THE NEAREST ROUTE SEARCH FOR A SHOE RETAIL SHOP USING ANDROID-BASED DIJKSTRA METHOD

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ABSTRACT

Shoe retail store is a company engaged in the sale of shoes that are developing. Until now, shoe retail stores still rely on physical stores in their business. Because it is engaged in sales, the shoe retail store requires an information system for finding a route to the store that can facilitate prospective buyers to find the location of the shoe retail store. With the shop route search information system, it can facilitate prospective buyers who do not yet know the location of the shoe retail store to find where the store is located. From the writer's observation, there are several shoe retail shops that are not indexed on Google Maps. Therefore, the author raises the title of the final project entitled "Information System for Route Search Towing the Nearest Shoe Retail Shop Using the Android-Based Dijkstra Method", to facilitate prospective buyers in the PT Stars International shoe store in finding the location of the shoe retail store. has been made, this application can run on smart phones running Android with versions starting from version 4.0.3. and the functions of this application can also run well. for the difference in distance calculation by the system using the dijkstra calculation and google maps distance calculation, a difference of 9,196% is obtained from an average of 25 random sample calculations.

Keywords: *Shoe Retail Shop, the closest distance, android, dijkstra.*

1. INTRODUCTION

Shoe retail store is a company engaged in the sale of shoes that are developing. Until now, shoe retail stores still rely on physical stores in their business. Because it is engaged in sales, the shoe retail store requires an information system for finding a route to the store that can facilitate prospective buyers to find the location of the shoe retail store. With the shop route search information system, it can facilitate prospective buyers who do not yet know the location of the shoe retail store to find where the store is located. Until now, shoe retail stores have not implemented a shop route search information system, as a result this can make it difficult for buyers who do not know the location of shoe retail stores. Therefore, it is necessary to make a route search information system for the nearest shoe retail store from the location of the prospective buyer. In measuring distance, there are a lot of methods, and the search application for shoe retail stores that will be developed in this study will use the dijkstra method, and use an android mobile device in its operation.

2. THEORETICAL BASIS

2.1. Understanding of System

The system is a set of interrelated and connected procedures for carrying out a task together. Broadly speaking, the system consists of three components, namely software, hardware, and brainware [1].

2.2. Understanding of Information

Information is the result of processing data from one or various sources and then processed in such a way that it can provide meaning, value, and benefits for users [1].

2.3. Understanding of Information System

Based on the above understanding, an information system is a combination of software, hardware, and human that is intended to process data into information through a particular process.

2.4. Shoe Retail Store

The shoe retail store used in this study is PT. Stars International, PT. Stars International is a growing company engaged in the retail of shoes, sandals and accessories such as socks and shoelaces. The growing business in the field of footwear, PT Stars International tried to sell other types besides shoes, namely clothing for women, men and children in the form of boutiques.

2.5. Dijkstra

Dijkstra's algorithm is a greedy algorithm that is used in solving the shortest distance problem for a directed graph with non-negative side weights. Figure 3.8 presents an example of a graph with its weight in determining the path using the Dijkstra algorithm.

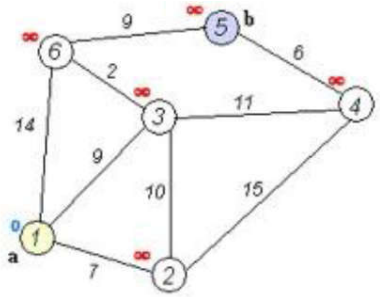

Figure 2.1. Graph Example on Dijkstra's Algorithm

The following will explain the steps for calculating the Dijkstra algorithm according to Dwi Ardana and Ragil Saputra:

1. First determine which point will be the initial node, then weight the first node to the closest node one by one, Dijkstra's algorithm will develop the search from one point to another and to the next point step by step. The logical sequence of the Dijkstra algorithm is as follows:
2. Give the weight value (distance) for each point to another point, then set the value of 0 at the initial node and the infinite value to other nodes (not filled in).
3. Set all nodes untouched and set the initial node as a departure node.
4. From the departure node, consider the neighboring node that has not been touched and calculate the distance from the departure point. For example, if the departure point A to B weighs a distance 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 (which has been previously recorded) delete old data, re-save the distance data with the new distance.
5. When we finish considering each distance from the neighboring node, mark the node that was touched as the node touched. Touched node will never be checked again, the distance saved is the last distance and the minimum weight.
6. Set the untouched node with the smallest distance (from the departure node) as the next departure node and continue by returning to step 3 [2].

3. SYSTEM ANALYSIS AND DESIGN

Based on the preliminary description above, this study aims to create an "Information System for Route Search Towing the Nearest Shoe Retail Shop Using the Android-Based Dijkstra Method". With this information system, the user can get the detailed address of the shoe retail store, the closest route to the store from the user's location, and the user also gets a route to get to the shoe retail store location.

3.1. *Flowchart* System

A system flowchart is a graphical depiction of the steps and sequences of procedures of a program. The following is an overview of the system flowchart that will be created.

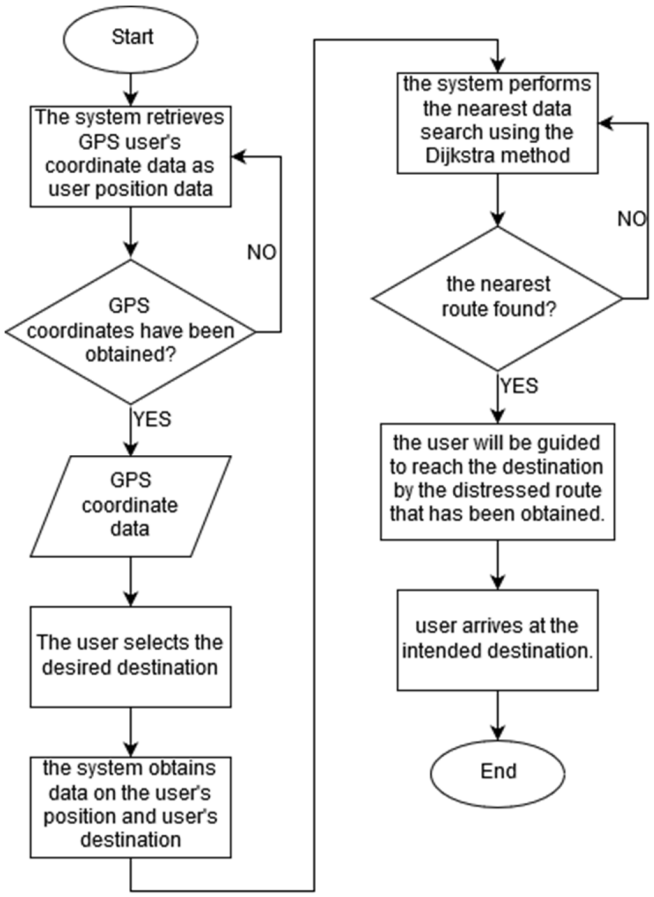

Figure 3.1. Flowchart system

3.2. *Entity Relationship Diagram* (ERD)

Entity Relationship Diagram is a diagram that illustrates the arrangement of tables and their attributes and determines relations between tables.

The following is an overview of the ERD of the system to be made:

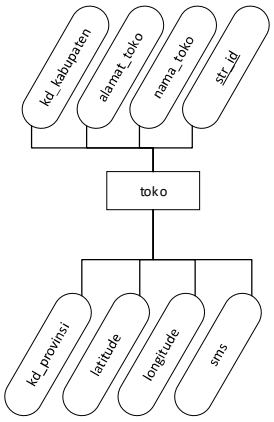

Figure 3.2. ERD

3.3. *Data Flow Diagram* (DFD)

Data flow diagram abbreviated as DFD or data flow diagram is a diagram that explains the data flow in a system. In this system, there are several levels of DFD described below.

3.3.1. *Context Diagram* (CD)

Context Diagram (CD) or context diagram is the highest level of DFD. This diagram illustrates the flow of data on a global system. The following is an illustration of the system context diagram that will be created:

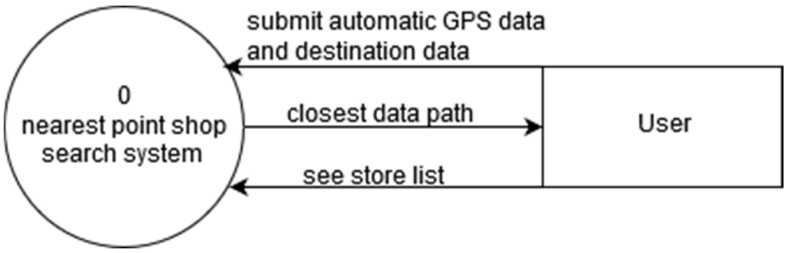

Figure 3.3. Context Diagram

The following is an explanation of the context diagram above:

a. The user can input the user's position data, and destination data.
b. Users can see the nearest route data and a list of store data displayed by the system.

3.3.2. *Data Flow Diagram* Level 0 (DFD 0)

Data Flow Diagram level 0 or DFD 0 is a DFD that describes the processes that are in the context diagram. The following is an overview of DFD 0 of the system that will be created.

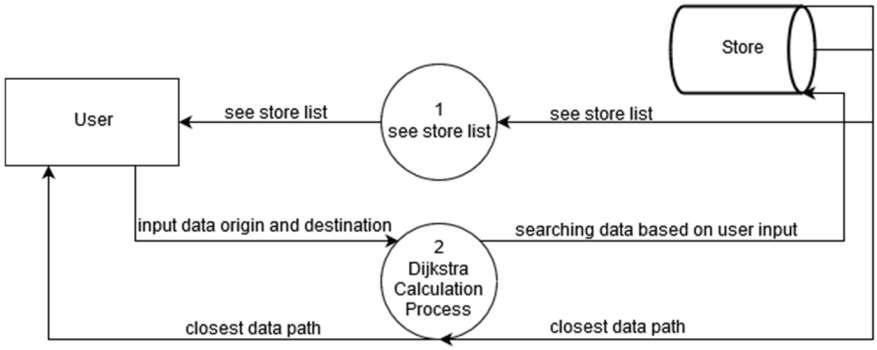

Figure 3.4. DFD 0

The following is an explanation of DFD 0 above:

a. The process of seeing a list of stores, in this process, users can see a list of stores that have been entered by the admin.
b. The calculation process is dijkstra, in this process, the user inputs the origin and destination data. Then the data will be further processed by the system, then if it is finished, the nearest path data will be displayed to the user.

4. TESTING AND RESULTS

The shortest path search information system the retail shoe store uses the Android-based Disjktra method using the black-box testing system testing method and the Dijkstra algorithm performance testing.

Black box testing is a test that does not see the coding structure of a program. And testing the performance of the dijkstra algorithm is testing how the application's performance in carrying out the methods applied in this application.

4.1. Testing Results

The following are the results of testing the information system for the shortest path search for shoe retail stores using the Android-based Disjktra method independently of the performance of the Dijkstra algorithm.
Following is the display of the route search application screen image

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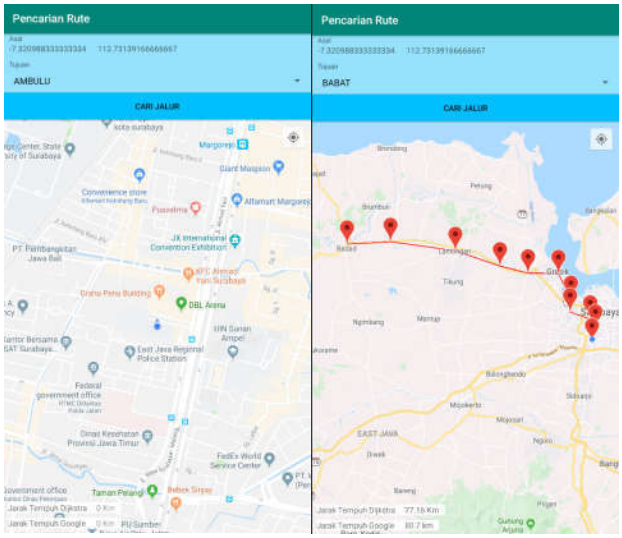

(a) (b)

Figure 4.3. Shop path search page window, a. before searching the shortest path, b. after searching for the shortest path

Following are the results of the dijkstra algorithm performance testing in this application.

Sample calculation data

Table 4.4. Sample calculation data table

No	Starting Point	Destination Point	No	Starting Point	Destination Point
1	Bangkalan	Sumenep_2	14	Bondowoso	Probolinggo_2
2	Sumenep_2	Bangkalan	15	Banyuwangi	Besuki
3	*Node* 27	Kranggan	16	Genteng	Ambulu
4	*Node* 27	Rungkut	17	Banyuwangi	Jember_2
5	*Node* 27	Pucang	18	Gondang_Legi	Malang2
6	*Node* 32	Sepanjang_1	19	Lawang	Batu
7	*Node* 27	Sepanjang_1	20	Bandungan	Tulunagung_2
8	*Node* 32	Krian_2	21	Nganjuk	Warujayeng
9	*Node* 27	Wadungasri	22	Lawang	Malang_2
10	Krian_2	Mojosari	23	Rogojampi	Jember_2
11	Tuban	Babat	24	Banyuwangi	Ambulu
12	Lamongan	Babat	25	*Node* 89	Ambulu
13	Paciran	Bojonegoro			

Table 4.5. Results of comparison of manual calculations and system calculations

No	Starting Point	End Point	Distance (Km)			Difference	Error
			Manual	System	G-maps		
1	Bangkalan	Sumenep_2	135,733	135,733	149	13,267	8,904%
2	Sumenep_2	Bangkalan	135,733	135,733	149	13,267	8,904%

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3	Node 27	Kranggan	10,61	10,61	11,4	0,79	6,929%
4	Node 27	Rungkut	6,22	6,22	7,0	0,78	11,142 %
5	Node 27	Pucang	9,661	9,661	9,0	0,661	7,344%
6	Node 32	Sepanjang_1	2,67	2,67	3,1	0,43	13,870 %
7	Node 27	Sepanjang_1	3,865	3,865	4,4	0,535	12,159 %
8	Node 32	Krian_2	12,653	12,653	12,9	0,247	1,194%
9	Node 27	Wadungasri	4,957	4,957	4,9	0,057	1,149%
10	Krian_2	Mojosari	12,849	12,849	13,6	0,751	5,522%
11	Tuban	Babat	25,9	25,9	29,4	3,5	11,904 %
12	Lamongan	Babat	27,8	27,8	29,0	1,2	4,137%
13	Paciran	Bojonegoro	62,008	62,008	65,1	3,092	4,749%
14	Bondowoso	Probolinggo_2	79,28	79,28	96,9	17,62	18,183 %
15	Banyuwangi	Besuki	118,41	118,41	136	17,59	12,933 %
16	Genteng	Ambulu	73,67	73,67	92,9	19,23	20,699 %
17	Banyuwangi	Jember_2	86,839	86,839	105	18,161	17,296 %
18	Gondang_Legi	Malang_2	22,387	22,387	23,7	1,405	5,928%
19	Lawang	Batu	26,753	26,753	28,3	1,547	5,466%
20	Bandungan	Tulunagung_2	20,151	20,151	20,9	0,749	3,583%
21	Nganjuk	Warujayeng	17,159	17,159	17,6	0,441	2,505%
22	Lawang	Malang_2	19,398	19,398	19,5	0,102	0,523%
23	Rogojampi	Jember_2	73,339	73,339	90,9	17,561	19,319 %
24	Banyuwangi	Ambulu	103,97	103,97	128	24,03	18,773 %
25	*Node* 89	Ambulu	87,231	87,231	93,6	6,369	6,804%

4.2. Analysis of Testing Results

The conclusion of the application compatibility testing above is that the application runs quite well on Android starting in version 4.0.3.

From the testing of the Dijkstra algorithm that is implemented in this application it can run well, although the value of the distance between the starting point and end point has a distance difference from that displayed by Google Maps. And the average distance difference between Google Maps and Dijkstra is 9,196% of the 25 sample trials.

From the results of the above tests, the application can be stated that the system is worth testing the Dijkstra algorithm performance testing.

5. CONCLUSION AND RECOMMENDATION

5.1. CONCLUSION

Based on the results of research and discussion that has been done, it can be concluded that:

A. A search application for the nearest route to the Stars International shoe store has been created using the Android-based Dijkstra method.
B. The Dijkstra method cannot detect roads that are only one-way or two-way.
C. The application can apply the Dijkstra method, even though there is a difference in distance with what is displayed on Google Maps.
D. The more the curve of the road, the greater the measurement distance distance of the dijkstra method and Google maps will be even greater.
E. The application can display Dijkstra lines and Dijkstra nodes that are traversed according to the start and end points specified by the user.
F. By using the calculation of 25 sample data, the calculation error value obtained in this application when compared with the calculation of Google Maps is 9,196%.

5.2. Recommendation

Based on the results of research and discussion that has been done, there are several suggestions for further research, namely:

A. It is hoped that in future studies the A * method can be used to determine the fastest path, because the A * method is the development of the Dijkstra method.
B. In further research, additional features can be made to search for products at the nearest International Shoes Stars store.
C. For the creation of Djkstra nodes and paths, to be made close to the form of road curves, so that the resulting distance difference is not too far from the distance indicated by Google Maps.

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