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Transportation Routes with Fastest Determination Algorithm Prim in Department of Transportation

Trinanda Syahputra Badrul Anwar Mukhlis Ramadhan Ahmad Calam
Department Computer Engineering STMIK Triguna Dharma Medan
www.trigunadharma.co.id Jln. A.H. Nasution No 73 F, Kode Pos 20144, Medan, Sumut, Indonesia

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Abstract
Prim's algorithm is an algorithm in graph theory minimu spaning looking for a tree to resolve the problems TSP example is the replacement of the telephone network system or service transport lines making ari mail post box, and so on. In DISHUB (Department of Transportation), especially in Asahan. Which are currently experiencing density of transport, even experienced problems in determining the appropriate transport connections needed in Asahan. So on the basis that the author describes a case study with the determination of the transport path in Asahan District Department of Transportation
Keywords: Prim's Algorithm, Transportation, Asahan

1. INTRODUCTION

Prim's algorithm is an algorithm in graph theory that minimum spaning looking for a tree to resolve the problems TSP example is the replacement of the telephone network system, the decision letter from the mailbox and so forth . Problems of transportation and inventory policy is a key decisions in the sphere of logistics systems. In addition to the cost for the purchase of goods, generally transport also absorb a considerable cost. One way to reduce the cost of transportation is by determining the efficient delivery service. Problems TSP (Travelling Salesman Problem) is the problem of a salesman must visit every town, every city is visited only once. The goal is to determine the shortest route. There several ways unusual in solving this problem. Dijkstra's algorithm is an algorithm to solve the problems of the shortest path algorithm and Prim common method used to form the minimum spanning tree. In DISHUB (Department of Transportation), especially in Asahan. Which are currently experiencing density of transport, even experienced problems in determining the appropriate transport connections needed in Asahan.

2. LITERATURE REVIEW

2.1 *Graph theory*

Graph theory starts with Konigsberg bridge problem, in 1735. This problem leads to the concept Graph Eulerian.Euler discusses the problem of the Konigsberg bridges and built a structure to solve the problem of the so-called Eulerian graph. The concept of a tree, (connected graph without cycles) applied by Gustav Kirchof in 1845 and he used the idea of the the oretical chart in the calculation of the current in power lines or circuits. Then in 1856, Thomas Kirkman and William P. R.Hamilton polyhydra learn cycle on and find a concept called Hamiltonian graphs by studying the trip visited a particular place exactly once. Vertices in a graph can be numbered with letters, such as a, b, c, ..., v, w, ... with natural numbers 1,2,3, ..., or by a combination of both. While the connecting node u to v is expressed by the pair (u, v) or otherwise with the symbol e1, e2, ... in other words, if e is the connecting node u with vertices, then e can be written as e = (v, v). In geometry graph is described as a collection of nodes (node) in a two-dimensional field that is associated with a set of lines (sides) In G2sisi e3 = (1.3) is called the double (multiple edges or parallel edges) because both sides have to connect two pieces of the same node, the node 1 and node 3. In G3, the e8 = (3.3) is called bracelets or a loop (loop) because it begins and ends at the same vertex.

2.2 *Tree (Tree)*

The tree is a connected graph that does not contain circuit.concept tree (tree) in graph theory is a very important concept, because its application various fields therefore between the tree (tree) is very closely related to graph theory. The definition of tree is a connected undirected graph that does not contain a circuit, according to this definition, there are two important properties of trees that is connected and not mengadung circuit. Tree (tree) is a graph in which any two vertices have at most one path connect.tree often have root.because every node in the tree has only one access path from any other node, it is not possible for a trajectory to form a knot (loop) or cycles (cycle) that simultaneously through a set of vertices. Trees are a non-trending graph is connected and does not contain circuits. Examples of trees.

2.3 *Spanning Tree (Spanning Tree)*

Spanning tree of a connected graph G is a subgraph G which is a tree and contains all the points in G.example G

= (V, E) is an undirected graph is connected is not a tree, it means there is a circuit in G. G can be converted into T = (V, E) by disconnecting one side of the circuit-circuit there. The trick is to decide on the one side of the circuit until there is no circuit in G. If G is no longer in the circuit, then the tree T is called a spanning tree. Known spanning tree for all the nodes in the tree T is equal to signal graph G. Minimum Spanning Tree (Minimum Spanning Tree)

Minimum spanning tree algorithm is found in various areas of application such as, optimal solution of a greedy algorithm, the approximate solution to the problem of minimum spanning tree, the group defines a set of data and other. Minimum spanning tree (also called MST) is to find a spanning tree with the amount of weight (weight) of at least of a connected graph (connected). This problem is the same as the traveling salesman problem. If G on Figure 2.13 is a weighted graph, then the weight spanning tree T1 and T2 is defined as the sum of the weights of all the T1 or T2.Diantara spanning tree that exist in G, the most important is the spanning tree with minimum weight or Minimum Spanning Tree (MST) . MST frequently used application is the modeling of highway construction projects using a graph. MST is used to choose the path with the smallest weight will minimize the cost of road construction.

3. RESULTS AND DISCUSSION

Prim algorithm

Prim's algorithm is an algorithm in graph theory that seek minimum spanning tree for a connected weighted graph. This means finding a subset of the edges that forms a tree that includes every point, where the total weight of all the edges in the tree is minimized. If the graph is not connected, then he found jungle minimum range (minimum spanning tree for each connected component). The basic concept used in Prim algorithm is at every step, select the edge of the graph G the minimum weight, but does not create any side circuit in T . Prim algorithm steps:

1. Perform sequencing on each side in the graph G from the side with the smallest weight.
2. Select the edge (u, v) which has a minimum weight is not formed, that is, when the circuit at T. Add (u, v) to the T.
3. Repeat step 2 until the minimum spanning tree is formed, that is, when the side in the spanning tree T amounted to n-1 (n is the number of vertices of a graph G) Prim algorithm writing in the form of algorithmic notation (pseudocode):

```
Procudere Kruskal (inputG: graf, output Q: Trees)
{Establish minimum spanning tree T of graph
Connect G
Feedback:-weighted connected graph G = (V, E),
Which / V / = n
Output: minimum spanning tree T = (V, E)}
Declaration
I, p, q, u, v: integer
algorithm
{Assumption: the sides of the graph already sorted
Ascending by weight}
T {}
While the number of sides in the T <n-1 do
Select the edge (u, v) of E whose weight
smallest
If (u, v) does not form a cycle in T then
T T ... {(u, v)}
endif
Endfor .
```

Problems of transportation and inventory policy is a key decisions in the sphere of logistics systems. In addition to the cost for the purchase of goods, generally transport also absorb a considerable cost. One way to reduce the cost of transportation is by determining the efficient delivery service.

Problems TSP (Travelling Salesman Problem) is the problem of a salesman must visit every town, every city is visited only once. The goal is to determine the shortest route.

In DISHUB (Department of Transportation), especially in Asahan. Which are currently experiencing density of transport, even experienced problems in determining the appropriate transport connections needed in Asahan.

Collecting Data and Information

In the data collection was conducted observation of direct observation in the study so that problems can be seen clearly. Interviews conducted with field division coordinator at the local /i. Direct observation to determine the

condition of the transport is running. While the interview was conducted in order to obtain in-depth information about the condition of the transport is running at DISHUB Asahan. Data used to start analyzing the data derived from 25 districts, 27 urban village and 175 Villages in Asahan. Where areas are broken up into two regions, territories range of eastern and western regions range. In the analysis of all the regions applied.

The data obtained from observation of the data range area east of the city and the area west of the city range. Can be seen in the table below this region:

1. Regional Cities East Range
2. Western Range Region City

Table 1. Regional Cities East Range

No	Kode Pos	Name Vilage	Wilayah City	Disctrict	Province
1	21219	Kisaran Naga	Kisaran East City	Disctrict Asahan	Sumatera East
2	21221	Gambir Baru	Kisaran East City	Disctrict Asahan	Sumatera East
3	21221	Lestari	Kisaran East City	Disctrict Asahan	Sumatera East
4	21222	Kisaran East	Kisaran East City	Disctrict Asahan	Sumatera East
5	21222	Teladan	Kisaran East City	Disctrict Asahan	Sumatera East
6	21223	Mutiara	Kisaran East City	Disctrict Asahan	Sumatera East
7	21224	Sentang	Kisaran East City	Disctrict Asahan	Sumatera East
8	21225	Siumbut-Umbut	Kisaran East City	Disctrict Asahan	Sumatera East
9	21226	Siumbut New	Kisaran East City	Disctrict Asahan	Sumatera East
10	21227	Kedai Ledang	Kisaran East City	Disctrict Asahan	Sumatera East
11	21228	Selawan	Kisaran East City	Disctrict Asahan	Sumatera East
12	21229	Karang Anyer	Kisaran East City	Disctrict Asahan	Sumatera East

Table 2. Western Range Region City

No	Kode Pos	Name Vilage	Wilayah City	Disctrict	Province
1	21211	Bunut	Kisaran West City	Disctrict Asahan	Sumatera East
2	21211	Bunut East	Kisaran West City	Disctrict Asahan	Sumatera East
3	21212	Dadi Mulyo	Kisaran West City	Disctrict Asahan	Sumatera East
4	21212	Sidodadi	Kisaran West City	Disctrict Asahan	Sumatera East
5	21213	Sei Renggas	Kisaran West City	Disctrict Asahan	Sumatera East
6	21214	Kisaran East	Kisaran West City	Disctrict Asahan	Sumatera East
7	21215	Kisaran City	Kisaran West City	Disctrict Asahan	Sumatera East
8	21215	Cliff Kisaran	Kisaran West City	Disctrict Asahan	Sumatera East
9	21216	Kisaran Baru	Kisaran West City	Disctrict Asahan	Sumatera East
10	21216	Mekar New	Kisaran West City	Disctrict Asahan	Sumatera East
11	21217	Sidomukti	Kisaran West City	Disctrict Asahan	Sumatera East
12	21218	Sendang Sari	Kisaran West City	Disctrict Asahan	Sumatera East
13	21218	Tegal Sari	Kisaran West City	Disctrict Asahan	Sumatera East

In resolving transportation problems in Asahan then at this stage will be analyzed regional data, analysis area that will be settled using Prim's algorithm. The first thing to do, is to analyze the obtained data and create graphs of the data.

In the Prim algorithm there are several data processing techniques in order to obtain valuable results. Some steps to resolve the problem as follows:

Prim's algorithm:

1. Perform sequencing on each side in the graph from the side with the smallest weight.
2. Having the minimum weight that is connected to the node.
3. Search minimum spanning tree.
4. The existence of spanning tree that has a minimum weight.

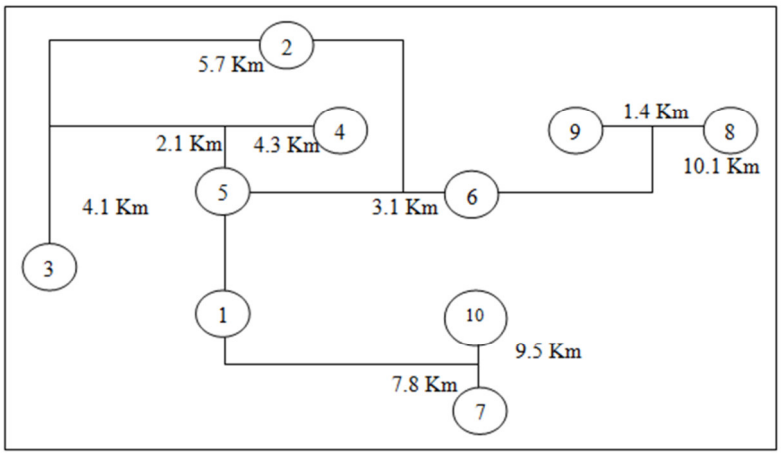

Figure 1. Range Regional Node Deployment City East

Table 3. Regional Node Eastern Range State
Google maps from the map table can be determined node region (mileage earned)

No	Name Vilage	Node (Mileage)
1	Kisara Naga	5.7 Km
2	Gambir Baru	4.1 Km
3	Lestari	4.3 Km
4	Kisaran East	2.1 Km
5	Teladan	3.1 Km
6	Mutiara	7.8 Km
7	Sentang	10.1 Km
8	Siumbut-umbut	1.4 Km
9	Siumbut Baru	9.5 Km
10	Kedai Ledang	

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