

Geographic Information Systems Practice Midwife In Merauke Regency Android-Based Method Using Spherical Law of Cosines

Tatik Melinda Tallulembang

Proram Studi Sistem Informasi, Fakultas Teknik Universitas Musamus Merauke

* Corresponding Author:

Email: tatik_melinda@unmus.ac.id

Abstract

Health is a resource for the daily life of the community. Because without health, a person can not run the activity with the good. To that end, the society can not be separated from the figure of health that play a role in manifesting the life of a healthy society as a midwife. One of the reasons people really need a midwife is the cost of the examination or the cost of labor is affordable. Therefore, it is needed a Geographic Information System Midwife Practice in Merauke Regency Android-Based Method Using Spherical Law of Cosines can help and facilitate user to search, and know the location of the midwife practice and service information available at the place of such practices as well as the closest distance to the user. Geographic Information system Midwife Practice in Merauke Regency Android Based on the design by using Eclipse with the java programming language, and using a MySQL database. The method used to search the nearest distance of the user with the location of the midwife practice using the method of Spherical Law of Cosines, and the method of testing using the method of blackbox and questionnaires. The result of this research is to produce a geographic information system application based on android to handle mapping the location of the midwife practice as well as data information midwife online which is accessible to the public in Merauke Regency.

Keywords : *Geographic Information System, Practice Midwife, Android, Spherical Law of Cosines*

I. INTRODUCTION

In the aspect of maternal and child health as well as the process of childbirth, the profession of a midwife, much needed in the community, especially in remote areas such as rural. One of the reasons people really need a midwife is the cost of the examination or the cost of labor is affordable in support with the number of patients at one practice that midwives Anny with the amount of visitors on average per day 10 patients (Source: Midwives Anny). The practice of midwives is a series of activities of the health care provided by a midwife to the patient in accordance with the authority and ability. Health services provided such as, delivery services, inpatient treatment, antenatal care, immunization, every childbirth is normal, treated light as well as the family planning program. A midwife is a woman who has the education kebidan that has been recognized by the Government and has completed the education and pass the exam which has been determined as well as obtain a certificate which has been listed as a major statement to do the practice in accordance with his profession[4]. Midwives who practice independently must have a Letter of Permission to Practice Midwife (SIPB) so that it can run the practice on health advice or program. (Imamate ,2016).

The shape of the earth with the extreme point on the surface of the earth (Wisdom, 2015).

Information system is a system that is responsible for managing, presenting information related to geographic[3]. [1] while the formula haversine used based on the shape of the earth round by eliminating the factor that the earth is slightly elliptical (viewed from a straight line without seeing the actual path) [2].

To perform a search of the distance from one location to another, there are two formulas that can be used as a solution to the search for the closest distance, the formula is the Spherical Law of Cosines and the formula haversine. The Formula of Spherical Law of Cosines this assumes neglect the effect of the relief of the earth actually is. Based on the journal-the journal of research of a kind, this formula is considered accurate enough to be able to calculate the distance between two points on the earth's surface and will definitely give different results with the actual distance that consider the contour of the earth (Wisdom, 2015), while the formula haversine used based on the shape of the earth round by eliminating the factor that the earth is slightly elliptical (viewed from a straight line without seeing the actual path) (Agustan & Stanly, 2016).

Create the application itself can use a variety of tool motion. Android is a subset of software for mobile devices that includes an operating system, middleware dn application released by Google [5]. MYSQL is one of the types of database servers is open-source and not paid very much used by the application developer using the data base as a source of data management [6].

II. METHODS

Get information on the implementation of this research, several ways are included in a data collection method. The methods implemented include: the interview method ,the method of literature,observation and documentation. Black box testing is one of the types of software testing. Black box testing focuses on the functional requirements of the software. Thus, the black box testing enables the engineering of software to get a set of input conditions that fully uses the functional requirements for a program [8]. Spherical Law of Cosines

Spherical Law of Cosines is one of the base equation of the Spherical triangle. Spherical Law of Cosines this assumes neglect the effect of the relief of the earth actually is. One application of the Spherical Law of cosines is calculating the distance between two points on the surface of the earth and will definitely give different results with the actual distance that considers the contours of the earth [1].

Flowchart of the proposed system

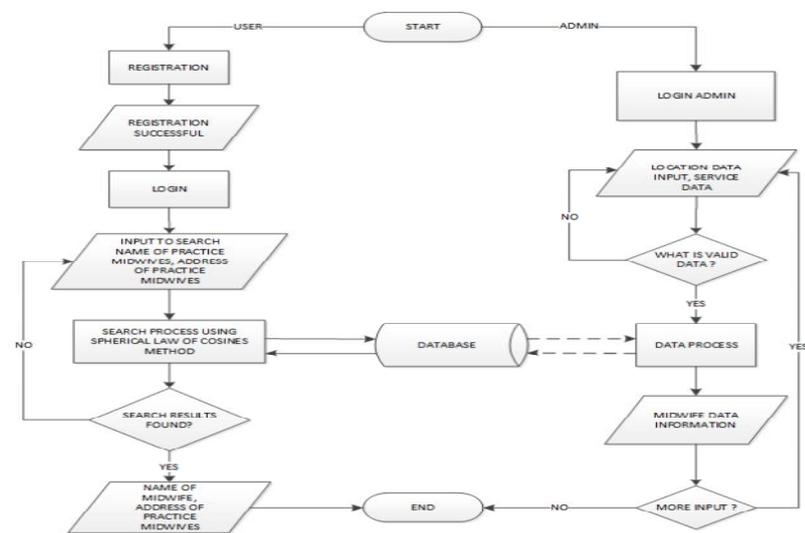


Fig 1.Flowchar system proposed

Context Diagram (Context Diagram)

The context Diagram has an external entity, i.e. the outer part of a system that has a relationship with the system

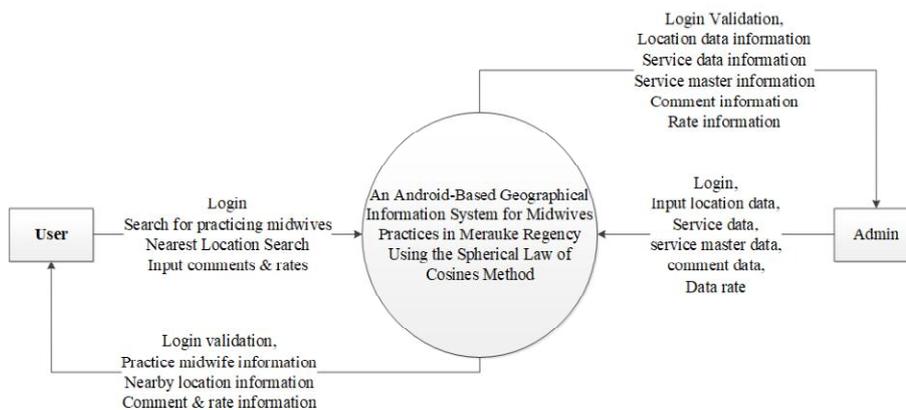


Fig 2. Context Diagram

Relasi Tabel .

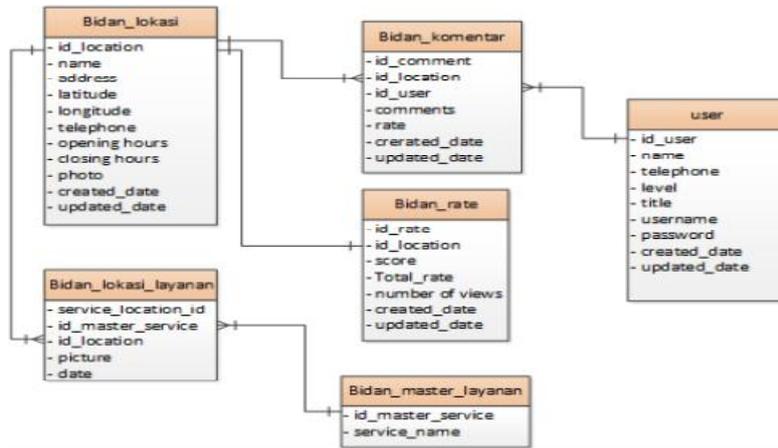


Figure 3. Relation table

III. RESULTS AND DISCUSSION

The Appearance Of The Main Page Of Admin

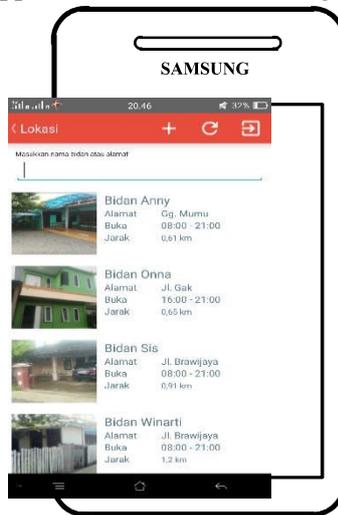


Fig 4. The Appearance Of The Main Page Of Admin

Display Data Input

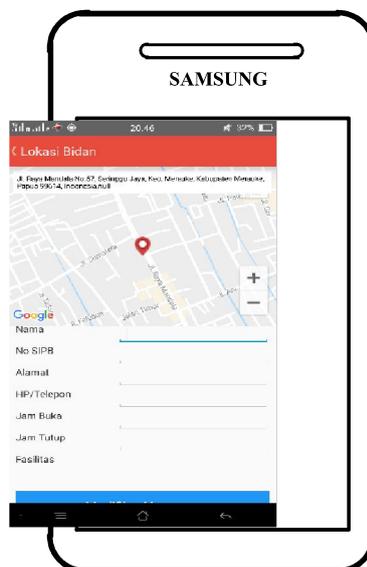


Figure 5. Page View Input Data

Testing Distance

The Implementation Of The Method Of Spherical Law Of Cosines

The implementation of the method of Spherical Law Of Cosines is one of the base equation of the Spherical Triangle. Spherical Law of Cosines this assumes neglect the effect of the relief of the earth actually is. One application of the Spherical Law of cosines is calculating the distance between two points on the surface of the earth and will definitely give different results with the actual distance that considers the contours of the earth.

Position on earth can be presented with the position of the latitude (latitude) and longitude (longitude). To determine the distance between two points on the earth based on the location latitude and longitude using one of the formula, namely the Spherical Law of cosines. Here is the Spherical Law Of Cosines formula :

$$d = ACOS(SIN LAT1 * SIN LAT2) + COS (LAT1)* COS (LAT2)*$$

Description :

- a. D is the distance between two point
- b. Lat is the latitude
- c. Long, is the longitude
- d. R is the radius of the circle the ball (R = 6.371.000 : the Earth's radius in meters (6371 Km).

The Latitude and Longtitude obtained from Google MapsServer.

Calculation of the distance to the nearest begins with the system determines the initial position of the user (Latitude and Longitude). As an example known to the starting position (start point) are on the road Bampel with the coordinates of the -8,503935, 140,397756 and the position of the destination is located in Midwives Anny road Gg.Mumu with the coordinates that -8,500599, 140,393269. The system will display a list of Midwife Practice and distance by using the method of Spherical Law Of Cosines.

Unknown :

- Lat1 : -8,503935
- Long1 : 140,397756
- Lat2 : -8,500599
- Long2 : 140,393269

The above values are still in the form of degrees, so it should be converted first in the form of a radian. The following table of values, which are converted into the form of a radian:

Table 1. Conversion Value In The Form Of A Radian

Point	Latitude	Longitude
1	-8,503935	140,397756
2	-8,500599	140,393269
Conversion of degrees to radians		
1	-0,148421665	2,450403105
2	-0,148363441	2,450324844

Testing The Calculation Method Of The Spherical Law Of Cosines

Below is the results of the comparison based on the case study above. Midwife practice that is displayed only in the form of a sample. Data coordinates of the samples below were obtained from Google Maps. The coordinates of the User are the coordinates of the user's position (start point), while the coordinates of the midwife practice are the coordinates of the destination (destination point).

Table 2. The results of the Calculation of the Distance By the Method of SLC

No.	Name Practice Midwife	Midwife Practice		User		Distance
		Latitude	Longitude	Latitude	Longitude	

1.	Bidan Anny	-8,500599	140,393269	-8,503935	140,397756	0,61 Km
2.	Bidan Onna	-8,502936	140,391882	-8,503935	140,397756	0,65 Km
3.	Bidan Winarti	-8,502661	140,408604	-8,503935	140,397756	1,20 Km
4.	Bidan Indah	-8,498179	140,386821	-8,503935	140,397756	1,36 Km
5.	Bidan Manurung	-8,521061	140,411831	-8,503935	140,397756	2,45 Km

Can be seen in table 4.3 above, based on a sample that has been calculated midwife practice that is closest to the position of the user that are in the Way Bampel is a Midwife Anny namely the extent to 0.61 Km.

Testing Method Comparison SLC and Haversine

Testing the comparison method of distance calculation is done using peerhitungan the formula of the method of Spherical Law of Cosines and the formula method Haversine use the javascript language to determine whether the two methods produce the same distance or a different. The following tables the results of the testing in the second method :

Table 3. The results of the Testing Method Comparison SLC and Haversine

No.	Name Practice Midwife	Testing <i>Spherical Law of Cosines</i>	Testing <i>Haversine</i>	The Difference In Distance
1.	Bidan Anny	0,61 Km	0,62 Km	0,01 Km
2.	Bidan Onna	0,65 Km	0,66 Km	0,01 Km
3.	Bidan Indah	1,36 Km	1,37 Km	0,01 Km
4.	Bidan Winarti	1,20 Km	1,21 Km	0,01 Km
5.	Bidan Manurung	2,45	2,46 Km	0,01 Km

IV. CONCLUSION

- This system can display information on data midwives practice in the form of the name of the midwife, the number of SIPB, address, phone number, facilities, services, hours of service, and feedback.
- This system is created by using formula Spherical Law Of Cosines (SLC) to search for the closest distance of the user with the location of the midwife practice.

V. SUGGESTIONS

Based on the results of the above conclusion, the writer can give suggestions for the development of the next system is expected to be developed to be better than the existing system before, eg addition on the distribution map location midwives practice in Merauke Regency.

REFERENCE

- [1] N. Hikmah, "Penerapan Spherical Law of Cosines Pada Aplikasi Pemilihan Objek Wisata Berbasis Android," *Teknik Informatika*, 2015.
- [2] A. Latif, "Sistem Informasi Pemetaan Rumah Ibadah di Kabupaten Merauke Berbasis Android Menggunakan Metode Haversine," *KNSI*, 2016.
- [3] S. Aronoff, *Geographic Information System; A Management Perspective*, Ottawa, 1989.
- [4] R. Depkes, Keputusan Menteri Kesehatan RI No: 900/MENKES/VII/2007 Konsep Asuhan Kebidanan, Jakarta, 2007.
- [5] N. Safaat, *Pemrograman Aplikasi Mobile Smartphone dan Tablet PC Berbasis Android*, Bandung: Informatika Bandung, 2015.
- [6] M. Arief, *Pemrograman Web Dinamis menggunakan PHP MySQL*, Yogyakarta: Andi, 2011.
- [7] I. W. E. Swastikayana, "Sistem Informasi Berbasis Web Untuk Pemetaan Pariwisata Kabupaten Gianyar," 2011.
- [8] R. S. Pressman, *Rekayasa Perangkat Lunak Pendekatan Praktis (Buku I)*, Yogyakarta: ANDI, 2012.