

1_Selection of the Best Educational Application

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Selection of the Best Educational Application Based on Android with SMART Method (Simple Multi Attribute Rating Technique)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Android system is widely chosen by smartphone users in Indonesia. One of the reasons for its popularity is the large number of free applications supported by Google Play Store. The large number of applications on the Google Play Store provide many choices for the needs of the community. But sometimes, this actually makes people have difficulty in choosing an application they need. This research will create a decision support system (DSS) in choosing the best application, so that it can help the community in choosing the application they need.

Methodology: The factors used in choosing include rating, file size, compatibility and others. The method used to determine the best application in this research is the SMART (Simple Multi Attribute Rating Technique) method. This method can be used to support decisions in choosing between several alternatives. The implementation is made web-based with the PHP language to make it easier for the public to access this system.

Results: The result of this research is the ranking of educational applications based on the criteria of rating, reviews, size and installs that can be taken into consideration by users in choosing applications.

Conclusion: SMART method can be used easily to generate application rankings. The results of data processing may change if the priority or weight of a criterion changes.

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1. INTRODUCTION

The large number of applications on the Google Play Store provide many choices for people's needs. But sometimes, this actually makes people have difficulty in choosing an application they need. This study implements a decision support system in choosing the best educational category Android application, so that it can help the community in choosing the applications they need. The factors used in choosing include rating, file size (size), user reviews and the number of installations of the application (install).

The method used to determine the best application in this research is SMART (Simple Multi Attribute Rating Technique). This method can be used to support decisions in choosing between several alternatives. This method has also been used in several Decision Support System Research, including the decision making of prospective blood donors [1], acceptance of Competency Based Training participants [2], determination of final disposal sites [3], recipients of aid funds [4], recruitment of computer laboratory assistants [5], selection of exemplary employees [6], and determining business viability [7]. Whereas decision support systems for application selection cases have been carried out to select browsers [8], social media applications [9] and Android games for early childhood [10].

2. METHODOLOGY

Data collection in this study was carried out by means of observation and literature study. In this study, data were obtained from Google Play Store. The data accommodates application data on the Google Play Store in 2021. In that data, there are 9660 applications with various types of categories.

In this study, the methods used for system design include:

- a) Analysis: At this stage, the most appropriate problem-solving alternatives are sought to overcome the existing problems. Make an alternative selection according to system requirements.
- b) Design: Designing a troubleshooting system to determine operating steps, procedures, as well as making a comprehensive system design that includes databases and system interfaces.

- c) Implementation: Implementation of the system that has been made, in accordance with the specifications specified in the system design.
- d) Testing: After the program is completed, the next step is to test the application.

3. RESULTS AND DISCUSSION

Simple Multi Attribute Rating (SMART) is more widely used because of its simplicity in responding to the needs of decision makers and the way it analyzes responses. The analysis involved is transparent so that this method provides a high understanding of the problem and is acceptable to decision makers [11]. The SMART method has several stages as follows:

1. Determine the alternatives and criteria to be used.
2. Give weight to each criterion with a scale of 1-100, then normalize by comparing the weight value with the total weight value.
3. Conduct alternative assessments for each criterion.
4. Calculate the utility value as in the formula 1

$$U_i (a_i) = 100 \frac{(C_{max} - C_{out})}{(C_{max} - C_{min})} \times 100\% \quad (1)$$

5. Calculate the final value by multiplying the number of normalization results with the results of the normalization of the criteria weights and then adding them up.

3.1 Application Data

In this study, application data contains information like App, Category, Rating, Reviews, Size, Installs, Type, Price, Content Rating, Genres, Last Updated, Current Version, and Android Ver. The data contains various categories of applications, but this study will only examine applications that have an educational category. The attributes used are application name, rating, reviews, size and installs. The number of application data that has the education category is 81 data. Example data can be shown in Fig. 1.

Based on the application data, it can be analyzed the distribution of data groups based on ratings, reviews, sizes and installs. The grouping analysis can be shown in Table 1 - 4 and the diagram in Fig. 2.

no	App	Rating	Reviews	Size	Installs
1	ABC Preschool Free	3,8	27.572	25	5.000.000
2	Blinkist - Nonfiction Books	4,1	16.103	13	1.000.000
3	busuu: Learn Languages - Spanish, English & More	4,3	206.532	21	10.000.000
4	C Programming	4,3	22.251	1,8	1.000.000
5	C++ Programming	4,3	11.904	1,8	1.000.000
6	C++ Tutorials	4,1	358	1,9	50.000
7	Cars Coloring Pages	4,4	1.090	49	1.000.000
8	Chegg Study - Homework Help	4,3	14.700	21	1.000.000
9	ClassDojo	4,4	148.549	59	10.000.000
10	Common Core	4	835	15	100.000
11	Dinosaurs Coloring Pages	4,4	390	41	500.000
12	EasyBib: Citation Generator	3,5	1.405	7,3	100.000
13	Edmodo	4,1	200.058	18	10.000.000
14	edX - Online Courses by Harvard, MIT & more	4,6	32.380	10	1.000.000
15	English Communication - Learn English for Chinese	4,7	2.544	18	100.000
16	English for beginners	4,6	9.321	27	1.000.000
17	English Grammar Test	4,8	4.075	5,1	500.000
18	English speaking texts	4,4	1.619	3	1.000.000
19	English with Lingualoo	4,7	254.519	27	5.000.000
20	Flippy Campus - Buy & sell on campus at a discount	4	889	7,4	500.000
21	Free english course	4,7	142.632	6,9	5.000.000
22	Free intellectual training game application	4,2	5.741	84	1.000.000
23	Fuzzy Numbers: Pre-K Number Foundation	4,7	21	44	1.000
24	Game for KIDS: KIDS match'em	4,4	7.005	6,9	1.000.000

Fig. 1. Google play store data education category

Table 1. Rating distribution

Group	Rating interval	Amount
1	Over 4.6	1
2	4.2 - 4.6	16
3	3.6 - 4.1	49
4	Less than 3.6	15

Table 2. Install distribution

Group	Install interval	Amount
1	Over 9,000,000	33
2	1001 – 5,000,000	7
3	500 – 1000	10
4	Less than 500	31

For the purposes of processing data on a decision support system using the SMART method, criteria are needed to be used in calculating rankings. Then give weight to each criterion with a scale of 1-100 and normalize by comparing the weight value with the total weight value.

The weight indicates the priority proposed by the researcher for this educational application case. Researchers give first priority to the rating attribute because this value is obtained from application users who have downloaded and used the application are shown in Table 6. The second priority is install which shows the number of application users are shown in Table 7. For the size attribute, researchers assumes that the smaller the file size will affect the memory owned by the user's device are shown in Table 8. Last

priority is given to reviews attribute, because this is only the opinion of the user, although it shows the user's enthusiasm for the application, which is shown in Table 9. The criteria and weights used in this study are as shown in Table 5.

Table 3. Size distribution

Group	Size interval	Amount
1	Under 5 MB	26
2	5 – 10 MB	22
3	11 – 20 MB	19
4	Above 20 MB	14

Table 4. Reviews distribution

Group	Reviews interval	Amount
1	More than 20,000	2
2	10,000 – 20,000	73
3	1,000 – 10,000	0
4	Less than 1000	6

Table 5. Criteria

No	Criteria	Weight
1	Rating	40
2	Install	30
3	Size	20
4	Reviews	10

To group the value of each criterion, in this study using intervals as in Table 2, Table 3, Table 4 and Table 5. The grouping of values is intended to make it easier for users to input the criteria values for each application.



Fig. 2. Distribution chart

Table 6. Rating sub criteria

No	Sub criteria	Value
1	Over 4.6	100
2	4.2 - 4.6	75
3	3.6 - 4.1	50
4	Less than 3.6	25

Table 7. Install sub criteria

No	Sub criteria	Value
1	Over 9,000,000	100
2	1001 – 5,000,000	75
3	500 – 1000	50
4	Less than 500	25

Normalization of criteria is done by comparing the weight value with the total weight value. The results of the normalization of criteria are as in Table 10.

3.2 Implementation of Web-Based Applications

In this study, the ranking calculation process using the SMART method was made web-based using the Hypertext Preprocessor (PHP)

language. The need for data processing requires a program to input alternative data, criteria and sub-criteria data and input alternative values based on existing criteria. All input processes are carried out by the admin. Users are only given processing results in the form of a ranking list of applications.

Table 8. Size sub criteria

No	Sub criteria	Value
1	Under 5 MB	100
2	5 – 10 MB	75
3	11 – 20 MB	50
4	Above 20 MB	25

Table 9. Reviews sub criteria

No	Sub criteria	Value
1	More than 20,000	100
2	10,000 – 20,000	75
3	1,000 – 10,000	50
4	Less than 1000	25

To store and process data, several tables are made to accommodate alternative data, criteria, sub-criteria and alternative assessments. The relation between tables can be shown in Fig. 3.

Table 10. Normalization criteria

No	Sub criteria	Value
1	Rating	0.4
2	Install	0.3
3	Size	0.2
4	Reviews	0.1

The web-based application page consists of the main page, alternative data management page, alternative values, criteria normalization, criteria data management, and sub criteria. On the alternative data management page, criteria and sub-criteria are equipped with functions to edit and delete data.

The main page is the page that appears the first time the user accesses the application. This page basically contains menus that can be

accessed by the user. The main page display looks like in Fig. 4.

The alternative data page is used to add, edit and delete alternative data for educational applications. To add alternative data, an add button is provided on the alternative data page. If the button is pressed, it will go to the alternative data input form. The main view of this page can be shown as in Fig. 5.

The alternative value page is used to assess alternatives based on the criteria that have been determined in this study. The initial view of the alternative value page can be shown in Fig. 8. To add or start giving an assessment, it is done by selecting the plus button and filling in the alternative name and values given to each category as shown in Fig. 6.

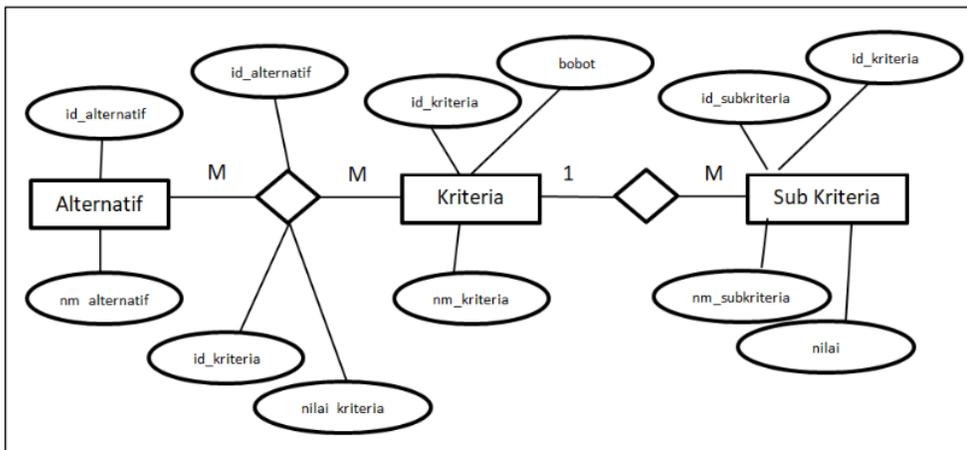


Fig. 3. Entity relationship diagram

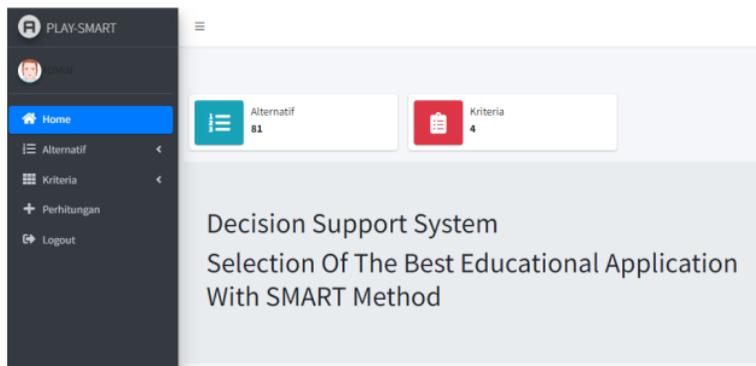


Fig. 4. Main page

The criteria data page is used to add criteria, edit and delete criteria. This page can be adjusted by the user when the priority criteria want to be replaced by giving a different weight to the existing value. The total percentage of all criteria actually does not have to be 100% because the application will calculate the normalization of the weights given by the user. The criteria data page can be shown in Fig. 7 while an example of the normalization process can be seen in Fig. 8.

each category will be assigned a value between 0-100. The first interval will be given a value of 100, the second interval will be given a value of 75, the third interval will be given a value of 50, and the last interval will be given a value of 25. The assessment is applied to positive criteria, while for negative criteria, the opposite is applied. The sub-criteria page can be shown in Fig. 9. Just like the other pages, the sub-criteria page is also equipped with edit and delete facilities.

The sub-criteria data page is used to make it easier for users to group criteria values. Based on the grouping of values, each criterion can be grouped to make it easier to classify the value of the criteria. Basically, this page is a detailed value of the existing criteria data. In this Android application selection Decision Support System,

The calculation page is used to show the calculation results from SMART. In the last column, a ranking of alternative applications will be displayed. It can help users find out the best application sequence according to the SMART method. The calculation page can be shown in Fig. 10.

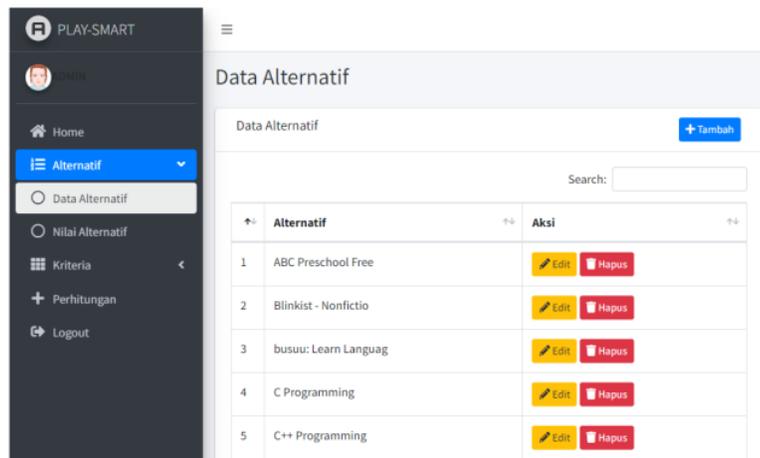


Fig. 5. Alternative data page

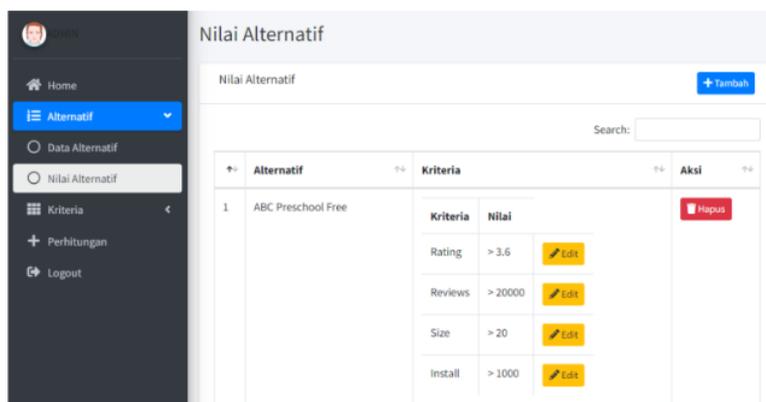


Fig. 6. Alternative values page

Data Kriteria

Data Kriteria + Tambah

Search:

#	Kriteria	Bobot (%)	Aksi
1	Rating	50	Edit Hapus
2	Reviews	20	Edit Hapus
3	Size	20	Edit Hapus
4	Install	30	Edit Hapus

Showing 1 to 4 of 4 entries Previous **1** Next

Fig. 7. Criteria data page

Hasil Normalisasi Kriteria

Hasil Normalisasi Kriteria

Search:

#	Kriteria	Normalisasi
1	Rating	0.4
2	Reviews	0.1
3	Size	0.2
4	Install	0.3

Showing 1 to 4 of 4 entries Previous **1** Next

Fig. 8. Normalization criteria

Sub Kriteria

Sub Kriteria + Tambah

Search:

#	Kriteria	Sub Kriteria	Nilai	Aksi
1	Rating	> 4.6	100	Edit Hapus
		> 4.1	75	Edit Hapus
		> 3.6	50	Edit Hapus
		< 3.5	25	Edit Hapus

Fig. 9. Sub criteria page

Alternatif	Rating	Reviews	Size	Install	Total	Rank
Learn English with W	41.6666666666667	16.6666666666667	16.6666666666667	25	100	1
Learn Spanish - Espa	41.6666666666667	16.6666666666667	16.6666666666667	12.5	87.5	2
Math Tricks	31.25	16.6666666666667	12.5	25	85.4166666666667	3
SoloLearn: Learn to	41.6666666666667	16.6666666666667	12.5	12.5	83.3333333333333	4
Learn HTML	41.6666666666667	16.6666666666667	12.5	12.5	83.3333333333333	5
Free english course	41.6666666666667	16.6666666666667	12.5	12.5	83.3333333333333	6
Learn Java	41.6666666666667	16.6666666666667	12.5	12.5	83.3333333333333	7
TED	31.25	16.6666666666667	8.33333333333333	25	81.25	8
Learn SQL	41.6666666666667	12.5	12.5	12.5	79.1666666666667	9
ClassDojo	31.25	16.6666666666667	4.16666666666667	25	77.0833333333333	10

Fig. 10. SMART calculation page

Based on calculations using the SMART method, the best application is the application that has the greatest value. This application has also been given a ranking to make it easier for users to understand this application.

4. CONCLUSION

From the research results, the authors conclude that the SMART method can be used easily to generate application rankings. The results of data processing may change if the priority or weight of a criterion changes. In this study, the results of calculations using the SMART method give a score of 100 with a rating value of 41.6, a review value of 16.6, a size value of 16.6 and an install value of 25.

The input that can be given to improve this research is to adjust the value grouping method for each criterion. This can be done by further researchers to produce good groupings. Alternative data can be upgraded according to the latest conditions so that the number of alternative data is more.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Boy AF, Setiawan D. "Application of the SMART method (Simple Multi Attribute Rating Technique) in decision making of prospective blood donors at the Indonesian red cross (PMI) Tanjung

- Morawa district." J. Saintikom (Jurnal Sains Manaj. Inform. Dan Komputer). 2019 ;18(2)202.
2. Ramadandi S, Adawiyah R, Sumpala AT. "Implementation of the Ahp & SMART Method in the android-based PBK participant admission DSS." J. Sains Dan Inform. 2021;7(2):182–191.
3. Windarto YE, Windasari IP, Arrozi MAM. "Implementation of simple multi attribute rating technique for determining final disposal site." J. Pengemb. Rekayasa Dan Teknol. 2019;15(1):12.
4. Andani SR. "The Simple Multi Attribute Rating Technique (SMART) method in determining the recipient of Amik Tunas Bangsa Foundation aid funds." J-Sakti (Jurnal Sains Komput. Dan Inform. 2019; 3(2):160.
5. Saleh A. "Application of simple multi attribute rating technique exploiting rank method in computer laboratory assistant recruitment decision support system." J. Masy. Telemat. Dan Inf. 2017;8(1):2–6.
6. Safrizal M. "Decision support system for selection of exemplary employees with SMART method (Simple Multi Attribute Rating Technique)." J. Coreit. 2015;1(2) 25–29.
7. Diana. "Decision support system determining business eligibility." Jurnal Ilmiah Matrik. 2016;18(2):113–124.
8. Agustina N. "Browser on android using the Analytical Hierarchy Process (AHP) method." 2014;lii(2):228–236.
9. Sari RRP, Agustina N. "Decision analysis of chat application selection for groups on android smartphone users using

- the Analytic Hierarchy Process (AHP) method." Paradigma. 2017;19(2):131–141.
10. Mu'alimin M, Latipah. "Android game selection application decision support system for early childhood." JSII (Jurnal Sist. Informasi). 2021;8(1):24–30.
 11. Purnamasari Y, Pudjiantoro TH, Nursantika D. "Performance assessment system for exemplary lecturers using the Simple Multi-Attribute Rating Technique (SMART) method." J. Teknol. Elektro. 2017;8(1).

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