LOCATION TRACKINGFOR TRANSPORTATION USING ANDROID/WEBAPPLICATION

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Abstract: *The time of advanced technologies and services, location access is one of the important feature. Accessing of the location via using several technologies has made life easy at the industrial as well as the domestic level. In the increasing development of path finding topic, many problems are occurs for searching a path. The problem of path finding has to be solved in transportation, city planning, commercial computer games, navigation and many other fields. Our purpose is to develop an application which is useful for path finding mainly for transportation problem. Now a days more and more people choose online ordering of goods, which are available in current day to day life. But the goods are not provided at the right time with location tracking facility. Our aim is to find the shortest path of two points in a big city or even a country. For increasing result and performance we used two types of algorithm first is the hierarchical A-star algorithm which adds the hierarchical mechanism into traditional algorithms and save the resources of CPU and memory. The second algorithm is Euclidean distance algorithm for finding distance between two points.*

Key Words: *Euclidean distances algorithm, Global positioning system, Hierarchical A-star algorithm.*

1. INTRODUCTION:

Location based services have been increased in the recent years with the increasing development in technology in smart phones and web application. In previous days for the transportation, system uses the open street map (OSM) and A-star algorithm. OSM is provide free geographical information of map, also the pictorial representation of the specific area. This map is editable and freely available on internet, on which it is not possible to track live location. After this A-star algorithm is used for finding shortest path, but this algorithm works like Dijkstra's algorithm. In Dijkstra's algorithm it show the shortest distance between the small city or area but does not work in big city or country. By using this there were lots of problems created for finding shortest path. To overcome all these problems, our aim is to implement a new application using two algorithm that are hierarchical A-star and Euclidean distance algorithm. In the Euclidean algorithm is used for calculating the distance between source and destination accurately. And the hierarchical A-star algorithm is used to find number of shortest path for the destination. By using this it is very easy for a person for finding the shortest path and distance with time to reach their destination in a short period of time. Now a day's people are using hardware for location tracking transportation system but it is too costly for preferring this hardware. We design software application which is cheaper as compare to the hardware and alsoprofitable for the users. The next biggest advantage of making this software application is that a manager can track workers at the time of working [1].

2. LITERATURE SURVEY:

As computer game worlds get more elaborate the more visible path finding performance bottlenecks become. The heuristic functions typically used for guiding a star based path finding are simplistic to provide the search with the necessary guidance in such large and complex game worlds [2].
Yuma Imi, Tomomichi Hayakawa used Open Street Map (OSM) played a useful role during the Great East Japan Earthquake of OSM, which provides free geographical information. In recent years, the Open Street Map (OSM) project collected a large repository of spatial network data containing a rich variety of information about traffic lights, road types, points of interest etc [3].

A* algorithm for big map navigation in special areas [4] introduced A* algorithm used for find out shortest path between source and destination. Big city or even a country, this algorithm may result a bad performance.

Shortest Path Algorithm:

1. Dijkstra's algorithm-

Dijkstra's Algorithm is one of the most famous algorithms in computer science. Back before computers were a thing, around 1956, Edsger Dijkstra came up with a way to find the shortest path within a graph whose edges were all non-negative values. To this day, almost 50 years later, his algorithm is still being used in things such as link-state routing. Many times, Graph is used to represent the distances between two cities. Everybody is often interested in moving from one city to other as quickly as possible. The single source shortest path is based on this interest. In single source shortest path problem the shortest distance from a single vertex called source is obtained. Let G (V, E) be a graph, then in single source shortest path the shortest paths from starting vertex to all remaining vertex is determined. The starting vertex is then called as source and the last vertex is called destination. Dijkstra's algorithm extended by others to create more advanced path finding algorithms such as A*.

1. A-star algorithm-

A* is just like Dijkstra, the only difference is that A* tries to look for a better path by using a heuristic function which gives priority to nodes that are supposed to be better than others while Dijkstra's just explore all possible paths. Hence, typically A* is used for path finding in games etc. Many methods to increase the efficiency of A-star algorithm. A-Star uses a compromise search method to find a good enough (perhaps not the best) path from a start node to destination node. It traverses the graph, choose the lowest expected total cost while keeping a priority queue of traversed nodes. This algorithm can also be known as Breadth-First-Search plus heuristics factor.

$$f(x) = g(x) + h(x)$$

As shown in equation 1, this algorithm uses a heuristic cost function of node x ($f(x)$) to determine the order which will be traverse in a priority queue. The cost function can be dividing into two parts, past path cost function and future path cost Function.

The former one, represented as $g(x)$, is the known distance from the start node to current node x, and the latter function $h(x)$ is a estimation of current node x to the destination node. For Different situation, $h(x)$ are usually calculated differently. And for navigation in a map, a compromise $h(x)$ usually represent by straight-line distance from current node to destination node.

In this algorithm maintains two tables OPEN and CLOSED, table OPEN saves all the nodes that can be detected but not accessible yet, table CLOSED saves the nodes already visited; heuristic function sort the OPEN table according to the result of f(x) explained before, and select the minimum cost for each node to access, step by step, it find the relatively shortest way to the destination.

2. Hierarchical a-star algorithm-

Easiest way is to find a minimum distance from the start point to destination point. It overcomes the problem of A* algorithm and extend their features for route selection. This algorithm works tree like structure and execute recursively. A fair amount of research has been carried out on path finding problems in the context of transportation networks, whereas path finding in off-network space has received far less interest. In geographic information systems, the latter is usually associated with the cost surface method, which allows optimum paths to be calculated through raster's in which the value of each cell depicts the cost of traversal through that cell [4]. A* algorithm as a provably optimal solution for path finding. Since it was created, it has successfully attracted attention of thousands of researchers to put effort into it. A long list of A* based algorithms and techniques were generated. Aim of A-star to explore the relationship between various A* based algorithms [5].

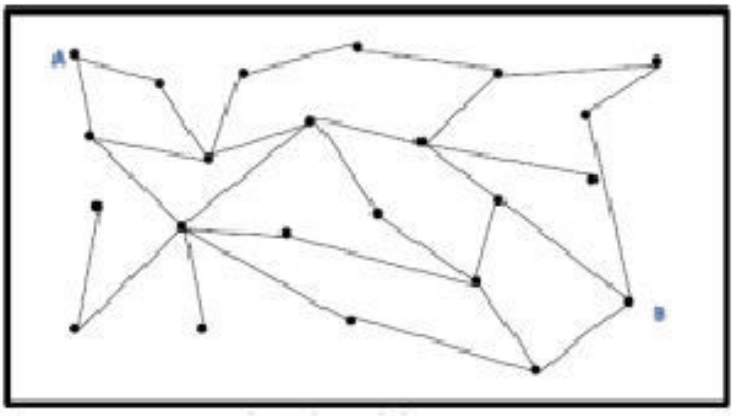

Figure 3.1:Original map.

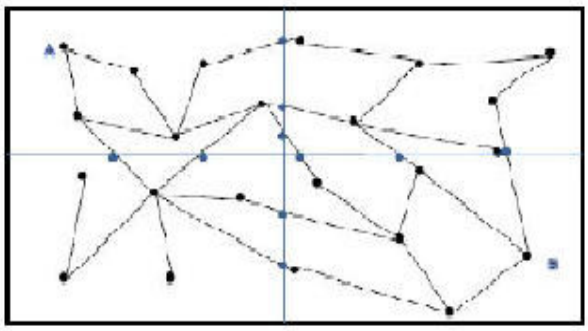

Figure 3.2:The map is divided into four equal parts.

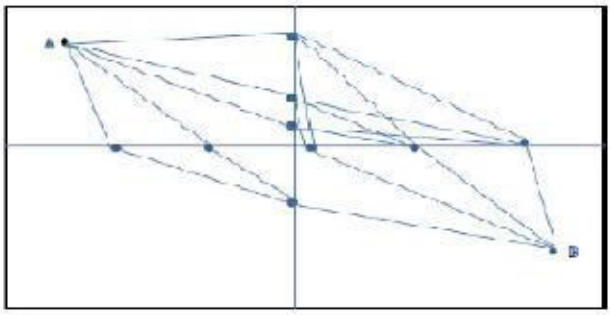

Figure 3.3: Link source to destination point via multiple related path.

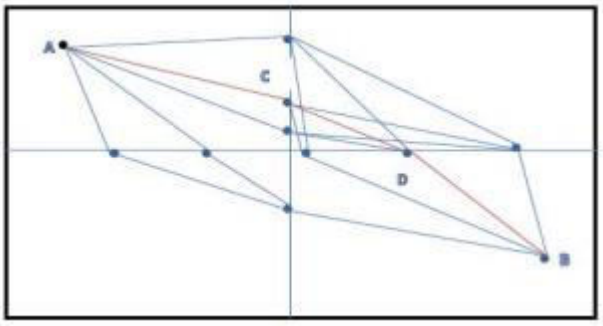

Figure 3.4: Established shortest path between source to intended destination.

3. Euclidean distance algorithm-

The Euclidean distance between points p and q is the line segment connecting them. In Cartesian coordinates, if p = (p1, p2,..., pn) and q = (q1, q2,..., qn) are two points in Euclidean n-space, then the distance (d) from p to q, or from q to p is given by the Pythagorean formula.

$$d(p,q) = d(q,p) = \sqrt{(q1-p1)^2 + (q2-p2)^2 + ... + (qn-pn)^2}$$

$$= \sqrt{\sum_{i=1}^{n}(qi-pi)^2}$$

n dimention

$$d(p,q) = \sqrt{(p1-q1)^2 + (p2-q2)^2 + ... + (pi-qi)^2 + ... + (pn-qn)^2}$$

Within image analysis the distance transform has many applications. The distances transform measures the distance of each object point from the nearest boundary. For ease of computation, a commonly used approximate algorithm is the chamfer distance transform. Donald G Bailey presents an efficient linear time algorithm for calculating the true Euclidean distance-squared of each point from the nearest boundary. It works by performing a distance transform on each row of the image, and then combines the results in each column. It is shown that the Euclidean distance squared transform requires fewer [6].

3. CONCLUSION:

The issue of path finding is solved in transportation, citified proposal, economic games, navigation and many other fields. To increasing result and performance of map navigation we developed an application for transportation problem. We conclude that our system provide better quality both in time consuming and performance, we add hierarchical mechanism into path finding problem by HAS algorithm and for distance calculating by Euclidean distance algorithm is used. This application find related shortest path to reaching destination for delivering the goods also track current location of worker at time of working. After successful delivery of goods is done then manager gets acknowledgement from worker.

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