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A Comparative Study on Various Graph Algorithms

Angulakshmi.M[1], Rathi.R[2], Sudha.S[3], Brindha. K[4]

[1,2,3,4]*School of Information Technology and Engineering,*
VIT University –Vellore,Tamilnadu,(India)

Abstract

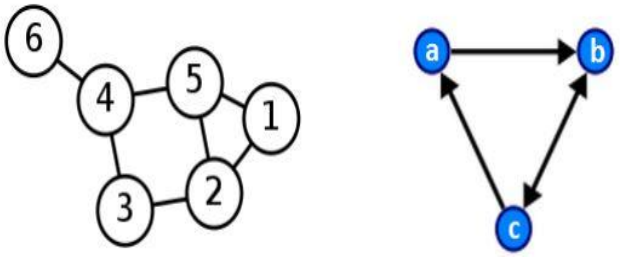
The paper in the field of networking represents comparative study of graph-based algorithm. Set of vertices and edges of a graph data structure is established. Unidirected is a graph in which the edges are unordered pairs of vertices and the other one does. Is a directed graph in which each directed a pair of corner edge. In this paper we compare the shortest path to the different graph algorithms are going on. An undirected graph, directed graph, minimum spanning tree (Prim's algorithm), shortest path (Dijkstra's algorithm), BFT, DFT - several algorithms which are used in this paper are some of them. Underline their adjacency matrix or an end (or top) of the list can be represented. Prim's algorithm for finding the minimum spanning tree. This is the best algorithm for it. And, we use Dijkstra's algorithm and Bellman-Ford algorithm can find the shortest path. So, this letter will tell which is best for the shortest path algorithm.

Keywords:· Unidirected graph, Directed graph, Weighted graph, Unweighted graphs, Shortest Path, Minimum Spanning Tree

I. INTRODUCTION

Graph an order triple G = (V, E, F) Here V nodes, a set of points or vertices, E is a set whose elements are known as edges or lines, f maps each element of the function E Vertex v is a basic element in the corner for the couple who is disorganized or a node is designed as a point. Vertex G sets usually V (G), or V marked. A line connecting the two corners, the corner is called, or prepared as closing - and the edge is a set of two elements. G side of the set, usually E (G) or G network is marked by hundreds of years has been used in a variety of applications. In the realm of mathematics, we better visually through graphs can describe these networks. A graph of a group or set of objects, called the corner, some of the corners are connected by links, also known as the edges are represented. The study of these graphs is often known as graph theory. There is the following as shown in the Figure 1, which are two graphs: -

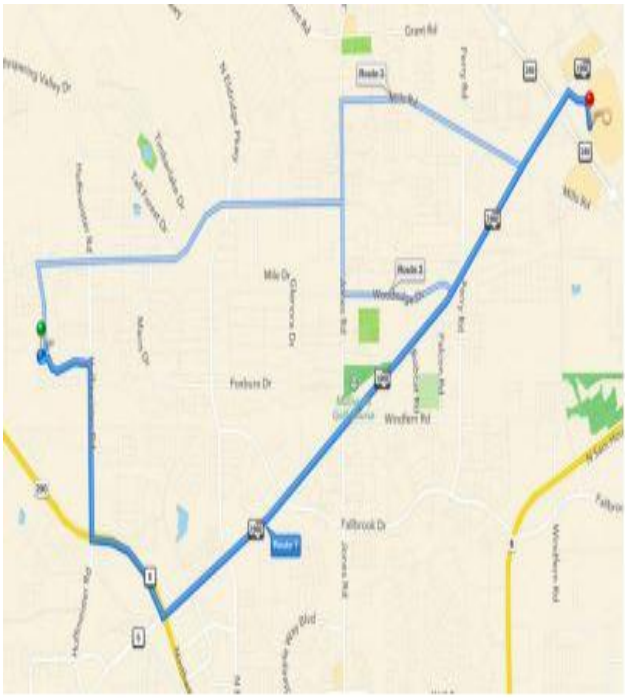
Fig 1.a Undirected Graph 1.b Directed Graph



The Figure 1.a is used, for example, an undirected graph, a graph in which the edges are known as an orientation. A more practical example of an undirected graph will have two people shaking hands. Person B is shaking hands with a person and at the same time, shaking hands with person B person is

And this Figure 1.b is a directed graph, or ligature is shown. Direction edges and arcs is called a ligature that is. Arcs from one node to another on the arrows are used to show the flow.

Fig 2 . Navigation software graph



The Figure 2 is recommendation from one location to another in a way that shows an example of navigational software. The shortest path, or a small amount of weight between the two places, as shown by the dark blue line, while light blue lines represent alternative paths are. There are many algorithms used in this papers which are as following as:-

II. UNDIRECTED UNWEIGHTED GRAPH

In this type of graph the direction between vertices and distance will not be shown on the edges. If there exist a root to Vi to Vj is necessary that ,there will be root from Vj to Vi. In this type of graph the distance between the vertices will be shown on the edges but not direction there is example of this type of graph is prims minimum spanning tree graph algorithm.

2.1 Prims Alorithm

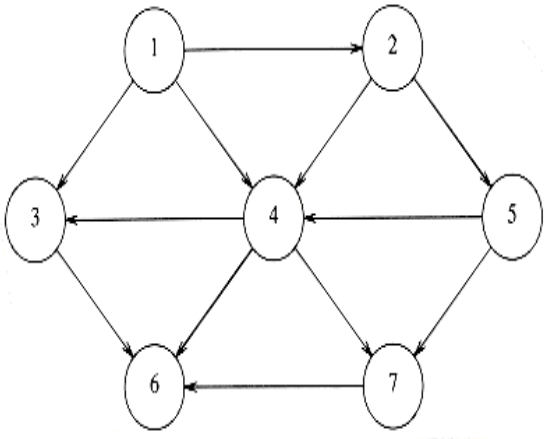
The prism algorithm is basically use for the find the minimum distance between the vertices and find the shortest path between them the working of the algorithm is as simple as we can easily do it in any way as we all know that it is a greedy algorithm so it can find that way which is the smallest from the other so it greed them as a first preference than it can do again that process and do it again[11]. As we all know that this paper is in the finding the better algorithm between the all so this is also a very good algorithm in the field of the networking. The other similar type of algorithm which work on the same principle in which prims algorithm work is the kruskal minimum spanning tree algorithm which is also used to finding out the minimum distance and based on the greedy algorithm. Only difference is that it is some more time consuming and more accurate than prims algorithm.

There is one more algorithm in the minimum spanning tree family that is the reverse delete algorithm which is also a greedy algorithm basically it work on the reverse of the kruskal's algorithm that make a deep impact on this types of algorithm that it has a huge advantage on it is used for clearing the mistakes which is happening in the kruskal algorithm its start in end of the graph and delete edges and again change the values of the algorithm so in networking its effect more that it has been send of the last edge as well.

III. DIRECTED UNWEIGHTED GRAPH

In this type of graph the direction will be shown on the edges but not distance as shown in Figure 3

Fig 3 Directional Weighted Graph



In this type of graph both direction and distance will be shown on the edges.

3.1 Breath First Traversal

In this algorithm first we will create the graph, depending upon the type of graph set the flag=1 if it is directed otherwise set the flag=0 if it is undirected. Then Start the traversal from any vertex say Vi and mark the corresponding index position of the visited array as 1 and move the vertex to the queue.[12]. After that visit the vertex Wi, which is adjacent to Vi and mark the corresponding index position of visited array as 1 and move the vertex to the queue. Repeat the previous step, till all the adjacent vertices of Vi are visited. On reaching a vertex, whose all adjacent vertices visited, go back to the vertex whichever is having unvisited and repeat the third line and previous line of this algorithm. Repeat the third line,fourth line and fifth line till all the vertices are visited. If all the index position of the visited array becomes 1, stop the traversal and display the queue elements.

3.2 Dedth First Traversal (DFT)

In this algorithm we will also create the graph and depending upon the type of graph set the flag 1 if it is directed otherwise set the flag 0 if it is undirected. Then Start the Traversal from any vertex say Vi and mark the corresponding index position of visited array as 1 and push the vertex to the stack. After that visit the vertex Wi, which is adjacent to Vi and mark the corresponding index position of visited array as 1 and push the vertex to the stack. Repeat previous line for every recently visited vertex Wi. And next step is third line and Fourth line till all the vertices are visited. On reaching a vertex whose all adjacent vertices are visited , go back the vertex which ever having unvisited and repeat line no fourth and five. If all the index position of visited array becomes 1, stop the traversal and display the stack elements.

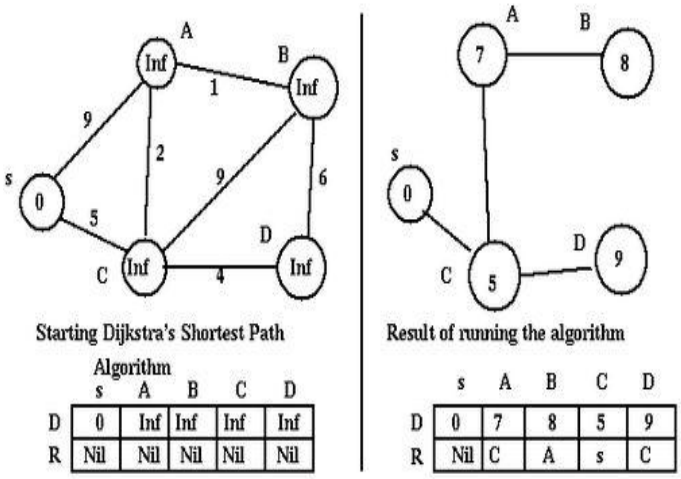
3.2 Shortest Path Algorithm

There are many steps to find out the shortest path which are as following as in graph the shortest path are basically use for find the shortest route b/w the two different path. The first step of this algorithms is to start the traversal from any vertex . Basically there are two types of the shortest path algorithm 1[st] is the Bellman-Ford algorithm and 2[nd] is the Dijkstra's algorithm we will see both the algorithm in paper[11].

- Bellman-Ford shortest Path algorithm:- This algorithm is basically used for finding the shortest path between the two or more than two vertices it work like dijkstra's shortest path algorithm but Bellman –ford algorithm is much slower than the dijkstra 's to finding the shortest route. This algorithm is first proposed by the shimbel in 1955 but instead it named is Richard Bellman and Lester ford jr. who firstly published this algorithm in 1958 and 1956.[17] This algorithm has a major advantage that is it is able to detect negative edges or negative cycle which means its has a huge change in it. But there are some drawback also like it is a old algorithm it is not abke to compete with other algorithm and it is also much slower than the Dijkstra's algorithm.
- Dijkstra's shortest path algorithm[16].Dijkstra's is also used for finding the shortest path between the two or more than two vertices the vertices Vi and update the visited column as 1 in the Dijkstra's table and also update the distance of vertices which are reachable from Vi only if the current distance is less than previous distance. And the second step is to select any one unvisited vertex Wi which is adjacent to Vi whose distance is less than all other unvisited vertices. After that Wi is visited, update

the distance of vertices which are reachable from Wi only if the current distance is less than the previous distance. Repeat the previous step till all the vertices are visited. Construct Spanning Tree from the final Dijkstra's table to compute the shortest distance from source to all other vertices. The working flow of the dijkstra's algorithm is given below in Figure 4.

Fig 4..Dijkstra's shortest path algorithm



Algorithm

	s	A	B	C	D
D	0	Inf	Inf	Inf	Inf
R	Nil	Nil	Nil	Nil	Nil

	s	A	B	C	D
D	0	7	8	5	9
R	Nil	C	A	s	C

This is the working flow of the algorithm which is mostly used and preferred algorithm to finding out the shortest path algorithm we are able to describe this algorithm in step by step process.

IV. CONCLUSION

After making a study in the above algorithm we have to make a conclusion so after making it n after studying the shortest path graph algorithm is very much effective in the terms of the networking because it is well elaborated and considering less error than the other algorithm we also evaluate it in term of time complexity of all the algorithm some algorithm have better time complexity but in term of the network the shortest path algorithm is much better than other algorithms.

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