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DEVELOPMENT OF ANDROID APPLICATION FOR TOURISM INFORMATION IN BANDA ACEH

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ABSTRACT

Banda Aceh is a city where the tourism sector is growing rapidly. The tourists from outside Aceh, especially those who are visiting Banda Aceh for the first time, will have little difficulty in accessing tourist locations in this city because they do not have detail information about the locations. The purpose of this study is to develop a mobile-based Geographic Information System on tourism in Banda Aceh, which can help tourists in choosing the tourist location they want to visit and recommend the nearest route from the user's position to the tourist spot, by using the shortest popular route search algorithm, Dijkstra's algorithm. In addition, this application uses Haversine Formula in calculating the distance between two location on a surface of earth. The results of this study are dual-language android-based applications that can inform tourist locations and display the nearest route from the user's position to the tourist spot.

KEY WORDS: Mobile GIS, Dijkstra Algorithm, Shortest Route

INTRODUCTION

After the tsunami, the city of Banda Aceh became one of the cities that was most interested in tourism in Indonesia. From year to year the number of tourists visiting Banda Aceh increase significantly.

There is a difficulty in accessing the tourist sites, especially for travelers from outside Aceh, because they do not have enough information about the tourist location in this city. For this reason, it is necessary to develop an android application that can be accessed through various mobile devices that can help local and international tourists in the search of information on tourist locations in Banda Aceh.

The implementation of a mobile web based Geographic Information System (GIS) is one way to assist tourists in accessing tourist information in Banda Aceh, because mobile devices are commonly owned by every tourist at this time. This system is designed to help users getting complete information about the tourist locations and recommend the shortest navigation route to the spot, by implementing the Djikstra algorithm, so that tourists can use their time efficiently while visiting tourist locations in Banda Aceh. This application is dual languages, Indonesian and English, so that it can be used by both local and foreign tourists.

LITERATURE REVIEW

A. Dijkstra Algorithm

Dijkstra's algorithm is a greedy algorithm used in solving the shortest distance problems for a directed graph with edge values that are not negative. The basic idea of the Dijkstra algorithm is the search for the minimum value of the total cost to the goal node on a weighted graph, in order to get the optimum path. In the Dijkstra algorithm, node is used because Dijkstra Algorima uses a directed graph to determine the shortest path. This algorithm works to find the shortest path based on the smallest weight of one node to another. Suppose the node describes a building and line describes a road, then the Dijkstra algorithm calculates all possible smallest weights of each node. An example of graph with its weight to determine the shortest path using Algorithms Dijkstra is given in Figure 1

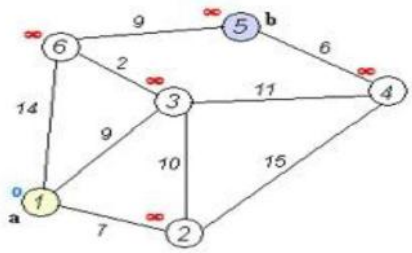

Figure 1. An example of finding a path using the Dijkstra algorithm

1. First, specify which point will be the starting node, then give the distance weight from the first node to the nearest node one by one. The Dijkstra Algorithm will develop a search from one point to another point and to the next point step by step. The logical sequence of the Dijkstra algorithm can be described as following:
   Give the weight (distance) from each point to

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another, then set the value 0 to the initial node and the value limitless to other nodes (not filled).
2. Set all nodes untouched and set the initial node as the departure node.
3. From the departure node, consider the neighboring nodes that have not been touched and calculate the distance from departure point. For example, if the departure point A to B has a distance weight of 6 and from B to node C is 2, then the distance to C passes B to 6 + 2 = 8. If this distance is smaller than the previous distance (previously recorded), deletes the old data, sets the distance data with new distance.
4. When we are finished considering each distance to the neighboring node, mark the node that has been touched as touchable nodes. Touched node will never be checked again, the saved distance is the last distance and the least weight.
5. Set the untouched node with the smallest distance (from the departure node) as the next departure node and continue to step 3.

B. Haversine *Formula*

The Haversine Formula method is used to calculate the distance between two points on the surface of earth, based on latitude and longitude values. The Haversine Formula method has now undergone development, namely by using a simple spherical law of cosine formula, where computer calculations can provide a very accurate level of precision between two points:

D = acos(sin(lat1).sin(lat2)+cos(lat1).cos(lat2).
cos(long2−long1)).R

Description:
R = Earth's radius of 6371 (km)
D = Distance (km)
Lat1, lat2 = latitude points 1 and 2
Long1, long2 = longitude points 1 and 2

RESULTS AND DISCUSSION

This application is developed to be used by the community and the Banda Aceh Tourism Office. The community is the main target of this application,where they can be facilitated in a tour in Banda Aceh, while Banda Aceh Tourism officer can manage tour locations information.

A.Analysis and Design

Use Case diagrams can be used to describe a system's requirements, communicate design with client, and design a test case for all of the features in the system. In addition, use case diagram also describes functions that can be performed by the system. System limits, actors involved and use cases are determined based on functional requirements. Figure 2 shows the Use Case diagram for this application.

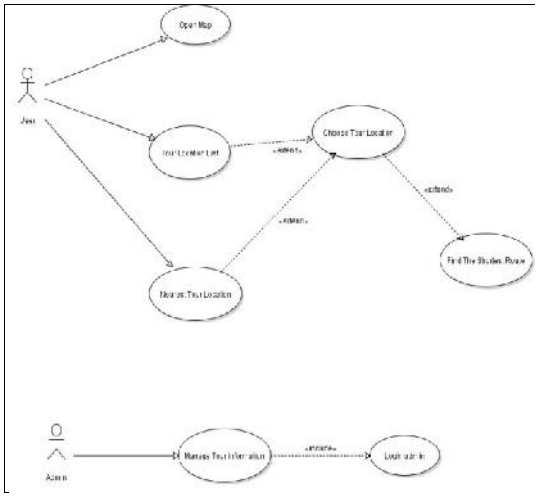

Figure 2. *Use case diagram*

C. Interface Implementation

a. Main page

This page is the page that is first displayed when the user opens the application. Figure 3 is the view of the main page. There are 2 application access levels namely admin access and public access. Admin access requires login to the system, while public access does not require login.

Figure 3 Main page

b. Menu Setting

The Settings menu is accessed by clicking the user icon in the upper right corner. There are 2 menus here, namely the management of tourist location information and the language selection menu. For the management of tourist location information, the user must log in, while to choose a language, there is no need to log in. After logging in, administrator can add, change and delete tourist location data, as shown in Figure 4

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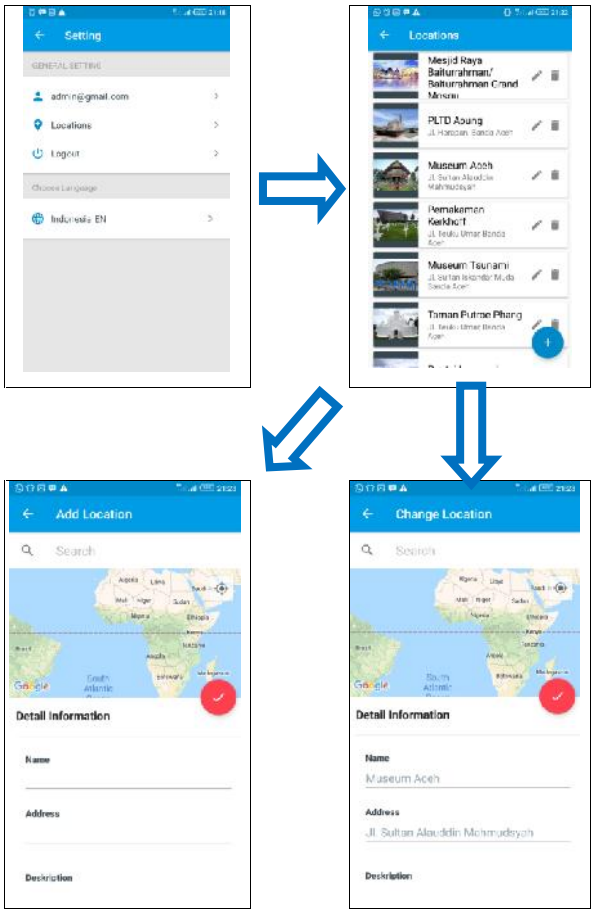

Figure 4 Menu Location

The language selection menu provides users with choices of Indonesian and English

c. Public Menu

Public menu is available to user without login. There are three main menu available that is Open Map, Tour Location List, and Nearest Tour Location. All the three menu details are shown in figures 5, 6 and 7 respectively.

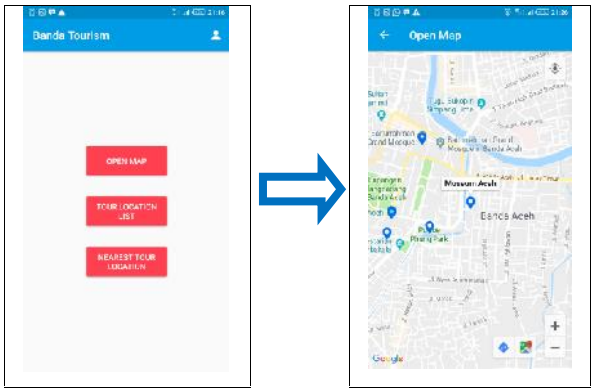

Figure 5 Menu Open Map

The Open Map menu displays a map of Banda Aceh with its point markers. If a point marker is clicked, information about that location will appear. Menu Tour Location List will display a list of tourist locations in Banda Aceh. If a list item is clicked, a detailed tourist location information will be displayed. The process of finding routes to tourist sites uses Dijkstra algorithm, which will produce the shortest route, as shown in Figure 6.

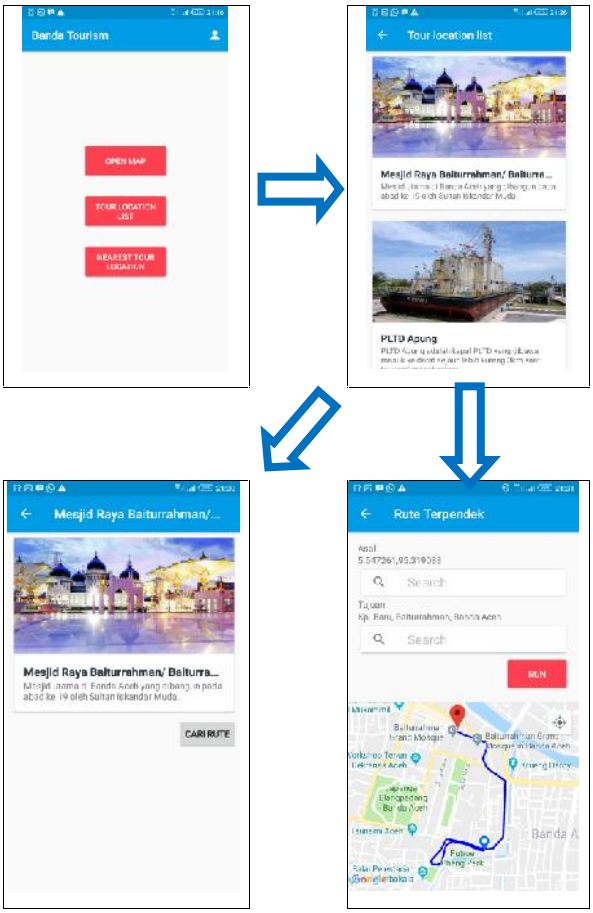

Figure 6 Menu Tour Location List

Nearest Tour Location menu will display a list of tourist locations, sorted from the closest to the user's position. The distance from the user to the tourist location is calculated by using Haversine Formula. If a list item is clicked, a detailed tourist location information will be displayed. The process of finding routes to tourist sites using the Dijkstra algorithm, which will produce the shortest route.

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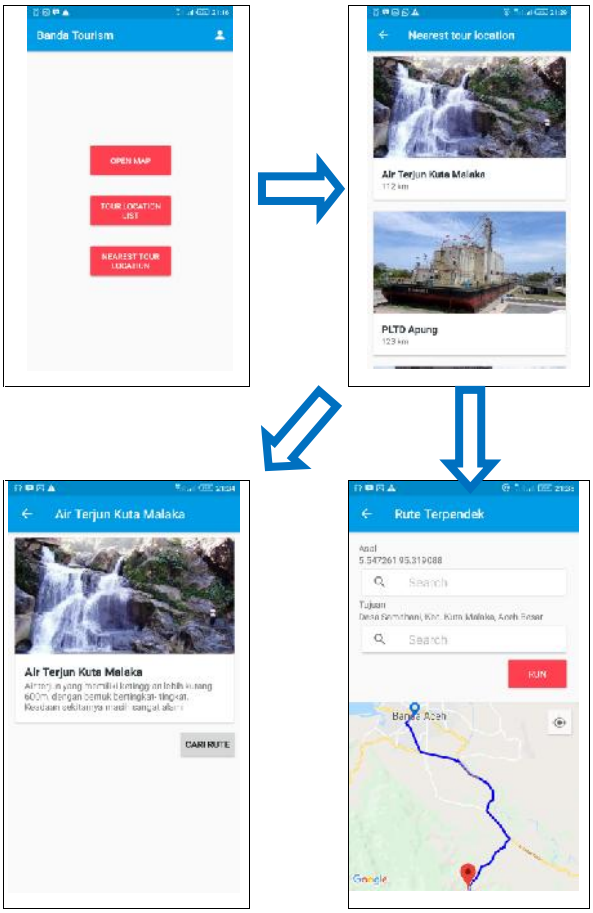

Figure 7 Menu Nearest Tour Location

CONCLUSION

An android application of Banda Aceh tourism information has been developed by utilizing the Dijkstra algorithm to find the shortest route to tourist sites and using the Haversine Formula to recommend the nearest tourist location.

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