4thICITB

APPLICATION OF THE DIJKSTRA ALGORITHM IN THE DISSEMINATION OF LOCATION OF CERTIFIED TEACHING STAF OF LAMPUNG PROVINCE PUBLIC ELEMENTARY SCHOOLS

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ABSTRACT

Provision and provision of information currently takes place very quickly in human life. The necessary information must be easily accessed by various parties who have interests to be more effective and efficient. One of them is information in the world of education, occupying a very important role because education and information is a vehicle in actualizing all the available potential so that it can improve and develop human resources. One of the information needed is knowing the location of certified public elementary school educators in Lampung Province. This mapping application is a distribution from the location of certified educators by applying the Dijkstra Algorithm. So that with this application, it is expected that the data collection of professional teachers or those who have been certified for the State Elementary School level with the Dijkstra Algorithm in Lampung Province can be monitored and known by the Education Office of Bandar Lampung city. Besides that it also provides information to other parties who need it.

Keywords:Mapping, Location of Educators, Dijkstra Algorithm;

INTRODUCTION

The development of information technology is currently very fast. Information technology is not only limited to computer technology (hardware or software) that is used to process and store information, but

also includes communication technology to transmit information. The necessary information must be easily accessed by various parties who have interests to be more effective and efficient.

One of the information needed is information in the world of education. Information in the world of education for elementary school, occupies a very important role. Where primary school education is the basis of the implementation of teacher quality in improving national education in Indonesia. In addition information in the world of education is a vehicle to actualize all the potential that exists so that it can improve and develop human resources. One of the information needed is knowing the location of certified public elementary school educators in Lampung Province. This mapping application is a dissemination of the location of certified educators by applying the Dijkstra Algorithm by finding the shortest route from a weighted graph.

This application is expected to be able to provide information related to professional or certified teacher data collection for the State Elementary School level with the Dijkstra Algorithm in Lampung Province which can be monitored and known by the Education Office of Bandar Lampung city. In addition, it can also provide information to other parties who need an overview of the location of certified educators in Lampung Province Primary School based on the Dijkstra Algorithm.

LITERATURE REVIEW

The development of Information Technology is currently very fast advancing and plays an important role in all fields. The need for fast and accurate information is needed by all parties, both individuals, private business groups both small, medium and large as well as government agencies. Information is data that has been processed into a form that is meaningful to the recipient and useful in making decisions today or in the future (Al Fatta, 2007).

According to Kadir (2013) there are several experts who define Information Technology as follows:

1. Haag den Keen (1996), "A set of tools that help humans work with information and perform tasks related to information processing".
2. Martin (1999), "Information technology is not only limited to computer technology (hardware or software) that is used to process and store information, but also includes communication technology to transmit information".
3. Williams and Swayer (2003), "Technology that combines computing (computers) with high-speed communication lines that carry data, sound and video".

Geographic Information System (GIS) is the computer based system. Computer based system are a series or order of elements – elements that are set to achieve a predetermined goal through information processing (Pressman, 2012).

Pressman (2012) states that the paradigm prototype begins with gathering needs, then the design is carried out, then ends with a prototyping evaluation which can be seen in Figure 1 below:

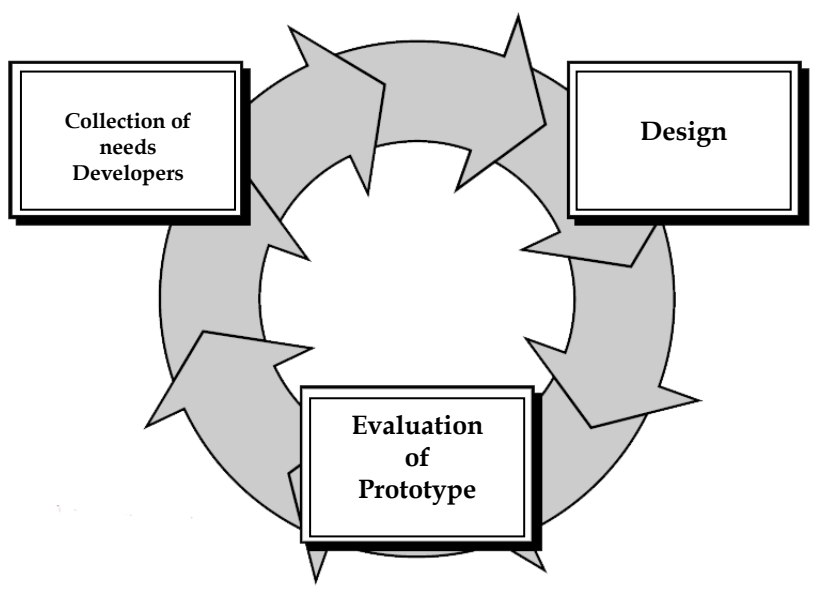


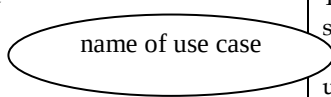
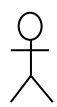
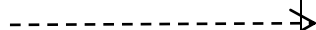
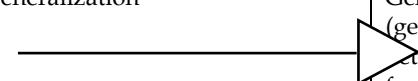
Figure 1. Prototype model

The stages of the Prototype Model in Figure 1 above are as follows:

1) Collection of needs Developers and clients meet to determine common goals, known needs and descriptions of the parts that will be needed next. Next, analyze what data is needed
2) Design The design is done quickly and the design represents all aspects of the software that are known, and this design is the basis for making Prototype.
3) Evaluation of Prototype Prospective users evaluate Prototype that is created and used to clarify software requirements. Software that has been run, is repaired if it is unsatisfactory.

Use case diagram is a high ranking description of how the software (application) will be used by its users. Use case is not only very important in the analysis phase, but also very important for design, to find classes involved in the application, as well as to conduct testing (Nugroho, 2010). There are symbols used in the Use Case Diagram as shown in the table 1 below:

Table 1. Symbols Use Case Diagram

Symbol	Description
Use case 	The functionality provided by the system as units that exchange messages between units or actors is usually expressed using the verb at the beginning of the phrase name use case.
Actor  name of actor	People, processes, or other systems that interact with the information system that will be created outside the information system that will be created itself, so even though the symbol of the actor is a picture of a person, the actor is not necessarily a person; usually stated using nouns at the beginning of the phrase name actor.
Association 	Communication between actors and use cases that participate in the use case or use case has interactions with actors.
Extend <<extend>> 	Additional use case relations to the use case where the use case added can stand alone even without the additional use case; similar to the principle of inheritance in object-oriented programming; usually additional use cases have the same first name as the use case added.
Generalization 	Generalization and specialization (general-specific) relationships between two use cases where one function is a more common function than the other.

The following are previous studies related to the application of the shortest path search:

Shaga Bogas Priatmoko, with the title Dijkstra Algorithm for Searching the Nearest Path and Recommendations on Tourism Objects on the Island of Bali, Informatics Engineering Study Program, Dian Nuswantoro University. Describes that the tourism industry will develop if the growth of tourist visitors continues to increase will contribute to increasing economic income. Some factors that can guarantee the tourism industry are the availability of information about tourism. Every person who travels tourism must choose the shortest distance to reach the destination because it can save time. From these problems, the shortest path search system and tourist recommendations are made. It is expected to help determine the path of other tourism objects that can be used to regulate the schedule of travel or can be used as a consideration to determine the alternative location of tourism objects that are one-way or adjacent, so as to save costs and time. The way to search for the shortest path is to use the dijkstra algorithm. This algorithm is chosen because it can complete the search for the shortest path from one node to all nodes in a directed graph with non-negative weights and values.

RESEARCH METHOD

Data collection techniques performed in this study use:

1. Literature Study by studying the literature related to research conducted both from books and from scientific journals.
2. Field Study by taking the necessary data on the object under study by conducting interviews (question and answer) and observation (direct observation).

Some of the advantages of this study are as follows:

1. This study analyzes conditions and maps the location of certified teaching staff at the Lampung Province public primary school level. The results obtained are an overview of the allocation of public elementary school teaching staff in Lampung Province in the form of digital knowledge.

2. From the results of the analysis and mapping, a location for certified primary school educators in the Lampung Province will be established based on the Dijkstra Algorithm. So that the Education Office will have the spread of location applications for public elementary school educators in Lampung Province by applying the Dijkstra Algorithm. This application can provide information to other parties who need a deployment of the distribution of locations of certified educators of Lampung Province State Primary Schools based on the Dijkstra Algorithm.

3. The final result to be achieved from the research is to support the Education Office in mapping the distribution of locations of certified state primary school teaching staff in Lampung Province using the Dijkstra Algorithm. Besides that it also provides information to other parties who need it. As well as improving the service of the Education Office in providing information on the distribution of public primary school teaching staff locations with the application of the Dijkstra Algorithm.

The description of the stages of this research is to use the stages of the Prototype Model (Pressman, 2012):

1. Collection of Needs Conduct a survey as a basis for sorting / grouping data on the distribution of certified teacher locations at Lampung Province Public Elementary Schools. Next, take data to the Education Office to obtain data and information about Public Elementary School teachers who have been certified in Lampung Province.
2. DesignThis stage design the application of the location distribution of certified state primary school educators in Lampung Province by applying the Dijkstra Algorithm:

   a. Use Case DiagramUse Case diagram is a high ranking description of how the software (application) will be used by its users.The first stage in designing the application of the location of the educator's power distribution is to create a use case diagram. Figure 2 below is a use case diagram for the application for distributing locations of certified public primary school educators to Lampung Province based on the Dijkstra Algorithm:

Figure 2. Use Case Diagram

b. Table Structure

The following table 2 is used to store District data:

Table 2. District Table Structure Design

Field Name	*Tipe Data*	*Size*	*Description*
No	Int	16	Number
Kecamatan	Varchar	20	Kecamatan

The following table 3 is used to store Regency data:

Table 3. Draft Structure of District Tables

Field Name	*Tipe Data*	*Size*	*Description*
OGR_FID	Int	11	OGR FID
SHAPE	Geometry		SHAPE
Id	Decimal	8,0	Id
Kabupaten	Varchar	20	Kabupaten
Luas	Varchar	16	Luas

The following table 4 is used to store school location data:

Table 4. Draft Structure of School Location Tables

Field Name	***Tipe Data***	***Size***	***Description***
OGR_FID	Int	11	OGR FID
SHAPE	Geometry		SHAPE
Id	Decimal	8,0	Id
lokasi_sekolah	Varchar	100	Lokasi Sekolah
Nama	Text		Name
Kecamatam	Varchar	50	Kecamatan
Alamat	Text		Addres

3. Evaluate the prototype

Improving and adding information to the mapping of the location distribution of certified public primary school teaching staff in Lampung Province, namely by evaluating and monitoring the application for distributing the location of public elementary school educators based on the Dijkstra Algorithm. This application utilizes website facilities to Google. Where the advantages provided from the website include easy access and distribution of information (Sidik, 2005).

FINDINGS AND DISCUSSION

The following are the results of the Application for Spreading the Locations of Public Elementary School Teachers based on the Dijkstra Algorithm:

1. On the Dijkstra shortest route test page, the user fills in the Initial Location and then fills the desired Destination Location and then selects the View Route button. The route test display uses the Dijkstra Algorithm on this application as in the following figure 3:

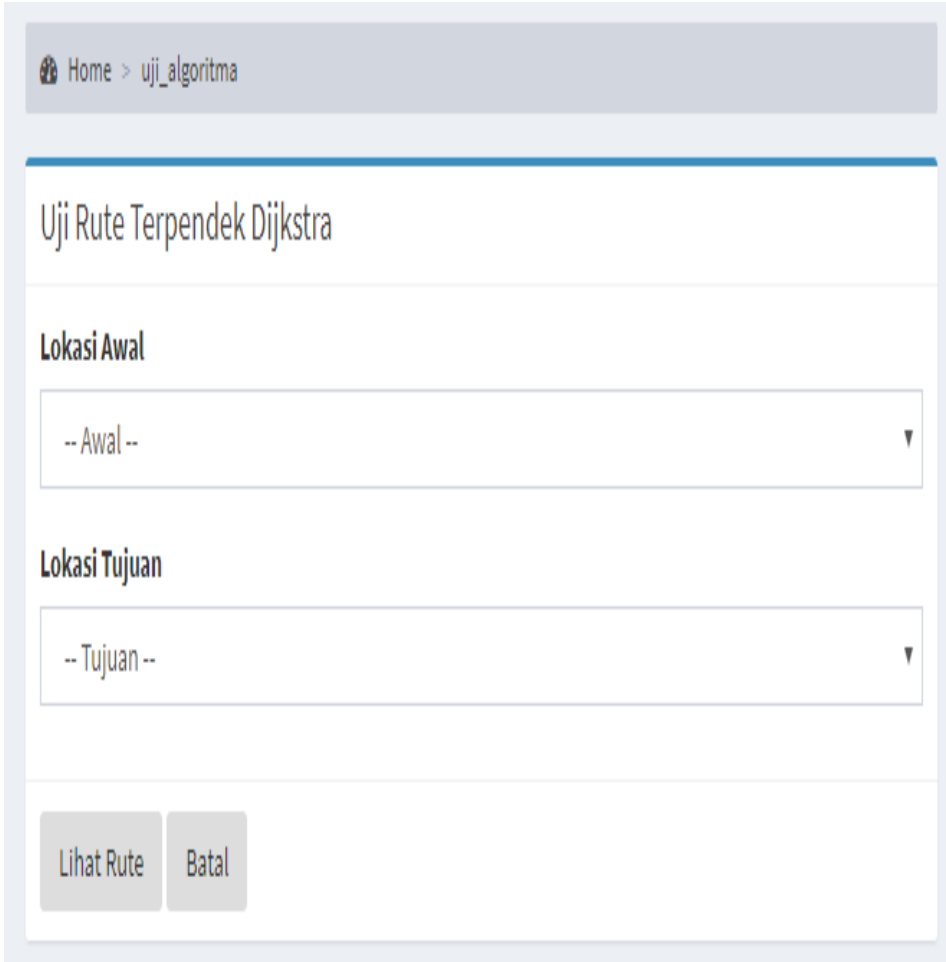


Figure 3. Display of Test Routes Using the Dijkstra Algorithm

2. Figure 4 below is a display of the results of the search for the shortest route using the Dijkstra Algorithm:

Hasil Pengujian Pencarian Rute Terpendek Dijkstra

Objek Asal	Objek Tujuan	Rute Perjalanan dengan Algoritma Dijkstra	Waktu	Jarak
Rajabasa, Bandar Lampung City, Lampung, Indonesia	Jl. Teuku Umar No.38a, Sidodadi, Kedaton, Kota Bandar Lampung, Lampung 35123, Indonesia	Gg. Masjid, Jagabaya II, Kec. Sukabumi, Kota Bandar Lampung, Lampung, Indonesia	18 menit	6,4 km
Rajabasa, Bandar Lampung City, Lampung, Indonesia	Jl. Teuku Umar No.38a, Sidodadi, Kedaton, Kota Bandar Lampung, Lampung 35123, Indonesia	Jl. Teratai No.21, Surabaya, Kedaton, Kota Bandar Lampung, Lampung 35132, Indonesia	12 menit	4,3 km

Figure 4. Results of Testing the Shortest Route Search Using the Dijkstra Algorithm

3. Figure 5 below is a display of route search results using the Dijkstra Algorithm:

::: Hasil Pencarian Rute Jalan Menggunakan Algoritma Dijkstra :::

Lokasi Awal	:	Rajabasa, Bandar Lampung City, Lampung, Indonesia
Lokasi Tujuan	:	SDN MANDAH
Rute Perjalanan Anda	:	Jl. Teratai No.21, Surabaya, Kedaton, Kota Bandar Lampung, Lampung 35132, Indonesia
Jarak Tempuh	:	**4,3 km** dengan Waktu Tempuh 12 menit

Figure 5. Search Results for Routes Using the Dijkstra Algorithm

The discussion for the Application for Spreading the Location of Public Elementary School Teachers based on the Dijkstra Algorithm is the distribution of the location of public elementary school teachers using the Dijkstra Algorithm which can provide information on the location of certified teachers in Lampung Province with the closest road route. This application is also expected to provide an overview of the spread of the location of public elementary school teachers in Lampung Province which can be monitored and known by the Education Office of Bandar Lampung city and other parties who need it with the application of the Dijkstra Algorithm.

CONCLUSION

Building Applications Spreading the Locations of Public Elementary School Educators based on the Dijkstra Algorithm, obtained several conclusions, namely:

1. Makes users able to find out the spread of the location of public elementary school teachers.
2. Provide an overview to the user regarding the nearest route to the distribution of certified teacher locations in Lampung Province.

Suggestions that can be given for the development of this application are as follows:

1. Addition of features to Application for Dissemination of Educators' Locations.
2. Improvement of features in the Dissemination Location of this Educator Power Application based on user needs.
3. Use of this application using Android technology.

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Shaga Bogas Priatmoko. (2017, December 5). Dijkstra's Algorithm for Nearest Path Search and Recommended Tourism Objects on the Island of Bali. Informatics Engineering Study Program, Dian Nuswantoro University. Retrieved From http://eprints.dinus.ac.id/13345/1/jurnal_13933.pdf.