions as a medium for entering new student data and also editing and deleting student data. The form display is as follows:

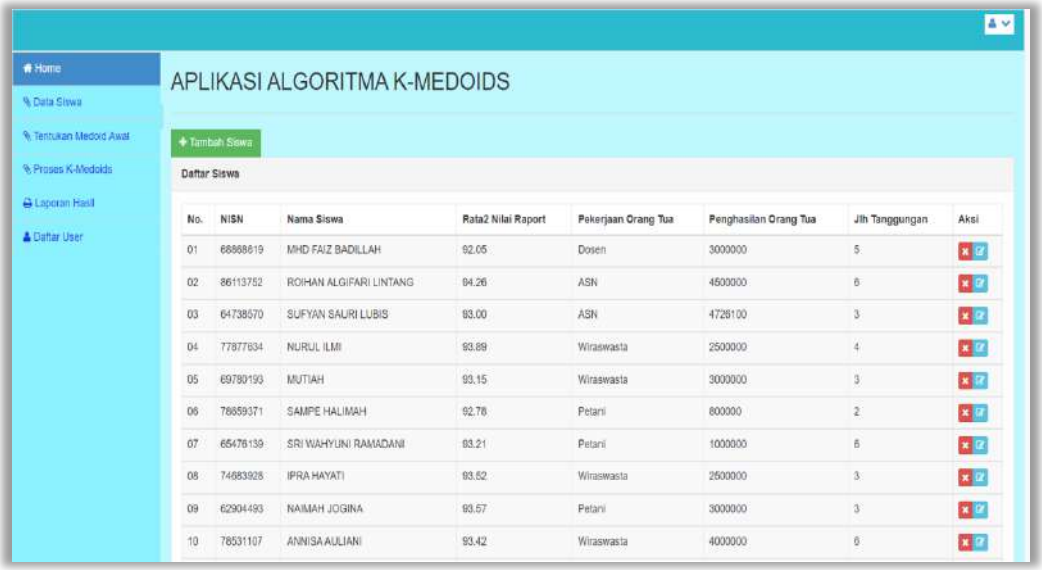


Fig 3. Student Data Form

To add student data, click the add button on the form. The following is a display of the student data input page.

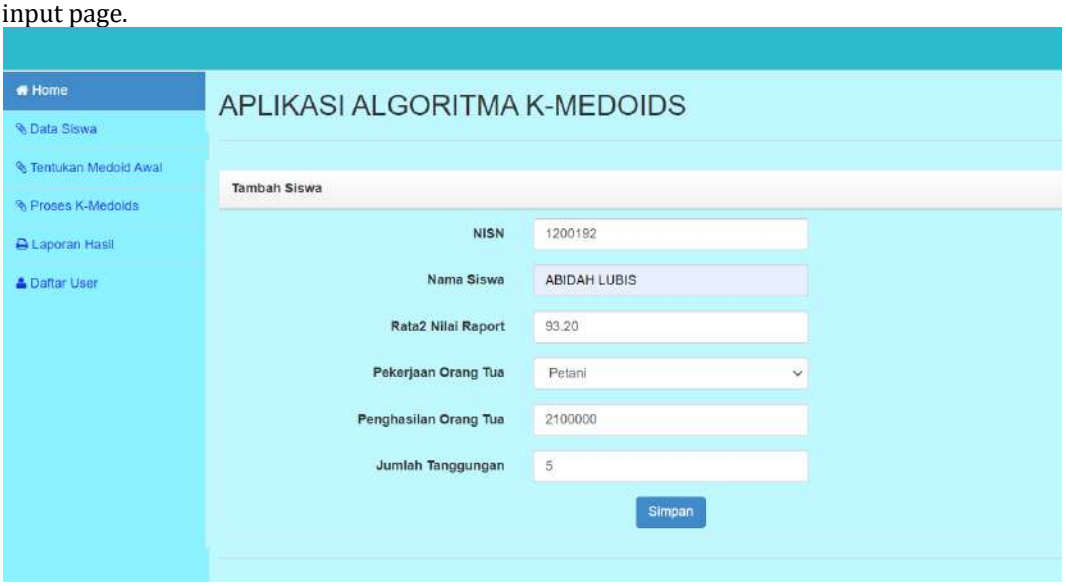
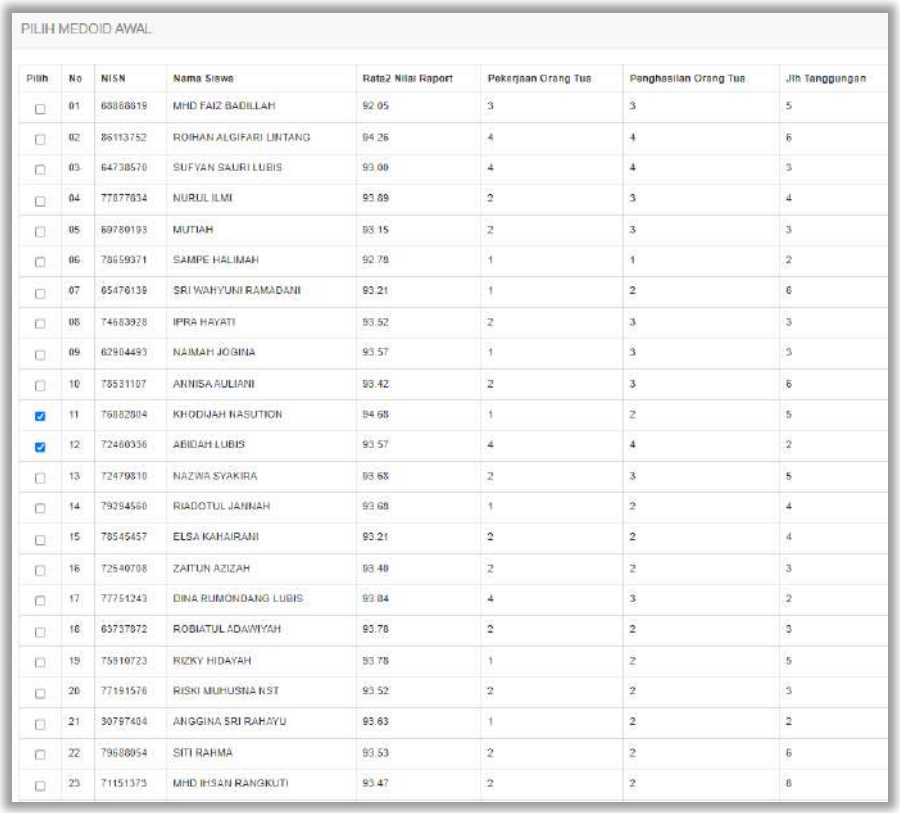


Fig 4. Student Data Input Display

4. Early Medoid Form

This initial medoid form display contains the determination of the initial medoid point which will be used as the basis for processing the data mining stages. The form display can be seen in the following image.


PILIH MEDOID AWAL

Pilih	No	NISN	Nama Siswa	Rata2 Nilai Raport	Pekerjaan Orang Tua	Penghasilan Orang Tua	Jlh Tanggungan
☐	01	68868619	MHD FAIZ BADILLAH	92.05	3	3	5
☐	02	86113752	ROIHAN ALGIFARI LINTANG	94.26	4	4	6
☐	03	64738570	SUFYAN SAURI LUBIS	93.00	4	4	3
☐	04	77877634	NURUL ILMI	93.89	2	3	4
☐	05	60780193	MUTIAH	93.15	2	3	3
☐	06	78659371	SAMPE HALIMAH	92.78	1	1	2
☐	07	65476139	SRI WAHYUNI RAMADANI	93.21	1	2	6
☐	08	74683928	IPRA HAYATI	93.52	2	3	3
☐	09	62904493	NAIMAH JOGINA	93.57	1	3	5
☐	10	78531107	ANNISA AULIANI	93.42	2	3	6
☑	11	76682804	KHODIJAH NASUTION	94.68	1	2	5
☑	12	72480336	ABIDAH LUBIS	93.57	4	4	2
☐	13	72479810	NAZWA SYAKIRA	93.68	2	3	5
☐	14	79294560	RIADOTUL JANNAH	93.68	1	2	4
☐	15	78545457	ELSA KAHAIRANI	93.21	2	2	4
☐	16	72540708	ZAITUN AZIZAH	93.40	2	2	3
☐	17	77751243	DINA RUMONDANG LUBIS	93.84	4	3	2
☐	18	63737872	ROBIATUL ADAWIYAH	93.78	2	2	3
☐	19	75910723	RIZKY HIDAYAH	93.78	1	2	5
☐	20	77191576	RISKI MUHUSNA NST	93.52	2	2	3
☐	21	30797404	ANGGINA SRI RAHAYU	93.63	1	2	2
☐	22	79688054	SITI RAHMA	93.53	2	2	6
☐	23	71151373	MHD IHSAN RANGKUTI	93.47	2	2	6

Fig 5. Early Medoid Form Display

5. K-Medoid Process Form

In the k-medoids process form, it is an interface display to perform k-medoids calculations from existing data. So that it will produce a cost value or medoid distance on each data.

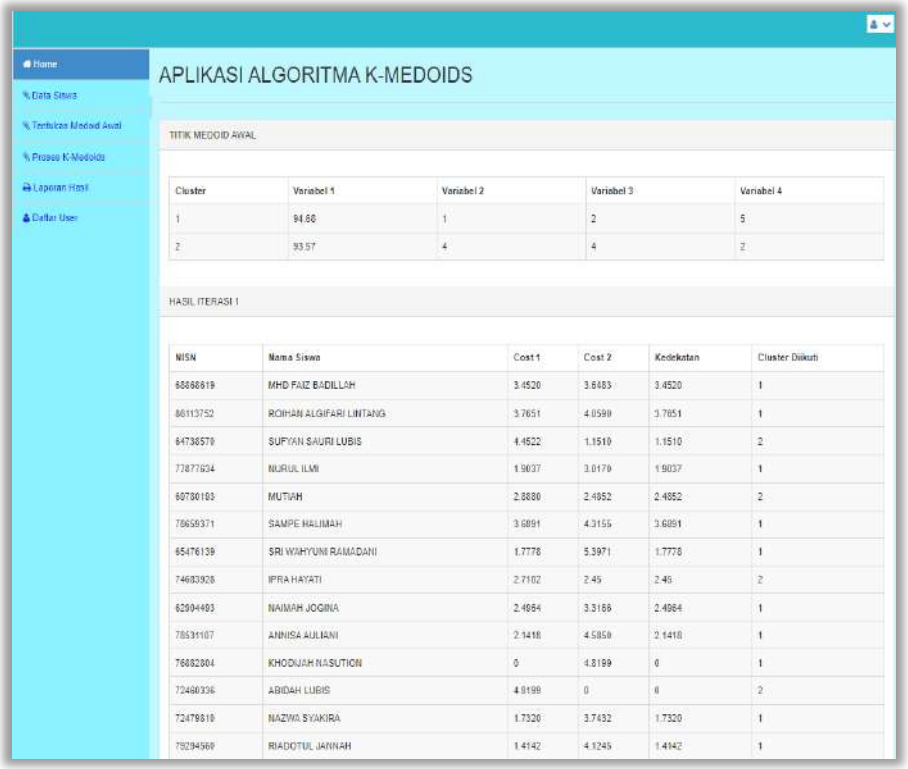
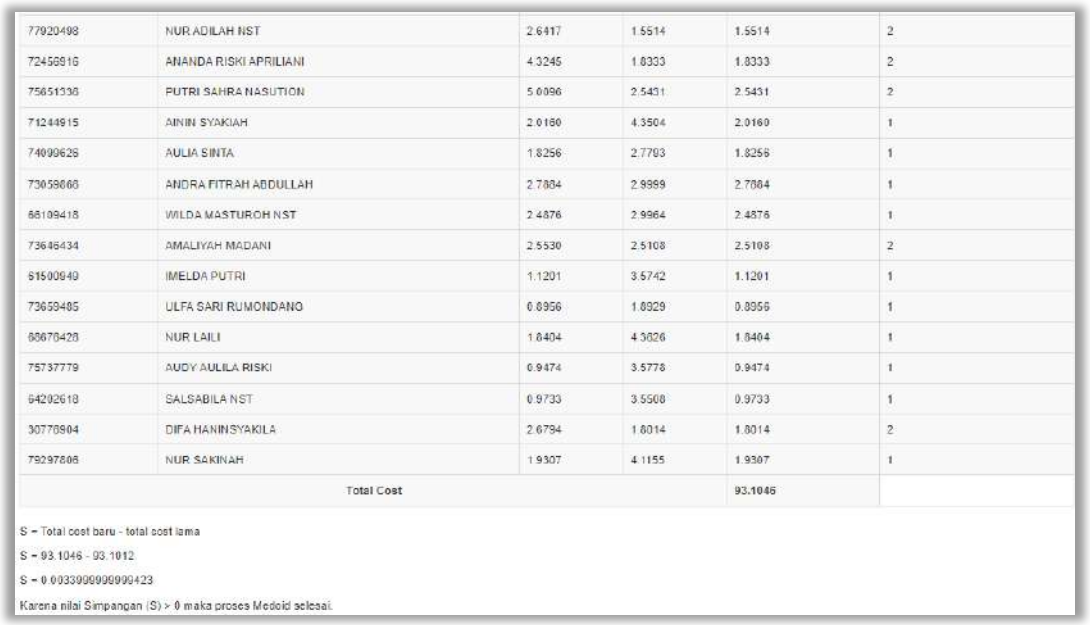


Fig 6. K-Medoids Calculation Display

6. Calculation Results Form Display

In the calculation result form is an interface display to display the results of the calculation data process from each data that has been entered into this system. The following is a picture of the implementation results of the calculation result form interface design, namely:



77920498	NUR ADILAH NST	2.6417	1.5514	1.5514	2
72456916	ANANDA RISKI APRILIANI	4.3245	1.8333	1.8333	2
75651336	PUTRI SAHRA NASUTION	5.0096	2.5431	2.5431	2
71244915	AININ SYAKIAH	2.0160	4.3504	2.0160	1
74099626	AULIA SINTA	1.8256	2.7703	1.8256	1
73058666	ANDRA FITRAH ABDULLAH	2.7804	2.9899	2.7804	1
68109418	WILDA MASTUROH NST	2.4876	2.9964	2.4876	1
73646434	AMALIYAH MADANI	2.5530	2.5108	2.5108	2
61500949	IMELDA PUTRI	1.1201	3.5742	1.1201	1
73659485	ULFA SARI RUMONDANG	0.8956	1.8929	0.8956	1
68676426	NUR LAILI	1.8404	4.3026	1.8404	1
75737779	AUDY AULILA RISKI	0.9474	3.5778	0.9474	1
64202618	SALSABILA NST	0.9733	3.5508	0.9733	1
30776904	DIFA HANINSYAKILA	2.6794	1.8014	1.8014	2
79297806	NUR SAKINAH	1.9307	4.1155	1.9307	1
	Total Cost			93.1046	

S = Total cost baru - total cost lama

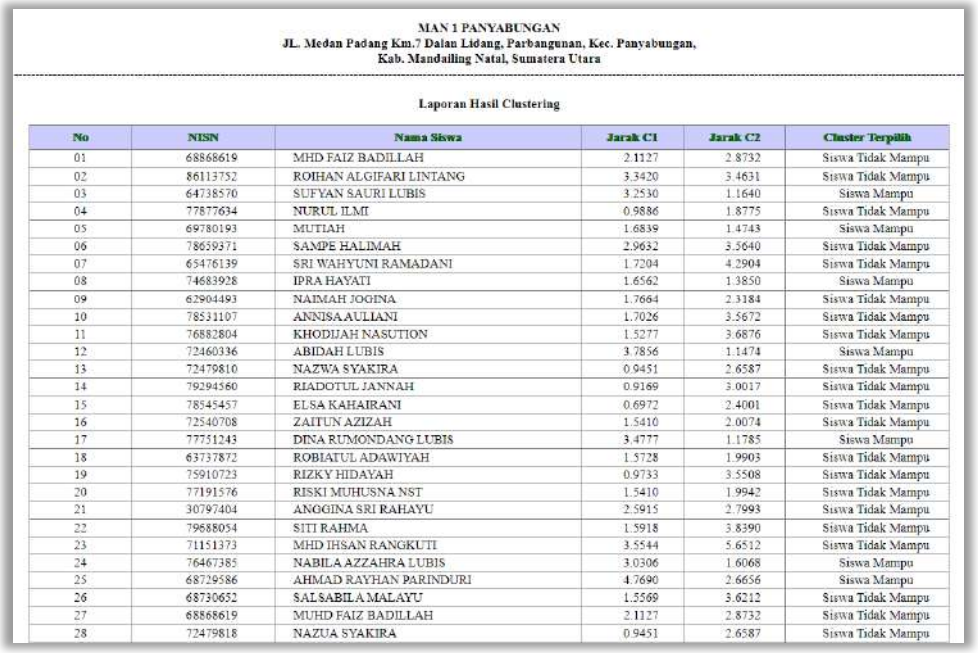
S = 93.1046 - 93.1012

S = 0.0033999999999423

Karena nilai Simpangan (S) > 0 maka proses Medoid selesai.

Fig 7. Calculation Result Display

After carrying out the implementation process, the next process is a trial with the aim of knowing that the application that has been created is in accordance with the needs. After testing, it produces a report, namely a decision result report as shown in the image below:



MAN 1 PANYABUNGAN
JL. Medan Padang Km.7 Dalan Lidang, Parbangunan, Kec. Panyabungan, Kab. Mandailing Natal, Sumatera Utara

Laporan Hasil Clustering

No	NISN	Nama Siswa	Jarak C1	Jarak C2	Cluster Terpilih
01	68868619	MHD FAIZ BADILLAH	2.1127	2.8732	Siswa Tidak Mampu
02	86113752	ROIHAN ALGIFARI LINTANG	3.3420	3.4631	Siswa Tidak Mampu
03	64738570	SUFYAN SAURI LUBIS	3.2530	1.1640	Siswa Mampu
04	77877634	NURUL ILMI	0.9886	1.8775	Siswa Tidak Mampu
05	69780193	MUTIAH	1.6839	1.4743	Siswa Mampu
06	78659371	SAMPE HALIMAH	2.9632	3.5640	Siswa Tidak Mampu
07	65476139	SRI WAHYUNI RAMADANI	1.7204	4.2904	Siswa Tidak Mampu
08	74683928	IPRA HAYATI	1.6562	1.3850	Siswa Mampu
09	62904493	NAIMAH JOGINA	1.7664	2.3184	Siswa Tidak Mampu
10	78531107	ANNISA AULIANI	1.7026	3.5672	Siswa Tidak Mampu
11	76882804	KHODIJAH NASUTION	1.5277	3.6876	Siswa Tidak Mampu
12	72460336	ABIDAH LUBIS	3.7856	1.1474	Siswa Mampu
13	72479810	NAZWA SYAKIRA	0.9451	2.6587	Siswa Tidak Mampu
14	79294560	RIADOTUL JANNAH	0.9169	3.0017	Siswa Tidak Mampu
15	78545457	ELSA KAHAIRANI	0.6972	2.4001	Siswa Tidak Mampu
16	72540708	ZAITUN AZIZAH	1.5410	2.0074	Siswa Tidak Mampu
17	77751243	DINA RUMONDANG LUBIS	3.4777	1.1785	Siswa Mampu
18	63737872	ROBIATUL ADAWIYAH	1.5728	1.9903	Siswa Tidak Mampu
19	75910723	RIZKY HIDAYAH	0.9733	3.5508	Siswa Tidak Mampu
20	77191576	RISKI MUHUSNA NST	1.5410	1.9942	Siswa Tidak Mampu
21	30797404	ANGGINA SRI RAHAYU	2.5915	2.7993	Siswa Tidak Mampu
22	79688054	SITI RAHMA	1.5918	3.8390	Siswa Tidak Mampu
23	71151373	MHD IHSAN RANGKUTI	3.5544	5.6512	Siswa Tidak Mampu
24	76467385	NABILA AZZAHRA LUBIS	3.0306	1.6068	Siswa Mampu
25	68729586	AHMAD RAYHAN PARINDURI	4.7690	2.6656	Siswa Mampu
26	68730652	SALSABILA MALAYU	1.5569	3.6212	Siswa Tidak Mampu
27	68868619	MUHD FAIZ BADILLAH	2.1127	2.8732	Siswa Tidak Mampu
28	72479818	NAZUA SYAKIRA	0.9451	2.6587	Siswa Tidak Mampu

Fig 8. Result Report Display

D. Interface Trial

At this testing or trial stage to re-ensure that the system that has been created can work as its function so that it can be used according to needs. The instrument used in this interface testing uses Blackbox Testing.

1. Blackbox Testing

This Blackbox Testing serves to check the functionality (Input and Output) in a program or application that is in the development stage. The focus in this testing is the end-user's point of view of the program or application, therefore each function must work properly as it should.

Table 6. Blackbox Login

No	Login	Description	Result
1	Click Login	The system adjusts the registered or inputted data in the database (username and password) with the data inputted on the web application button. If the username and password are available, the system will display the dashboard menu, if not, the system will continue to be on the login display.	[✓] Valid

The table above is a Blackbox of the login page accompanied by what is contained in the login page and then drawing the conclusion that the login function is running well or can be said to be Valid.

Table 7. Home Page Blackbox

No	Home Page	Description	Result
1	Click Home	The system will display the main page containing a brief explanation of the K-Medoids data mining application.	[✓] Valid
2	Click Student Data	The system will display the student data page.	[✓] Valid
3	Click K-Medoids Process	The system will display the K-Medoids algorithm calculation process page	[✓] Valid
4	Click User Page	The system will display the user management page.	[✓] Valid

The table above is a Blackbox testing table from the Main Page. There are 4 functions checked on this page, namely: Click Home, Click Student Data, Click K-Medoids to Click User Page. From all these functions, all the results are Valid and the function runs as the function was created.

Table 8. Student Page Blackbox

No	Student Page	Description	Result
1	Click Student Data	The system will display the student data page	[✓] Valid
2	Click Add	The system will display a page form to add student data	[✓] Valid
3	Click Edit	The system will display an edit display that allows users to change student data	[✓] Valid
4	Click Delete	The system will delete the selected student data	[✓] Valid

Table 9. Early Medoid Page Blackbox

No	Page	Description	Result
1	Click Home Medoid Page	The system will display the Initial Medoid page	[✓] Valid
2	Click Add	The system will display a page form to add data.	[✓] Valid
3	Click Edit	The system will display an edit display that allows users to change data	[✓] Valid
4	Click Delete	The system will delete the selected data	[✓] Valid

Table 10. K-Medoids Process Page Blackbox

No	K-Medoids Process Page	Description	Result
1	Click K-Medoids Process	The system will display the K-Medoids Process page	[✓] Valid
2	Click Add	The system will display a page form to manage K-Medoids Process data	[✓] Valid
3	Click Edit	The system will display an edit display that allows users to change K-Medoids Process data	[✓] Valid
4	Click Print	The system will display a report on the results of the K-Medoids calculation	[✓] Valid

2. Testing Result

After conducting experiments on the system, it can be stated that the results obtained are as follows:

a. The use of the K-Medoids method from the stage of inputting student data to the results of the grouping analysis on the web application in accordance with the design that has been done.
b. The data mining application using the K-Medoids algorithm for grouping capable and incapable students at MAN 1 Panyabungan runs well and can produce grouping results reports quickly and accurately.

4. CONCLUSION

After going through the previous research stages, it was concluded that the data mining application built is a system that aims to group students into 2 clusters, namely capable and incapable students based on the variables of average report card scores, parental employment, parental income and number of dependents. Designing an offline website application using the php programming language and using a mysql database. Applying the K-Medoids method grouping to the application that has been completed in the form of a pdf report file.

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