SMART RECOMMENDATION APPLICATION FOR PREPARATION AND HIKING GUIDE ON ANDROID PLATFORM

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ABSTRACT

In this modern era, a lot of nature lovers who are happy with climbing to the high mountains that exist in Indonesia. The mountain is a form of land that stands out above the surrounding area. Hiking is a mountain climbing activity. Usually hiking is done in groups consisting of several people. Rarely are people hiking alone. Hiking activities are increasingly popular both in the world and in Indonesia.

Equipment for mountain climbing and physical preparation is also a problem gained in hiking activities, as quoted from (lahiya.com) "Equipment and preparation tools are questions that often arise when wanting to climb mountains", based on the results of the questionnaire obtained about 59.5% of respondents did not know the equipment to climb the mountain. Cased Based Reasoning (CBR) is a reasoning model that combines problem solving, comprehension and learning and integrates the whole with memory processing. In the retrievel and reuse stages the search for case solutions is made. At the retrieve stage a case search is researched with a similarity level that approaches the user input budget case.

Based on the test results using black box testing method it can be concluded that Hikmate software has fulfilled the needs of users in helping to obtain information on equipment of hiking tools, helping to recommend hiking equipment, providing travel information, budget information and budget planning in equipment Hiking.

Keywords : Aplikasi mobile android, hiking, Cased Based Reasoning.

1. INTRODUCTION

In this modern era, a lot of nature lovers who are happy with climbing to the high mountains that exist in Indonesia. The mountain is a form of land that stands out above the surrounding region. A mountain is usually taller and steeper than a hill, but there is similarity, and use often depends on local custom. Some authorities define mountains with peaks over a certain magnitude, the mountain requires a height of 2000 feet (610 m) to be defined as a mountain.

Hiking is a mountain climbing activity. Usually hiking is done in groups consisting of several people. Rarely are people hiking alone. Hiking activities are increasingly popular both in the world and in Indonesia. In Indonesia, especially on campuses, almost certainly there are groups of nature lovers who often make the climb.

In doing climbing activities, the needs of the goods must also be prepared, so that climbing activities can be done well. However, there are often difficulties in preparing the goods, as quoted "Taking the goods while climbing the mountain it is easy-easy difficult". On the one hand we want to bring the goods as complete as possible, on the other hand the contents of our bag is limited to accommodate these items. Actually the number of these luggage depends on how long we will be on the mountain "[3].

Equipment for mountain climbing and physical preparation is also a problem gained in hiking activities, as quoted from (lahiya.com) "Equipment and preparation tools are questions that often arise when wanting to climb mountains", based on the results of the questionnaire obtained about 59.5% of respondents did not know the equipment to climb the mountain.

With evidence from (wisatagunung.com) Preparation and more mature travel management is necessary to safeguard the safety and success of climbing, as often the occurrence of accidents occurring with the evidence of "The Seven Tragic Accidents Going Mountaineers" [4].

Regarding the route is also often the problems that arise, how the route required in doing the hiking. With the proof "To conquer the highest mountain on the island of Java is not easy, it takes about four days and three nights or also can be three days and two nights to take the climbing route on the mountain semeru" [5].

Cased Based Reasoning (CBR) is a reasoning model that combines problem solving, comprehension and learning and integrates the whole with memory processing [6]. In the retrievel and reuse stages the search for case solutions is made. At the retrieve stage a case search is researched with a similarity level that approaches the user input budget case.

With the creation of this application, is expected to help climbers in carrying out these activities. Environment to be selected for the construction of this software is a mobile device because the user is certainly a mobile device users, while for the operating system to be used is android with the consideration that in addition to the user is ensured to use android operating system, currently android has a market share of 87.6 % Of all smart phones activated [7].

Based on existing problems, it is necessary a system that can help mountaineers in doing hiking, ranging from the preparation of goods in mountain climbing, provide travel route guidance, or buy hiking needs according to budget climber.

1.2 *Purpose and Objectives*

The purpose of this research is to build intelligent app recommendations for preparation and hiking guides on the android platform. The objectives to be achieved in this research are:

1. Provide recommended information on equipment of hiking equipment that must be prepared in accordance with the specified budget.
2. Assisting users in providing information where the sale of hiking tools in the presence of price comparison.
3. Provide recommended travel guide information from user location to mountain.

2. THE CONTENT OF PAPERS

2.1 Understanding Mountain

The mountain is a form of land that stands out above the surrounding region. A mountain is usually taller and steeper than a hill, but there is similarity, and use often depends on local custom. Some authorities define mountains with peaks over a certain magnitude, the mountain requires a height of 2000 feet (610 m) to be defined as a mountain.

2.2 Case-Based Reasoning (CBR)

Case Based Reasoning Method is one method to build expert system with decision making from new case based on solution from previous cases. The concept of a case based reasoning method is found from the idea of using documented experiences to solve new problems. Most decisionmakers use the experiences of past problem solving to solve the problems faced now.

The Case Babe Reasoning method uses an artificial intelligence approach that focuses on problem solving based on the knowledge of previous cases. If there is a new case it will be stored on the knowledge base so that the system will do the learning and knowledge owned by the system will increase. In general, this method consists of four steps, namely:

1. Retrieve (retrieve) the most similar cases. This task begins with the description of one / part of the problem and ends when the previous most suitable case has been found. The sub tasks refer to feature identification, initial matching, search and selection.
2. Reuse (use) information and knowledge of the case to solve the problem. The process of reuse of case solutions obtained in the context of a new case is focused on two aspects:
   a. The difference between the previous and the current case
   b. What part of the case has been obtained that can be transferred into a new case
3. Revise (revise / fix) the proposed solution. This phase consists of two tasks, namely:
   a. Evaluate the case solutions generated by the reuse process. If successful, then proceed with the retain process.
   b. If not then fix case solutions using domain specific knowledge.
4. Retain parts of the experience that may be useful for solving problems in the future. This process consists of selecting what information from the case to be stored.

The CBR problem solving component has two main parts: case retriever and case reasoner. Case retrievers are tasked with looking for problems that are similar to user-inserted issues in the case base, while case reasoners are tasked with finding solutions to user problems by viewing or adjusting solutions to problems found in case retrievers.

So CBR method itself there are stages that must be completed in sequence. In developing the application, the user must open the stages in the application. Each process must be done until understood. So if there is an additional requirement then it must wait until the final stage.

Stages in the CBR (Case-Based Reasoning) method are 4, retrieve, reuse, revise and retain. The relationship between the steps in the CBR (Case-Based Reasoning) method [9] can be seen in the following figure.

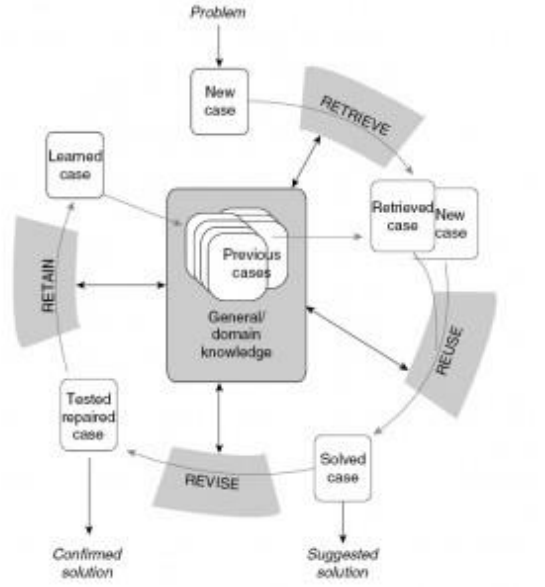


Figure 2. 1 Case-Based Reasoning Cycle

2.3 Discussion

For beginners, hiking is just beginning to do the climbing of the mountain is very difficult, with information about preparation and hiking guide. So the problem is as follows:

1. Difficult to find the necessary camping equipment store.
2. Not knowing the needle for hiking.
3. Not knowing to look for a mountain climbing route.

2.4 Retrieve

Retrieve to retrace old cases that closely resemble cases with new cases. Matching is done by inputting hiking planning data. If the matching case weight is equal or nearly the same as the case basis, then the reuse stage will be performed that is calculating the similarity of the weight of each attribute that results in the possible solution of the new case.

The assumption on this search is that similar cases will have similar solutions. The value of this weight is given as an illustration of how important the attribute is in determining the solution of the same case. The weight value starts from 0 to 1, where 0 is the lowest and the 1 is the highest.

The following is Table 2.1 Mount Data describing mountains, height, temperature, surface, and soil.

Table 2.1 Table Data Mount

Gunung	**Tinggi**	**Suhu Rata-rata**	**Permukaan**	**Tanah**
Ceremai	>3.000 mdpl	<15° C	Curam	Lembab
Merbabu	>3.000 mdpl	<15° C	Curam	Basah
Papandayan	<3.000 mdpl	>20° C	Datar	Kering

Below is Table 2.2 Mountain Characteristics describing the attribute name, and attribute value.

Table 2.2 Mount Characteristics

No	Nama Atribut	Nilai Atribut
1	Tinggi	< 3000 mdpl >= 3000 mdpl
2	Suhu	< 15°C >= 15°C
3	Permukaan	1. Curam 2. Landai 3. Datar
4	Tanah	1. Basah 2. Lembab 3. Kering

Table 2.3 Shoe Supplies

Jenis	**Tinggi**	**Suhu Rata-rata**	**Permukaan**	**Tanah**
Leher panjang	>3.000 mdpl	<15° C	Curam	Basah
Leher pendek	<3.000 mdpl	<15° C	Datar	Lembab
Sandal gunung	<3.000 mdpl	>15° C	Datar	Kering

Table 2.4 Jacket Equipment

Jenis	**Tinggi**	**Suhu Rata-rata**	**Permukaan**	**Tanah**
Tebal	>3.000 mdpl	<15° C	Curam, datar	Lembab, basah, kering.
Tipis	<3.000 mdpl	>15° C	Curam, datar	Lembab, basah, kering.

The following is a Table 2.5 of the Backpack which describes the type of backpack.

Table 2.5 Backpack Supplies

Jenis	Tinggi	Suhu Rata-rata	Permukaan	Tanah
<35 L	<3.000 mdpl	<15°C, >15° C	Datar	Lembab, basah, kering.
>=35 L	>=3.000 mdpl	<15°C, >15° C	Curam	Lembab, basah, kering.

The following is Table 2.6 Shoe Weights that explain the weight of shoes.

Table 2.6 Shoe Weights

No	Nama Atribut	Nilai Atribut
1	Tinggi	2
2	Suhu	2
3	Permukaan	4
4	Tanah	3

The following is Table 2.7 The Jacket Jacket describes the weight of the jacket

Table 2.7 Jacket Weight

No	Nama Atribut	Nilai Atribut
1	Tinggi	3
2	Suhu	4
3	Permukaan	2
4	Tanah	2

The following is Table 2.8 The knapsack of a backpack that describes the weight of the rucksack

Table 2.8 Backpack Weight

No	Nama Atribut	Nilai Atribut
1	Tinggi	4
2	Suhu	1
3	Permukaan	3
4	Tanah	2

In Nearest Neighbor search, the closeness of case features will also be calculated. The value of proximity is usually in the value 0 to 1 where the value 0 means the two cases are not similar while the value of 1 means both cases are similar. The searching of this application uses the Similarity (problem, case) technique on the k-nearest neighbor algorithm as follows:

$$\text{Similarity (problem, case)} = \frac{(S1*W1) + (S2*W2) + (S3*W3) + (S4*W4)}{W1+W2+W3+W4}$$

Information :

Table 2.9 Similarity Case Description

S1 : similarity (1)	W1 : bobot (Nilai Atribut 1)
S2 : similarity (2)	W2 : bobot (Nilai Atribut 2)
S3 : similarity (3)	W3 : bobot (Nilai Atribut 3)
S4 : similarity (4)	W4 : bobot (Nilai Atribut 4)

Table 2.10 Calculation of Long Neck Shoes

No	Sepatu panjang	Gunung ceremai	Similarity
1	>3.000 mdpl	>3.000 mdpl	1
2	<15° C	<15° C	1
3	Curam	Curam	1
4	Basah	Lembab	0

Shoe attribute weight:
Height (W1) = 2
Temperature (W2) = 2
Surface (W3) = 4
Land (W4) = 3

Similarity (Sepatu leher panjang, Ceremai)

$$= \frac{(S1*W1)+(S2*W2)+(S3*W3)+(S4*W4)}{W1+W2+W3+W4}$$

$$= \frac{(1*2)+(1*2)+(1*4)+(0*3)}{2+2+4+3}$$

$$= \frac{2+2+4+0}{11} = 8/11 = 0.72$$

Table 2.11 Calculation of Short Neck Shoes

No	Sepatu pendek	Gunung ceremai	Similarity
1	<3.000 mdpl	>3.000 mdpl	0
2	<15° C	<15° C	1
3	Datar	Curam	0
4	Kering	Lembab	0

Weight of shoe attribute
Height (W1) = 2
Temperature (W2) = 2
Surface (W3) = 4

Land (W4) = 3

Similarity (Sepatu leher pendek, Ceremai)

$$= \frac{(S1*W1)+(S2*W2)+(S3*W3)+(S4*W4)}{W1+W2+W3+W4}$$

$$= \frac{(0*2)+(1*2)+(0*4)+(0*3)}{2+2+4+3}$$

$$= \frac{0+2+0+0}{11} = 2/11 = 0.18$$

Table 2.12 Calculation of Sandals of the Mountain

No	Sandal gunung	Gunung ceremai	Similarity
1	<3.000 mdpl	>3.000 mdpl	0
2	>15°	<15°	0
3	Datar	Curam	0
4	Kering	Lembab	0

Weight of shoe attribute
Height (W1) = 2
Temperature (W2) = 2
Surface (W3) = 4
Land (W4) = 3

Similarity (Sepatu, Ceremai)

$$= \frac{(S1*W1)+(S2*W2)+(S3*W3)+(S4*W4)}{W1+W2+W3+W4}$$
$$= \frac{(0*2)+(0*2)+(0*4)+(0*3)}{2+2+4+3}$$
$$= \frac{0+0+0+0}{11} = 0/11 = 0$$

From the above calculation it can be concluded as follows:

Table 2.13 Shoe Counting Results

Jenis Sepatu	Nilai similarity	Presentasi
Sepatu leher panjang	0.72	72%
Sepatu leher pendek	0.18	18%
Sandal gunung	0	0%

Table 2.14 Thick Jacket Calculation

No.	Jaket tebal	Gunung Ceremai	Similarity
1	>= 3.000 mdpl	>= 3.000 mdpl	1
2	<15°C	<15°C	1
3	Curam	Curam	1
4	Lembab	Lembab	1

Weight of thick jacket attribute
Height (W1) = 3
Temperature (W2) = 4
Surface (W3) = 2
Land (W4) = 2
Similarity (Long neck Shoes, Ceremai)

$$= \frac{(S1*W1)+(S2*W2)+(S3*W3)+(S4*W4)}{W1+W2+W3+W4}$$
$$= \frac{(1*3)+(1*4)+(1*2)+(1*2)}{3+4+2+2}$$
$$= \frac{3+4+2+2}{11} = 11/11 = 1$$

Table 2.15 Thin Jacket Calculations

No.	Jaket tipis	Gunung Ceremai	Similarity
1	<3.000 mdpl	>= 3.000 mdpl	0
2	>15°C	<15°C	0
3	Curam	Curam	1
4	Lembab	Lembab	1

Thin jacket weights
Height (W1) = 3
Temperature (W2) = 4
Surface (W3) = 2
Land (W4) = 2

Similarity (Sepatu leher panjang, Ceremai)
$$= \frac{(S1*W1)+(S2*W2)+(S3*W3)+(S4*W4)}{W1+W2+W3+W4}$$
$$= \frac{(0*3)+(0*4)+(1*2)+(1*2)}{3+4+2+2}$$
$$= \frac{0+0+2+2}{11} = 4/11 = 0.36$$

2.5 Bugdet Allocation

At this stage done the calculation process in allocating budget to determine what items can be purchased according to the budget. Priority determination of goods purchased based on the weight of interest. The weight of interest is taken from the questionnaire results of 50 respondents of nature lovers with the description: 5 = Very important, 4 = Important, 3 = Important enough, 2 = Unimportant, and 1 = Very unimportant.
Table 2.16 The Budget Allocation describes hiking supplies and preparations.

Table 2.16 Budget Allocation

Types of goods	Price	Weight of Interest
Tenda	850.000	2
Sleeping bag	400.000	3
Jaket	300.000	5
Ransel	500.000	5
Sepatu	700.000	4
Jas hujan	150.000	1
Alat masak	400.000	2
P3K	300.000	3
Topi	150.000	1
Trousers	250.000	2
Botol minum	150.000	2
Pisau gunung	125.000	2
T-Shirt	150.000	1
Kemeja	300.000	1
Kacamata	200.000	1
Kaos tangan	200.000	2
Jam tangan	500.000	1

Sample case:
Budget in user inputkan Rp. 1,000,000
Obtained N = 1000000
1. Sorting the weight of the largest weights to the smallest weights.
Here is a flow chart that describes the stages of the process of calculating budget allocation.

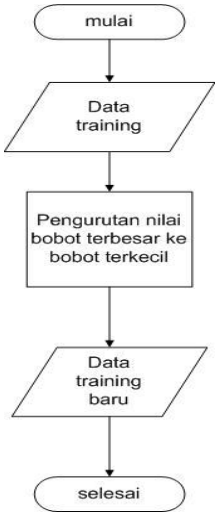


Figure 2. 1 Budget Calculation Process

Below is Table 2.17 Budget allocation that explains budget allocation based on importance weight.

Table 2. 17 Budget Allocation Based on Weight of Interest

Types of goods	Price	Weight of Interest
Ransel	500.000	5
Jaket	300.000	5
Sepatu	700.000	4
Sleeping bag	200.000	3
P3K	300.000	3
Tenda	400.000	2
Alat masak	400.000	2
Trousers	250.000	2
Botol minum	150.000	2
Pisau gunung	125.000	2
Kaos tangan	200.000	2
Jas hujan	150.000	1
Topi	150.000	1
T-Shirt	150.000	1
Kemeja	300.000	1
Kacamata	200.000	1
Jam tangan	500.000	1

2. Result of recommendation
Sorting based on the weight of interest from the largest to the smallest with the value of N = 1000000 as the determination of price limits.

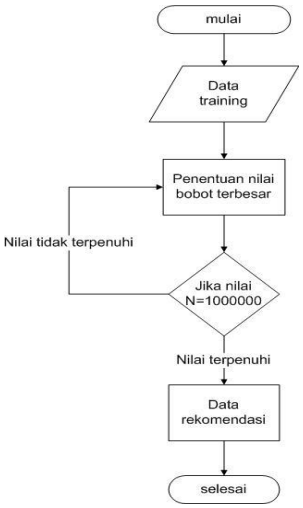


Figure 2.2 Recommended Results

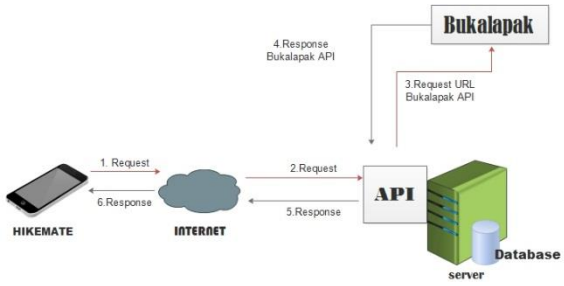
Below is Table 3.22 Results Recommendation that describes the recommendations based on the weight of importance and budget.

Table 2.18 Results of Recommendations

Types of goods	Price	Weight of Interest
Ransel	500.000	5
Jaket	300.000	5
Sleeping bag	200.000	3

2.2 System Architecture Analysis

System architecture analysis aims to identify the architecture to be built based on two web and mobile



subsystems.

Figure 2. 3 System Architecture

Architecture The system depicts the overall architecture of the system on the mobile platform. Here is a description of the System Architecture Picture:

1. Mobile device users request data by accessing the URL of API API.
2. Mobile device user malakukan request data by accessing the URL address API in the server.
3. API receives request data from smartphone, then API to request data to database which is in server.
4. Database sends data to API to be changed into JSON form.
5. Smartphone retrieves JSON data from API.
6. Smartphone accepts JSON data from API

2.5 Use Case Diagram

Use Case Diagram is a construction to describe the relationships that occur between actors with the activities contained in the system. From the analysis of existing application users then use case diagram on the mobile platform can be seen in the following figure.

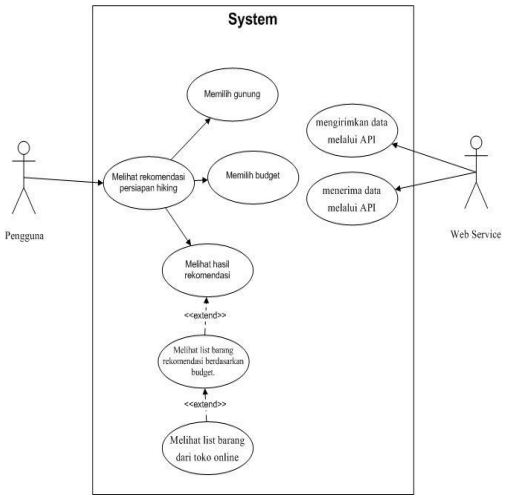


Figure 2.4 Use Case Diagram

2.6 Relation Scheme

Relation Scheme is a series of relationships between two or more tables in the database system. Figure 2.7 Relation Scheme is a description of the database sequence in the development of this application.

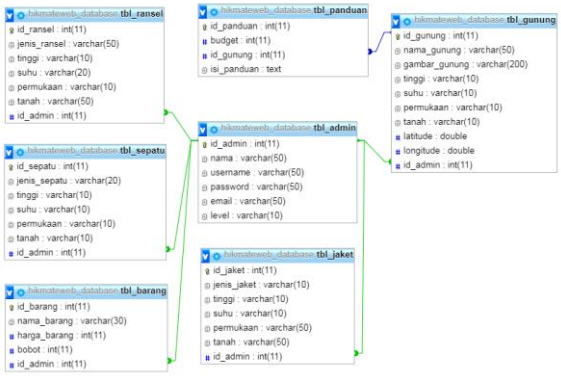


Figure 2.5 Relation Scheme

2.7 Menu Structure Design

The design of the menu structure that will be discussed in this section includes the design of the menu on the application hikmate. Here is an explanation:

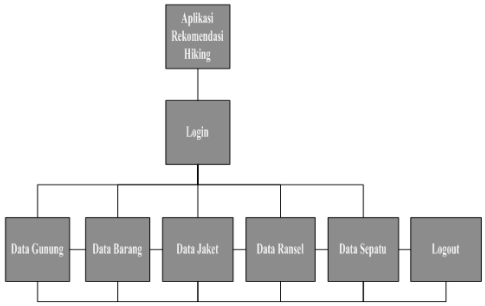


Figure 2.8 Designing User Menu Structure

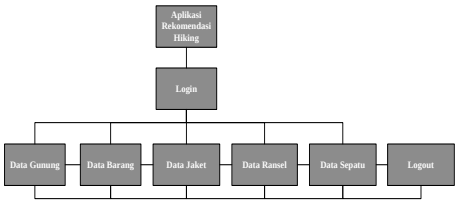


Figure 2.8 Design of Admin Menu Structure

2.8 Interface Design

Interface design describes the appearance of each form that will be used on the Hikmate application display. The user on this system is the user. Here is Hikmate application interface design.

1. Designing the Main Menu Form

An overview of the Main Menu Form Interface in the hikamate application can be seen in the following figure.

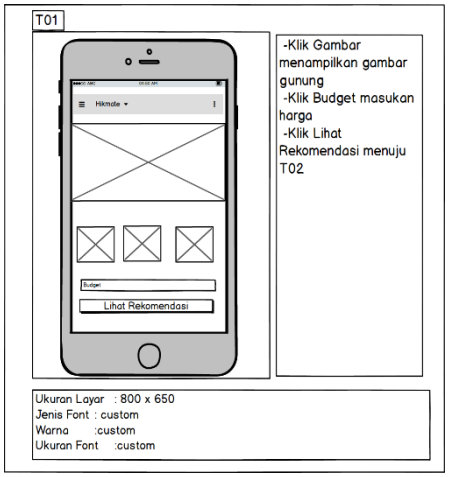


Figure 2.25 Designing the Main Menu Form

2. Design the Look Recommendation Form

An overview of the interface design form see the recommendations on the hikmate application can be seen in the following figure:

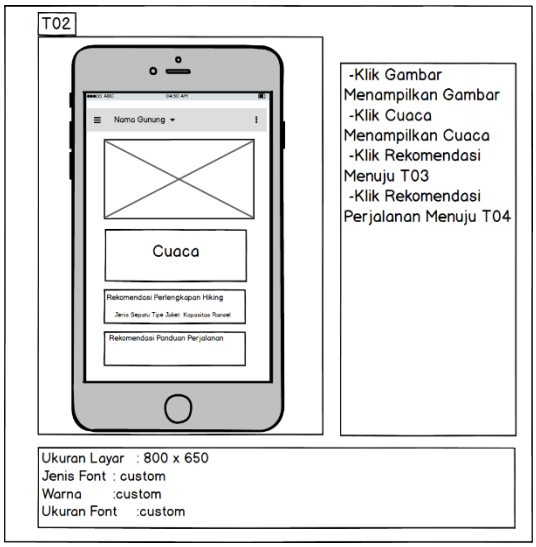


Figure 3. 26 Design Form See Recommendation

3. Designing Hiking Equipment Recommendation Form

An overview of the interface design of the hiking equipment recommendation form in the hikmate application can be seen in the following figure:

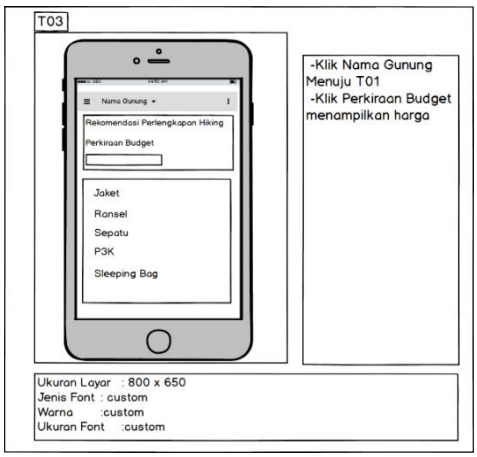
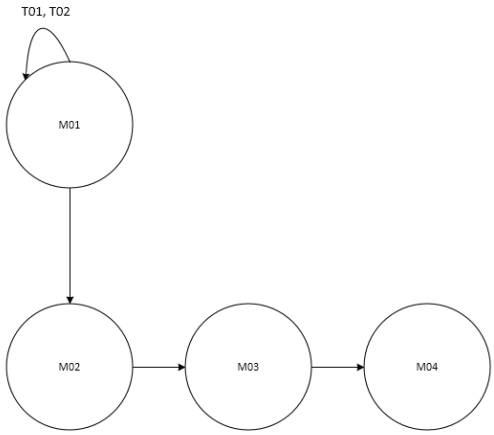


Figure 3. 27 Design of Hiking Equipment Recommendation Form

2.9 Semantic Network Design

Semantic network design is a picture of graphical knowledge that shows the relationship between various objects, consisting of circles associated with arrows that show objects and information about these objects. The following is a semantic network on the Hikmate app:



Gambar 2.26 Jaringan Semantik Pengguna

Table 2.5 Description of Display Network Semantics

Display Code	Description
M01	Main Menu Interface
M02	Select Mountain Interface
M03	Interface Input Budget
M04	Interface View Recommended Results

2.10 Conclusion Alpha Testing

Based on the results of software testing conducted it can be concluded that the software Hikmate on android platform that is built is running as expected both in terms of validation and error handling process.

2.11 Conclusion Beta Testing

From the results of the spread of questionnaires conducted on July 17-20, 2017 in the can 30 respondents who fill the review of software on the mobile subsystem. Based on the results of the beta test, it can be concluded that:

1. Users strongly agree this application can provide information equipment hiking tools that will be used to climb the mountain.
2. Users strongly agree this application can help you in recommending the sale of hiking tools.
3. Users strongly agree this application can provide information about the travel route in doing hiking.
4. Users strongly agree this application can provide information on equipment according to your budget.
5. Users strongly agree this application can help you in doing budget planning and hiking supplies.

3. CLOSING

3.1 Conclusions

Based on the results obtained in making this final project, it can be concluded as follows:

1. Applications can help users to search for hiking information
2. Applications can help users to make hiking plans
3. Applications can help users control spending during hiking activities

3.2 Suggestions

In order for the system built to work better, should be done things as follows:

1. For the sale of goods climbing purposes can be added geofancing feature to find a place to sell equipment around the user.
2. With this hiking application for further development can show the route to climb the mountain from bottom to top with the information pos- post on each mountain.

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