Blood Donor Location Search Using Floid Warshall Algorithm Based on Android For Increasing Blood Donor in Muslim Civil Society In South Tangerang PMI (Indonesian Red Cross)

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Abstract. The Indonesian Red Cross (PMI) is an institution engaged in social humanity, according to WHO (World Health Organization) is ideally availability of blood is 2% of the total population, which means that for Indonesia currently requires 4.6 million bags of blood, but the PMI only get less the requirement of 0.5% in 2005. The availability of blood bags at the office of the Indonesian Red Cross (PMI) City of South Tangerang, continues to diminish. In fact, no additional stock of blood bags, thus able to meet demand from a number of blood bags Hospital. This fact is reinforced by Dr. Alwan as director of PMI South Tangerang who said that in the provision of blood stock PMI South Tangerang still rely on blood donation every agency has been scheduled, but the location of blood donors are difficult to find. It is a problem in determining the closed distance to reach the location of a blood donor. Therefore, it is background to research Blood Donor Location Search Using Floid Warshall Algorithm Based on Android. It can help people to get to the closed location the blood donor. Finally, the result showed the display user interface menus of application software. It fulfills the needs of a blood donor in PMI South Tangerang.

Keywords: Floyd-Warshall algorithm; Android; Shortest Path; PMI (Indonesian Red Cross); Blood Donor; Muslim Civil Society

1 Introduction

In Indonesia, the blood needs a minimum of about 5.1 million blood bags per year, or according to WHO (World Health Organization) is ideally availability of blood is 2 percent of the population. But the production of blood and its components now only 4.6 million bags from 3.05 million blood donations, as much as 86.20 percent of which came from voluntary blood donors. That means blood production nationally is still less than 500,000 bags of blood [5].

The view availability of blood national can be seen in the image below:

ICONQUHAS 2018, October 02-04, Bandung, Indonesia

DOI 10.4108/eai.2-10-2018.2295466

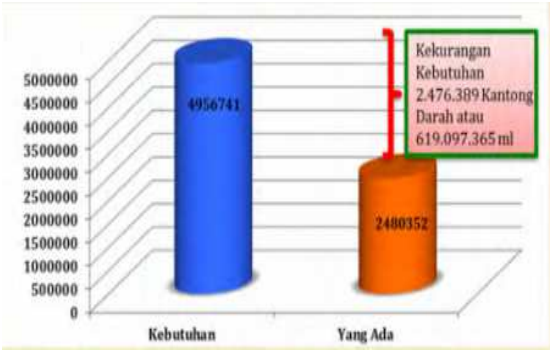

Figure 1. Annual report UTD PMI, 2013 by the Ministry of Health Media Centre

From the picture above shows the need for high blood bags make the Indonesian Red Cross (PMI) has continued to organize blood donation so that the supply of blood bags in Indonesia can be met, particularly in the UDD every region in Indonesia.

The availability of blood bags in the office of the Indonesian Red Cross (PMI) Serpong, South Tangerang continue to diminish. In fact, no additional stock of blood bags, so overwhelmed meet demand for blood bags from a number Hospital[7], the lack of participation of the community to donate blood is still lacking, was very influential in the blood supply in the UDD PMI Tangsel. Because the population of South Tangerang as many as 1,443,403 people (BPS Tangsel, 2014), 2% of the population requires a blood bag as many as 28 868 people per year. Meanwhile, the stock of blood bags Tangsel PMI data last Thursday (23/7), a total of 554 bags of blood that has been issued to meet the needs of hospitals. While before fasting to 900 bags of blood ejected by the PMI. From these data, it is quite far away there is a difference of about 55% [7]. As a result, a lot of demand for blood bags are not all fulfilled.

Based on the interviews with the Chief Director of the PMI South Tangerang namely Dr. Alwan said that in the provision of blood stock PMI South Tangerang still rely on blood donation every institution that has been scheduled, but the information search site blood donation is still a problem in determining the path closest to reach the site of blood donors so we need a system that can show the direction of the location a blood donation takes place.

In addition, according to an interview to Mr. Guntur as the marketing division that says that people do not want to know about blood donation location information. This becomes a problem and need to be considered in view of the high demand for blood stock in the PMI South Tangerang.

in religious terms called ta'awun is an effort to help each other, synergize between one party and another. Then the possibility can be positive and also negative. It is positive if you help to do it in terms of goodness, and negative if you help, it is done in terms of disobedience. In the teachings of Islam, the command to help is directed in a positive context, namely in matters of kindness and piety.

History has proven how a civil society in Madinah was formed thanks to ukhuwah (sense of brotherhood) and helped each other in kindness and piety between the Muhajirin and Ansar groups. Like this, please help in line with the basic objectives of Islam, namely in order to foster positive values and laudable character in every Muslim person.

A. The collection of the Proposal of the Qur'anic Verses About Help in Goodness and Devotion

Mutual help in kindness and piety is a very noble thing. A number of verses in the Qur'an have also stated explicitly about this order. Here is a Qur'an verses about helping in goodness

and piety that are important to us to know, as an affirmation that the habit of helping in the context of goodness and piety is part of the noble Islamic teachings.

B. The Translate Qur'an Surah Al-Maidah(QS 5 : 2): [9]

O you who have believed, do not violate the rites of Allah or [the sanctity of] the sacred month or [neglect the marking of] the sacrificial animals and garlanding [them] or [violate the safety of] those coming to the Sacred House seeking bounty from their Lord and [His] approval. But when you come out of ihram, then [you may] hunt. And do not let the hatred of a people for having obstructed you from al-Masjid al-Haram lead you to transgress. And cooperate in righteousness and piety, but do not cooperate in sin and aggression. And fear Allah; indeed, Allah is severe in penalty.

يَا أَيُّهَا الَّذِينَ آمَنُوا لَا تُحِلُّوا شَعَائِرَ اللَّهِ وَلَا
الشَّهْرَ الْحَرَامَ وَلَا الْهَدْيَ وَلَا الْقَلَائِدَ وَلَا آمِّينَ
الْبَيْتَ الْحَرَامَ يَبْتَغُونَ فَضْلًا مِنْ رَبِّهِمْ وَرِضْوَانًا ۚ
وَإِذَا حَلَلْتُمْ فَاصْطَادُوا ۚ وَلَا يَجْرِمَنَّكُمْ شَنَآنُ
قَوْمٍ أَنْ صَدُّوكُمْ عَنِ الْمَسْجِدِ الْحَرَامِ أَنْ
تَعْتَدُوا ۘ وَتَعَاوَنُوا عَلَى الْبِرِّ وَالتَّقْوَىٰ ۖ وَلَا
تَعَاوَنُوا عَلَى الْإِثْمِ وَالْعُدْوَانِ ۚ وَاتَّقُوا اللَّهَ ۖ إِنَّ
اللَّهَ شَدِيدُ الْعِقَابِ

Figure 2. Qur'an surah Al-Maidah (QS 5 : 2)

Floyd Warshall algorithm is one variants of dynamic programming, which is a method that perform troubleshooting by viewing solution that will be obtained as a decision interrelated.[3]

The algorithm works by calculating the shortest path (i, j, k) for all pairs (i, j), then the results will be used to calculate the shortest path (i, j, k) for all pairs (i, j), and so on. This process will continue until k = n and we have found the shortest path for all pairs (i, j) using the vertices intermediaries. [3]

Using this method because Floyd Warshall algorithm looked at solutions that will be obtained as a decision of interrelated so that better ensure the success of the invention of the optimum solution for the case of determining the shortest path. [4]

Based on searching on Play Store Android, there is currently no system that can provide the shortest route to the location information of blood donors. And referring to the studies above are still using the web to do research and have developed into a mobile version.

So, we make the title the research is " Blood Donor Location Used Floid Warshall Algorithm on Android (Case South Tangerang PMI)".

The study have limitation problem bellow:

Program used shortest distance search method Floyd Warshall. Development system used RAD (Rapid Application Development), which consists of three phases: planning requirements, workshop design and implementation. The modeling system Using UML (use case diagrams, activity diagrams, sequence diagrams, and class diagrams). Software testing

used Black Box Testing. The location of blood donors in South Tangerang region, with reference to the data of the UDD PMI (Indonesian Red Cross) South Tangerang. The location have been scheduled by PMI or already routinely perform blood donors in each certain institutions. The software used, among others, the Eclipse IDE for Java Developers Neon.1 Release (4.6.1), Sublime Txt 3, Microsoft Visio 2013. The application is built using the Java language, using SQLite database. The road map is used major roads, excluding the small streets or alleys.

This paper is organized as follows. Section 2 describes the related work of this research. Section 3 describes the method which used in this research. Section 4 describes the result and discussion. Finally, sections 5 resent our conclusion.

2 Related Works

The study the shortest path problem with cycles on a network; however the results can be simply applied to cases on a graph.[1] They review the Floyd–Warshall algorithm that finds both the shortest costs and the shortest routes between every pair of nodes on this network, and develop a new efficient algorithm for this problem that reduces the required computational effort of the Floyd–Warshall algorithm substantially. [1]

Presented approach reduces the transitive closure calculation time for parameterized graphs representing all dependences in the loop in comparison with that yielded by means of techniques implemented in the Omega and ISL libraries. [2]

The Floyd-Warshall algorithm is a simple and widely used algorithm to compute shortest paths between all pairs of vertices in an edge weighted directed graph. It can also be used to detect the presence of negative cycles. We will show that for this task many existing implementations of the Floyd-Warshall algorithm will fail because exponentially large numbers can appear during its execution. [4]

3 Methods

The research used method of below:

3.1 Data Collection Methods

This research used: Observation, Interview; two persons of the PMI South Tangerang, namely Dr. M. Alwan A.T as Director of PMI South Tangerang and Mr. Guntur as marketing division. and literature review

Systems Development Method

In Designing Search System Blood Donor location with Floyd Warshall method, the authors use the method of system development Rapid Application Development (RAD).[8] There are three stages in the RAD, namely: 1. Requirements Planning Phase; 2. Stage Design Workshop; 3. Implementation phase

3.2 The Requirements Planning Phase

Consist of: 1. Problem Analysis; 2. Defining the problem; 3. Walking System Analysis; 4. Analysis of the Proposed is: the design system location search using Floyd – Warshall algorithm on Android-based as mobile device platform. We use the shortest distance search by

Floyd - Warshall Algorithm. It is one variant of the method of finding the closest distance to compare all the possible trajectories on the graph for each side of all the nodes that exist, so that the conclusions are very optimal.

3.3 Floyd Warshall Algorithm Analysis

3.3.1 Work Steps Floyd Warshall algorithm

These algorithms find the shortest route from the origin node to the destination node in a graph by comparing all the possible trajectories (s) on a graph for each side of all nodes. The steps in determining the shortest route to the Floyd-Warshall algorithm namely:

a. The first issue is divided into several stages and creates a flowchart to facilitate the search for the shortest route.
b. When entering into a stage, the yield on the stage will be a new node to the next stage.
c. Define the first point as a starting point in order to do a search algorithm.
d. Find neighboring node directly to a node (the starting point).
e. Compare the weight of each stage are already summed with weights in the preceding stage, find the route with the weight of the smallest to the search process ends.
f. The weight held by a stage will be summed with weights exist at earlier stages as the number of stages.
g. The search stops when the destination node has been found.
h. After the process is complete, check out how these were acquired for a specific purpose and to select a route with the least amount of weight to be the shortest route from Floyd-Warshall algorithm.

3.3.2 Floyd algorithm flowchart Warshall

The algorithms design the flowchart to completed steps

3.3.3 Calculation Algorithm Floyd Warshall

The examples case that Floyd-Warshall algorithm calculation. It shows connectivity between route conditions in the region in this case, suppose someone will do a blood donor from point 3 to point 6. It seen in a graph following the map in

Figure 3.1.

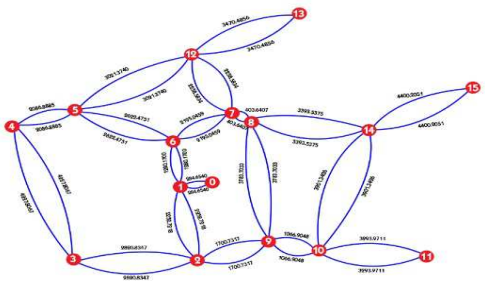

Figure 3. Undirected graph

The initial step is to group each stage of the search process and find nodes are connected directly to the node that is being reviewed, the process is as follows:

1. Stage 1: At this point node being reviewed is point 3. Then point 3 has two candidates solution that points 2 and 4.
2. Stage 2: Once phase 1 is completed to review, so now there are processes performed on stage 2, where the candidate point solutions exist at one stage, namely points 2 and 4 to be used next node on stage 2. Points 2 and 4 have candidate solutions i.e. 5 points, 1 and 9.
3. Stage 3: After phase 2 is completed to review, so now the process will be carried out there at stage 3, where the candidate point existing solutions in two stages ie 5 points, 1 and 9 for further used as a node in step 3. Points 5, 1 and 9 have candidate solutions that points 6,0,10 and 8.
4. Stage 4: In stage 4 until the latter stages will be explained through a flowchart, a process carried out in four stages similar to the process performed on the stages before. And if the points of interest is found, the calculation in Stop.
   The following flowchart depiction is a description of the process flow of the search Floyd Warshall algorithm based cases.

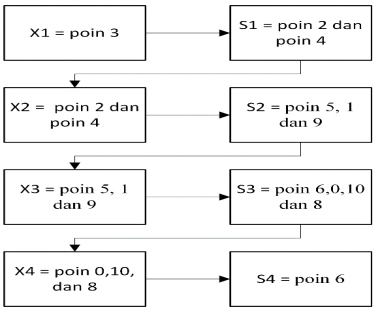

Figure 4. Flowchart 5 cases of use Floyd Warshall algorithm

Description of figure 4:
Xi = Point Node
Si = Candidates Solutions

4 Result and Discussion

Based on chapter 3 above we described follow:
f: the value of the distance between a point-per-stage (in meters)
k: phases of (1, 2, 3, 4, ..., n)
x: node / point of origin by-step
s: nodes under review to become candidates per-phase solution
Stage 1: f1 (s) = cx1s

Table 1. Table Floyd Warshall Calculation Process Phase 1

point of Interest	point of Origin

S_1	Optimum Solutions	
	$f_1(s)$	x_1
2	2820	3
4	4227	3

The first stage, the algorithm Floyd Warshall perform the calculation process from point of origin to the point 3-point interconnected to the point 6. In the first stage point 3 is connected with points 2 and 4, each point has a value of distance 2820 m and 4227 m. The following will be shown a map of the calculation of the shortest route phase 1 shown in Figure 5.

Figure 5. Phase 1-searching shortest path Floyd-Warshall algorithm

Phase 2: f2 (s) = min {CX2 s x2 + f2-1 (x2)}

Table 2. Calculation Process Floyd Warshall Phase 2

point of Interest	Point of origin			
X_2 S_2	$f_2(s) = min\ x_2 \{cx_2\ s + f_{2-1}(x_2)\}$		Optimum Solutions	
	2	4	$f_2(s)$	x_2
1	5072		5072	2
9	4520		4520	2
5		6313	6313	4

The second stage, the Floyd Warshall Algorithm performs the process of calculation of the origin 2 and 4, which had previously been a candidate point solution in step 1. The candidates have a solution that is point 1, 9 and 5, each point has a value range as following:

1. The total distance obtained through the calculation of phase 1, namely: (3 → 2) = 2820 m
2. The distance obtained in the calculation of phase 2, namely: 2 → 1 = 2252 m

3. The total distance obtained through the calculation of phase 2, namely: (3 → 2) + (2 → 1) = 2820 m + 2252 m = 5072 m

Calculation of the distance to the point that others are:

1. The total distance obtained through the calculation of phase 1, namely: (3 → 2) = 2820 m
2. The distance obtained in the calculation of phase 2, namely: 2 → 9 = 1700 m
3. The total distance obtained through the calculation of phase 2, namely: (3 → 2) + (2 → 9) = 2820 m + 1700 m = 4520 m

While the calculation for the distance to the point is:

1. The total distance obtained through the calculation of phase 1, namely: (3 → 4) = 4227 m
2. The distance obtained in the calculation of phase 2, namely: 4 → 5 = 2086 m
3. The total distance obtained through the calculation of phase 2, namely: (3 → 4) + (4 → 5) = 4227 m + 2086 m = 6313 m

Stage 3: f3 (s) = min {CX3 s x3 + f3-1 (x3)}

Table 3. Calculation Process Floyd Warshall Stage 3

point of Interest	Point of origin				
X_3 S_3	$f_3(s) = min\ x_3\ \{cx_3\ s + f_{3-1}\ (x_3)\}$			Optimum Solutions	
	1	9	5	$f_3(s)$	x_3
6	6352		8935	6352	1
0	5356			5356	9
10		6486		6486	5

The third stage, the Floyd-Warshall algorithm process of calculating from the origin 1, 9 and 5, which had previously been a candidate point solution in step 2. And the candidates have a solution that is point 6, 0 and 10, which each point has a value distance as follows:

1. The total distance obtained through the calculation of phase 2, namely: (3 → 1) = 5072 m
2. The distance obtained in the calculation of three stages, namely: 1 → 6 = 1280 m
3. The total distance obtained through the calculation of 3 stages, namely: (3 → 1) + (1 → 6) = 5072 m + 1280 m = 6352 m

Calculation distance from one point to others is:

1. The total distance obtained through the calculation of phase 2, namely: (3 → 5) = 6313 m
2. The distance obtained in the calculation of three stages, namely: 5 → 6 = 2622 m
3. The total distance obtained through the calculation of 3 stages, namely: (3 → 5) + (5 → 6) = 6313 m + 2622 m = 8935 m

Calculation of the distance to another point is the total distance obtained through the calculation of phase 2, namely: (3 → 1) = 5072 m

1. The distance obtained in the calculation of phase 3, which is 1 → 0 = 284 m
2. The total distance obtained through the calculation of 3 stages, namely: (3 → 1) + (1 → 0) = 5072 m + 284 m = 5356 m

While the calculation for the distances to the point are:

1. The total distance obtained through the calculation of phase 1, namely: (3 → 9) = 5420m
2. The distance obtained in the calculation of phase 2, namely: 9 → 10 = 1066 m
3. The total distance obtained through the calculation of phase 2, namely: (3 → 9) + (9 → 10) = 5420 m + 1066 m = 6486 m

The following will be displayed map the shortest route calculation in accordance with step 3 in Figure 6.

From the analysis that has been sought, the importance of the two routes on blood donors who were in item 6. The following will be reordered 2 service obtained from the process of manual calculations using Floyd Warshall algorithm along with the distance of each route that has been traced for later compared data to where the shortest route to use search distance with Floyd Warshall algorithms.

Route 1: 3, 4, 5, 6 = 8935 m

Route 2: 3,2,1,6 = 6352 m

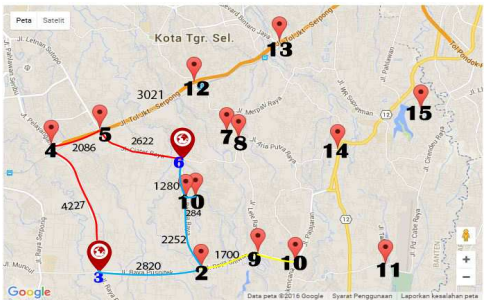

Figure 6. Phase 3-search shortest path Floyd-Warshall algorithm

From both these, the results of each route are then compared and obtained the shortest route on the route to two with a total distance of 6352 m, so to get to the location of blood donors who are in point 6, these were obtained using the algorithm of Floyd Warshall is 3.2, 1.6. The following route map will be displayed from the calculation of the shortest route is obtained using Warshall Floyd algorithm, can be seen in Figure 7.

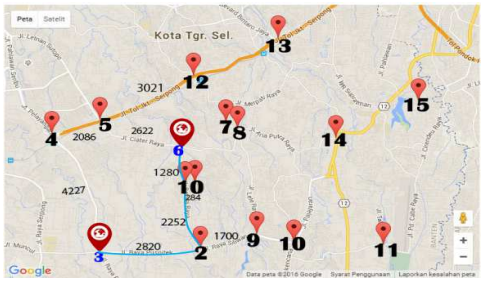

Figure 7. The results of shortest path Floyd -Warshall algorithm

Results Display User Interface:

1. Pageviews splashscreen

Image is an application splashscreen display. This page is the start page appears when you first run the application.

2. Home Page Views
   Image is the home display applications. This page is the home page that appears after splashcreen run.
3. Pageviews Stock Blood
   Image is the blood stock display applications. This page is the page that contains the features of blood stock selection blood stock information blood type A, B, AB and O.
4. Route Info Page Views
   Image is the info view these applications. This page is the page that contains the information feature maps the path closest to the location of a blood donor.
5. Location Info Page Views
   Image is an application location. This page is a page that displays feature location info map locations of donor blood that has been scheduled by UDD PMI South Tangerang.
6. Information Page Views
   Image is an information display applications. This page is a page that displays information feature selection user information required.
7. Calls Page Views
   Image is an application call display. This page is a page calling features that serve to make calls to the UDD Red Cross for the benefit of emergency first aid as well as information about the info blood.
8. Setting Page Views
   Figure is a display page calls an application that serves to make a call directly from our smartphone to UDD PMI.

5 Conclusion

The conclusions are:

1. Applications built already running on Android devices and can access content residing on the database on the server machine interface, and successfully demonstrated the shortest route directions to the location of the desired blood donor.
2. Various software (different versions of the Android OS) that is different, it can run all the application's features well.
3. Applications Search locations UDD PMI South Tangerang was able to show some of the features such as, blood stock location info, call and others, as well as finding the shortest route algorithm by applying Floyd-Warshall.

The suggestion are:

1. The development of further applications are expected to be able to show the data path that includes the types of roads (main roads and minor roads) and capable of adapting to road traffic conditions in the city of South Tangerang.
2. In the search application development next blood donor locations expected to have more other features in the app menu.
3. In the search application development locations next blood drive is expected to be operated not only on android smartphone, but also can be operated on any other platform.

4. The system is made to update the database is static (not dynamic).
5. the test results of blackbox testing there are still some features that are less attractive, such as its location so that there is no marker for further research can show the location marker to make it more attractive.

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