

## Dijkstra's Algorithm to Find Shortest Path of Tourist Destination in Bandung

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**Abstract:** Bandung is one of the many islands in Indonesia and is known as the "City of Flowers". Bandung has a variety of tourist destinations eg. The Asian-African Museum, Alun Alun Kota, Puncak Dago, and many other tours in the area around Bandung. Dijkstra's algorithm is one of the algorithms that can solve the problem of finding the shortest route which is a problem in graph theory. Implementation of the system that we use will result in a website application that uses the Javascript programming language. This system uses the Dijkstra algorithm which is very useful for visitors because tourists can find the shortest route that can be taken to and from a tourist destination in the area of Bandung that you want to visit using this system. With the research of the shortest route using the Dijkstra algorithm to find the fastest route of tourist attractions in the city of Bandung, the tourists can add information about the fastest route and finally the tourists can choose the best route that can streamline all costs and find out all the information on tourist objects in This city of Bandung.

**Keywords:** Graph, Javascript, Dijkstra Algorithm, Tourism

### 1. Introduction

With so many tours in Bandung, tourists want to know clear information on where the tourist sites are located and the paths that must be taken to get to the location of the destination tourist spot. The correct information is very important because there is a lot of hoax information circulating on social media, this can lead to disinformation for tourists visiting the city of Bandung [1] [2] [3]. The shortest path search is a problem to find a path between two nodes with a minimum number of weights, in the case of searching the fastest path between two locations on the map to travel between the two locations (Lestari<sup>1</sup> and A K Puspa, 2017; Chenrai & Jitmahantakul, 2019) . One of the methods used to solve the problem of running the shortest path using the Dijkstra algorithm, the Dijkstra algorithm is the algorithm for finding the cheapest path from an initial vertex to the last vertex, this algorithm is based on the greedy technique. The Dijkstra algorithm will search for the shortest path starting from the initial node to the destination node and this algorithm will compare the smallest weight from the initial node to the destination node to find the most efficient path

#### 1.1. Background Software Ideas

Bandung is the capital of West Java province. The city always attracts tourists both domestic and international with culinary tourism, shopping and nature tourism. Very diverse tourist attractions in Bandung, making tourists will not run out of ideas for places to visit. That is why, this city has become one of the main tourist destinations in West Java while on vacation. Its location is fairly close to Jakarta, making it a favorite tourist spot for citizens of the capital. Especially with the existence of a well-known campus to make the city of Bandung become crowded will come from outside the city.

#### 1.2. The Purpose and Benefits of Software Development

The benefits of this program are by showing the route on the tourist attractions with the shortest possible distance and effectively reach the tourist destination.

Benefits for students from outside Bandung can find out the list of attractions in the city of Bandung and its surroundings

#### 1.3. Limitation of Software Developed

This program will cover several limitations in order to clarify the scope of the program being made.

- Tourist attractions in the city of Bandung and surrounding areas
- Aimed at telkom students especially those outside the region
- Shortest route search based on distance

### 2. Methodology

Based on the workmanship and development of this application, what will be done first is from making an application mockup and then working on a web application front-end using javascript, especially using the javascript framework, leaflet.js, after that the map and data marker making are used to create a location plan tourist attractions in the city of Bandung and surrounding areas. For route search using the dijkstra algorithm or route search based on the smallest cost from source to destination.

### 2.1. Dijkstra's Algorithm

The shortest route search includes in-graph theory material. The very algorithm famous for solving this problem is Dijkstra's algorithm. This algorithm was invented by a Dutch computer scientist who was named Edsger Dijkstra. Figure 1 below is the pseudo code of Dijkstra's algorithm

```
1. procedure dijkstra (w,a,z,L)
2.   L(a) := 0
3.   S := { }
4.   for semua verteks x#a do
5.     L(x) := ∞
6.   T := himpunan semua vertex
7.   while z(T) do
8.     begin
9.       pilih v(T dengan minimum L(v)
10.      T:= T-{v}
11.      S:= S union {v}
12.      for setiap x(T di samping v
13.        do
14.          L(x):=min(L(x), L(v)+w(v,x) )
15.        end
16.      end dijkstra
```

Figure 1. Dijkstra's pseudo code algorithm

Dijkstra is the algorithm used to find the shortest path on a graph directed[4] [6]. An example of implementing the Dijkstra algorithm is the shortest path that connects between the two different cities (Single-source Single-destination Shortest Path Problems). Procedure Dijkstra's algorithm uses a greedy strategy, wher at each step, the side with the smallest weight is selected which connects an already node selected with other vertices that have not been selected. Dijkstra's algorithm requires parameters of the place of origin and place of destination. This result is the shortest distance from the place of origin to the destination and its route.

### 2.2. Scalable Vector Graphics (SVG)

Scalable Vector Graphics (SVG) is a file format for displaying graphic in XML-based web development (eXtensible Markup Language) [5][8]. SVG works to display 2-dimensional graphics in XML code. In reality, SVG can create three types of graphic objects, namely path (consisting of straight lines and curves), images, and text. SVG can create a graphic consisting of many different vectors. The main advantages of SVG are the image will not lose its quality enlarged or reduced (scalable) because it is made based on the vector method (vector), not pixels (such as graphic formats in general, GIF, JPEG and PNG). So that it allows developers web and also designers to create graphics with high quality.

### 2.3. Analysis of Requirements and Design of Software Solutions

In developing this system, steps are taken namely: conducting a needs analysis, making system design/design, coding, then implementation and testing. Needs analysis is done with data collection using the method literature that is done by reading books related to the system geographic information and tourist places at Bandung.

The next step in developing this system is making system design. The system design is described with the diagram as shown in Figure 2. System users are web visitors and the function it can do is search the shortest route, and zoom in / out map view. Of course, a map of Bandung island and its four tourist attractions are already available beforehand. If the user wants to find the shortest route, so the user must type one place of origin and one place of destination which are desired. While the facilities zoom in / out a map, can be selected when the user wants to see the display area that is it is desired to be larger / smaller.

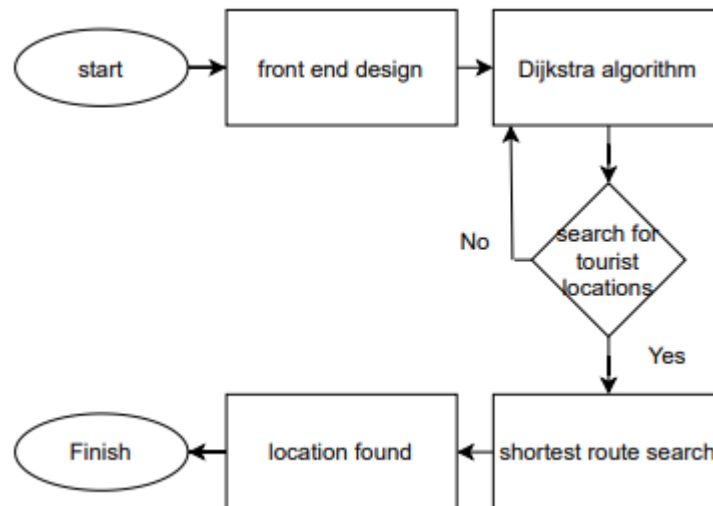


Figure 2. Shortest route search methodology

If all the design has been done, then proceed to check whether the system designed in terms of distance or weight can show the distance or not.

### 3. Implementation

#### 3.1. Interface System Design

At this stage the system interface is designed to interact between the user and the system. This stage is very important because a good interface design will make users feel comfortable in using a computer application. The following menu structures will be designed in this shortest route search application.



Figure 3. Design of Attraction Data

The picture above is a page that will be accessed by users to search for tourist attractions with the shortest route to be passed.

### 3.2. Software Implementation

To use the program, it's simple enough to just access and then just look for tourist attractions in the city of Bandung or on the map that has been provided then type in the start and end Type the Button that has the search icon

<u>Place Name</u>	<u>Latitude</u>	<u>Longitude</u>
Farm house bandung	-6.8329716,	107.6035328
Kebuh teh sukawana	-6.7769071,	107.5817071
Curug tilu leuwi opat	-6.7905692,	107.5804448
Tangkuban perahu	-6.7596375,	107.6010045
Kawah putih	-7.166154,	107.4010426
Situ patenggang	-7.1672928,	107.3532848
Curug cimahi	-6.799262,	107.575337
Taman huan rata Ir.Djuanda	-6.8565791,	107.6301794
Curug cisanti	-7.2088735,	107.6561095

Figure 4: Software Implementation

### 3.3. Documentation on How to Use the Software

To use the program, it's simple enough to just access and then just look for tourist attractions in the city of Bandung or on the map that has been provided then type in the start and end

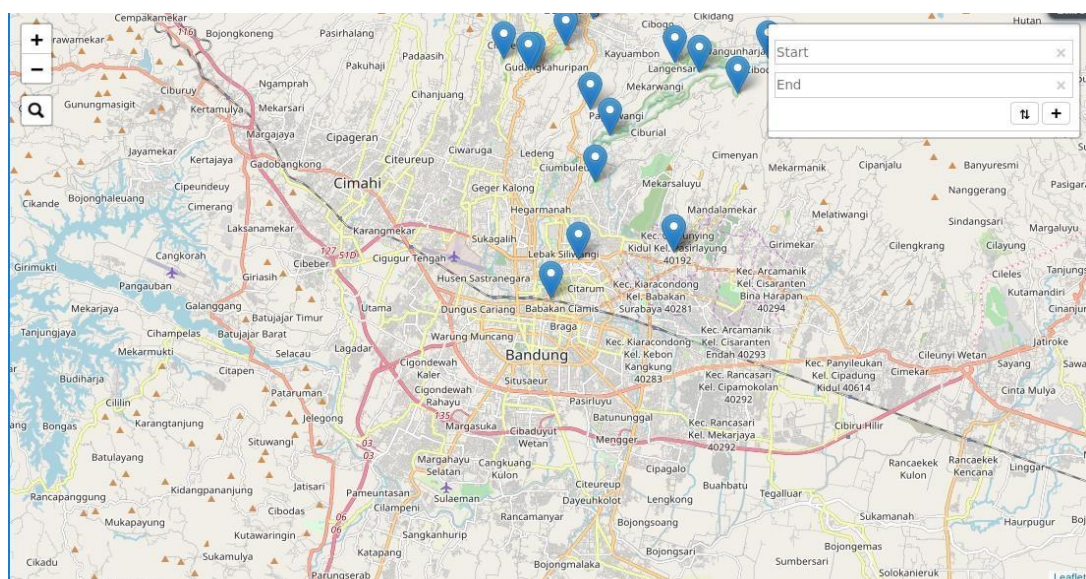


Figure 4: Software Implementation

Then the program will show the floor plan on the map provided

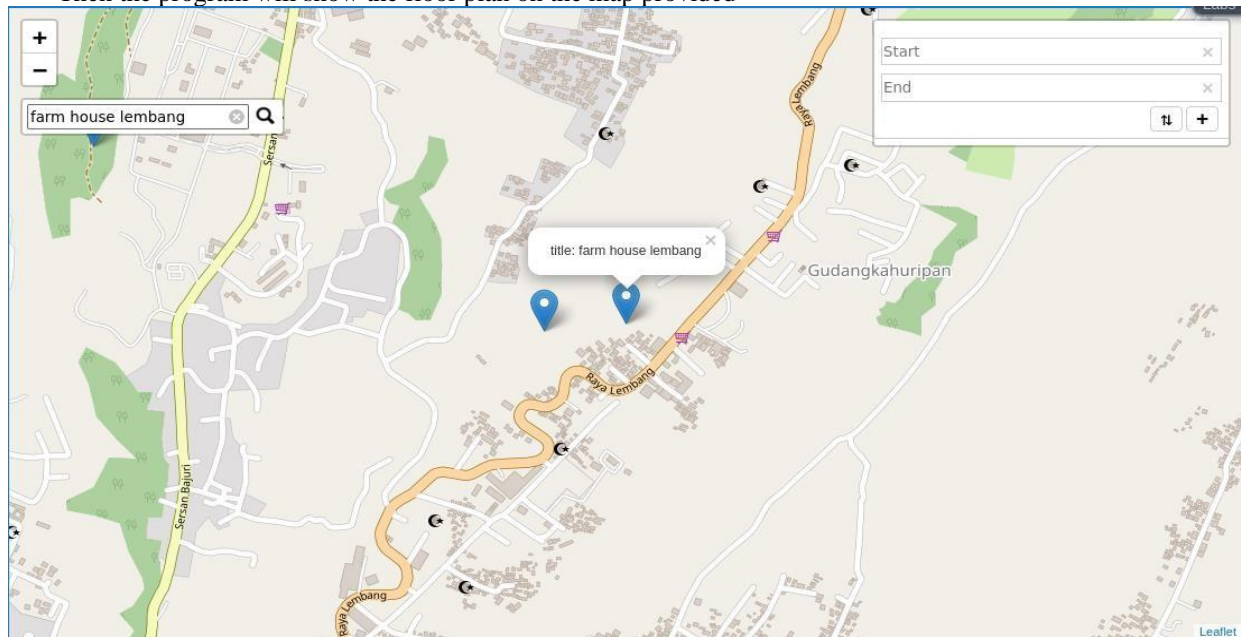


Figure 5: view of the route found

### 3.4. Cooperation Partners

For this application we undergo cooperation with the Bandung City Transportation Agency. The function of the Department of Transportation of the City of Bandung consists of four main bases which are explained as follows:

1. Formulation of technical policies in the field of transportation
2. Implementation of part of government affairs and public services in the field of transportation.
3. Fostering and implementing transportation operational tasks which include parking, transportation, terminal, service and operational traffic.
4. Implementation of administrative technical services.

The reason we want to collaborate with Dishub bandung is because in Bandung city makes a tourist bus that has 5 bus routes with 71 bus stops. Their bus route covers an area from the North (bandung city) with a stop at the Dago Tea House U-turn to the south (bandung city), so in our opinion it is very good to use the goWis application because in this application we use the Dijkstra algorithm to complete the problem of finding the shortest route and tourists will get to the tourist sites quickly and very effectively.

## 5. Conclusion

From the development and testing, and validation(SY.Yuliani, 2020) of the system that has been carried out in connection with the search for the shortest route by using Dijkstra's algorithm on Bandung tourist attractions can provide several things, namely:

1. Dijkstra's algorithm is good enough to use on the shortest route search from and to tourist attractions in Bandung
2. The quality of the resulting Bandung map image good using the file format SVG.
3. The system built with various types the advantages are: in access and wide range.

This system is not yet capable more than one tourist destination and the display system is still simple like multimedia facilities need to be added to make it more interesting and interactive. For that, we need this system further developed

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