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

ABSTRACT

Aims: At this time, many people have used smartphones for their daily needs. Smartphone with Android system is one of the people's choice. Supported by Playstore which provides various kinds of applications for free, making Android phones as popular phones.The large number of applications on the Playstore 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..

Keywords: smart, aplication, android, playstore, decision support system

1. INTRODUCTION

The large number of applications on the Playstore 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 pbkparticipants [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]. While the decision support system for the case of application selection has been carried out to select browsers [8], social media applications [9] and android games for early childhood [10].

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2. METHODOLOGY

Data collection in this study was carried out by means of observation and literature study. In this study, the data used data collected by Ludovico Cuoghi (Google Play Store Apps). The data is in the form of a csv file that 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 the selection of modules 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. Impementation: 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 this method provides a high understanding of the problem and can be accepted by 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

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

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.

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3.1 Application Data

In this study, the data used data collected by Ludovico Cuoghi. Application data contains information: App, Category, Rating, Reviews, Size, Installs, Type, Price, Content Rating, Genres, Last Updated, Current Ver, 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 figure 1.

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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 (L	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 Lingualeo	4,7	254.519	27	5.000.000
20	Flippy Campus - Buy & sell on campus at a discount	4	889	7,4	500.000

Fig. 1. Google Play Store Data Education Category

Based on the amount of application data that has an education category, 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 Figure 2.

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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

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

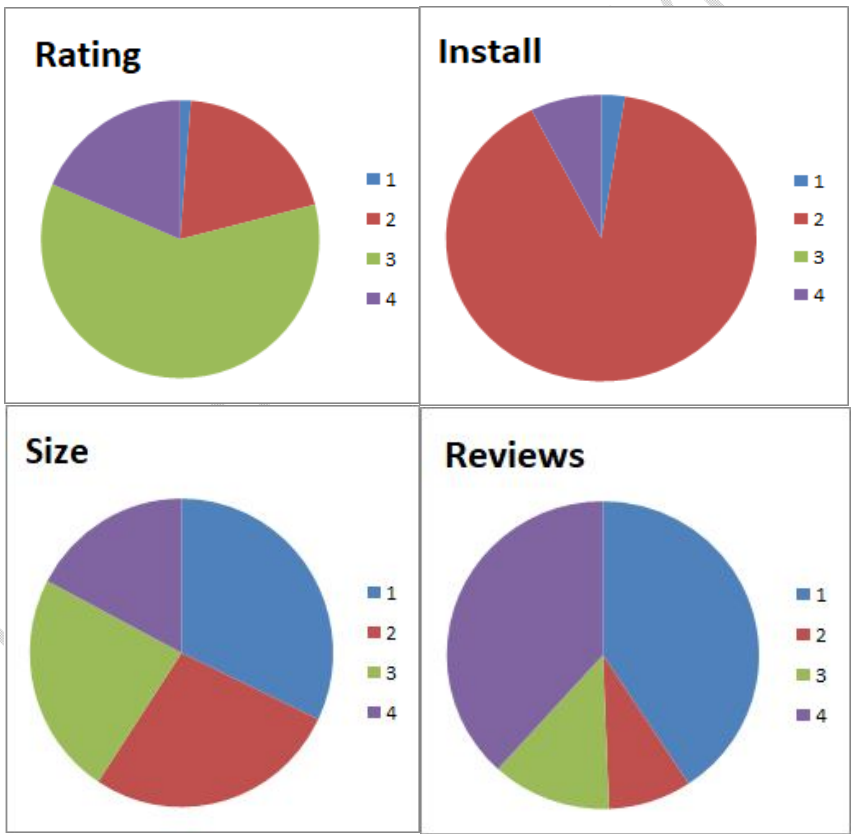

Fig. 2. Distribution Chart

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 the case of this educational application, the researcher gives the first priority to the rating attribute because this value is the value given by application users who have downloaded and used the application. The next sequence is install which shows the number of users of the application. For the size, the researcher assumes that the smaller the file size will affect the memory owned by the user's device. Last priority is given to reviews because this is only the opinion of the user, but it shows the user's enthusiasm for the application. The criteria and weights used in this study are as shown in table 5.

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Table 5. Criteria

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

To facilitate the grouping of values for 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.

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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

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

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.

Table 10. Normalization Criteria

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

3.2Implementation of Web-Based Applications

In this study, the ranking calculation process using the SMART method was made web-based using the 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 user. Meanwhile, users only need the results of the processing in the form of a list of applications that have been arranged in a ranking.

To store and process data, in this study several tables were created to accommodate data, namely alternatives, criteria, sub-criteria and alternative assessments. The relation between tables can be shown in Figure 3.

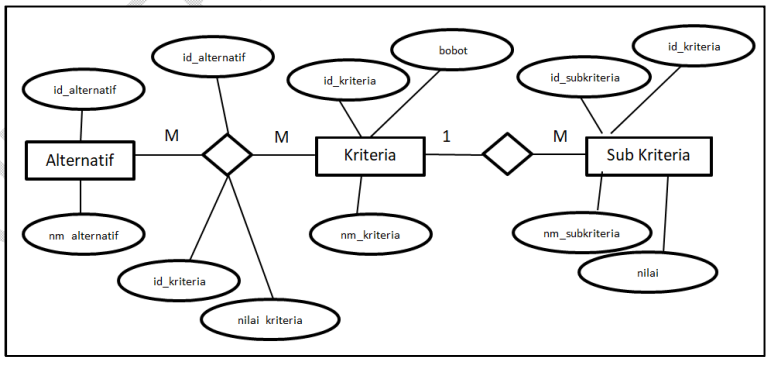

Fig. 3. Entitiy Relationship Diagram

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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.

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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 Figure 4.

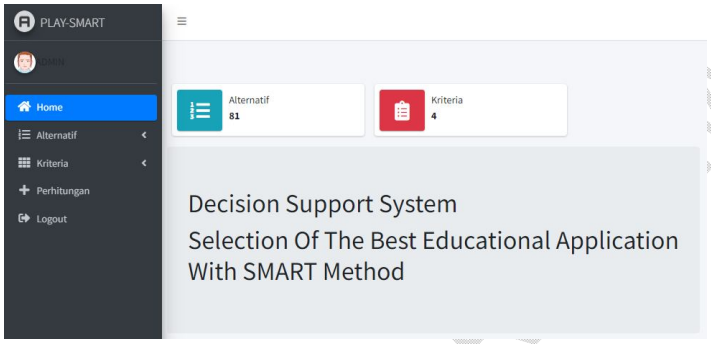

Fig. 4. Main page

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 Figure 5.

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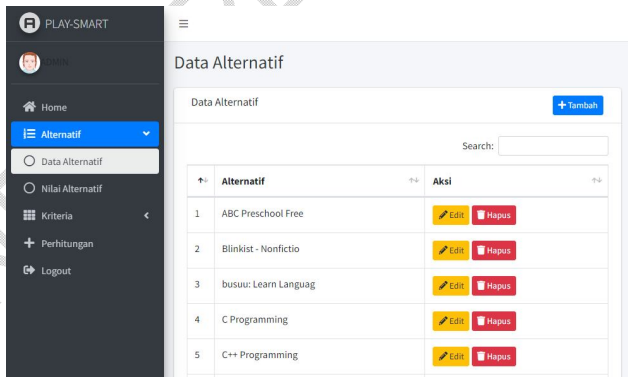

Fig. 5. Alternative Data Page

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 Figure 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 Figure 6.

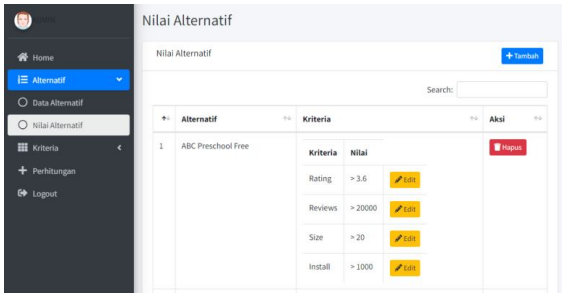

Fig. 6. Alternative Values Page

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 Figure 7 while an example of the normalization process can be seen in Figure 8.

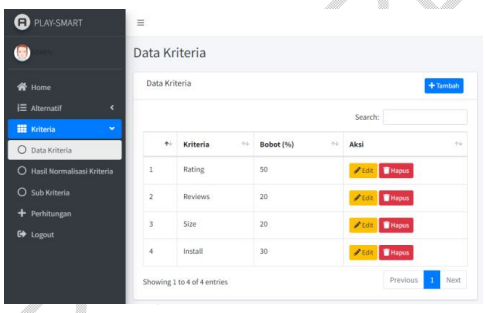

Fig. 7. Criteria Data Page

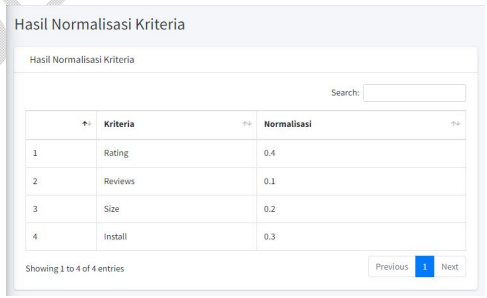

Fig. 8. Normalization Criteria

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 DSS, 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 Figure 9. Just like the other pages, the sub-criteria page is also equipped with edit and delete facilities.

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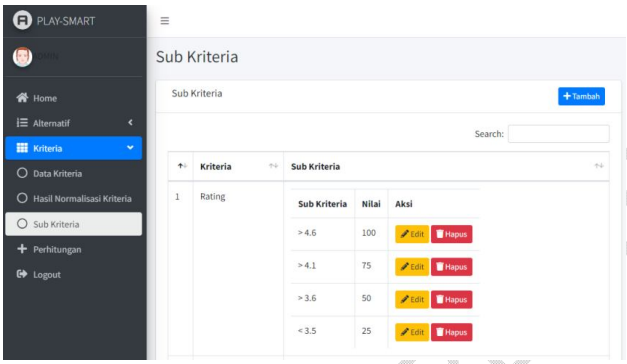

Fig. 9. Sub Criteria Page

The calculation page is used to show the calculation results from SMART. At the end of the table also shown the ranking of alternative applications that can help users to find out the order of the best applications according to the SMART method. The calculation page can be shown in figure 10.

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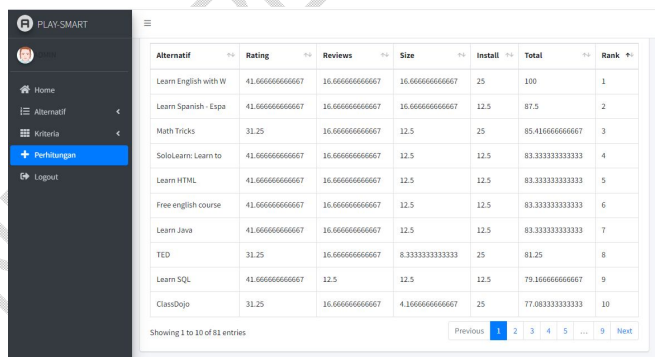

Fig. 10. SMART Calculation Page

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.

Inputs that can be used as material to improve and/or perfect the research that has been done, by grouping the values on each criterion can be changed according to the method used by researchers to produce good groupings. Alternative data can be upgraded according to the latest conditions so that the number of alternative data is more.

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