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Intelligent Tour Planning System using Crowd Sourced Data

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Abstract

To observe the beauty of nature and to visit various places around the world, a vast number of tourists visit different countries and many tourist attraction sites now-a-days. But Most of the tourist places have failed to introduce itself as a tourist destination to the visitor due to lack of proper information and proper guideline to visit there. This paper tries to focus on some problems in the tourism industry and try to solve those problems using crowd sourced data with some customized algorithms. Some of the main problems are the lack of information about a destination tourist spot, combination on budget to visit the spot, time of travels etc. We proposed a customize algorithm which will provide maximum suggestion to visit a place with nearest all sub place based on user destination within their given budget and time. Using our method, user can choose the most suitable plan for them to visit those places.

Index Terms: Data Crowdsourcing, Tourist, BFS, DFS, Dijkstra, Tour Planner, Route Suggestion.

1. Introduction

Crowdsourcing is known as the operation of snatching job or capitalization. From a group or crowd of people, crowdsourcing is usually done by online or offline. Innovation, problem solving, or efficiency are the common intention for engaging a 'crowd' or group of people is the main practice of it. In general crowdsourcing is a process of work done by a crowd of people. In tourism crowd sourcing is intended to perform the collaborative updating of the tourism resources knowledge base system considering the tourists and tourism businesses [1]. Gathering more and more information is the base of a tourism system. Every country of this

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world has been taken this issue seriously so that this information can be easily increased and developed day by day [2].

We tried to find out some widespread problem in the tourism sector. Inevitably the tourism industry is also affected by the information technological revolution. According to research paper of strategic use of information technologies in the tourism industry [8], tourism is inevitably influenced by the business process re-engineering experienced due to the technological revolution. The impact of information technologies on businesses over 60%. On other research of Rich Harrill et al. [3] Tourists become sophisticated and more demanding to constitute their tour outline easier. A map with regional attraction is potentially useful in terms of attracting tourist to remote areas and this could counteract effort to reduce the distance of travel [4]. Therefore, effective tourism marketing requires [5]. Sharing information through technology can create a phenomenon to receive adequate attention in tourism. A successful tour depends on planning in most of the cases. Moreover, planning is blamed as a failure if proper plan implementation is interrupted anyhow [7]. Tourist also wanted to make their tour successful within their desired budget. But budget and time always conflict with each and others [6]. If tourist can get a proper idea or suggestion considering their plan, this will give comfort to millions of people in this world. Even later they can share their tour information with others so that everyone might get some idea before planning a tour.

A few researchers have investigated the relationship between urban space and attitudes toward tourism development. They also try to generate connections between tourism zones and the physical distance between residents and tourists in specific residential area. Based on the variables of size, distance and location, the attachment gets weaker as the population and density increase [8]. Tourism has become an extremely dynamic system. Economic globalization, fast changing customer behavior, development of transport system and information technologies, modifications in the forms of organizations and labor, all of them are strongly influence the industry. In this scenario, the intensified marketing efforts of all tourism organizations have led to a more effective and positive approach. [9]

2. Related Work

However to get the solution, first we analysis some research paper of DFS algorithm [10][11][12]. The depth first search algorithm is a recursive algorithm which uses the idea of backtracking. If we consider all node as a location then DFS can visit of all the location by going ahead, if there are no more location available then it normally searches by backtracking. All the possible location will be visited on the current path till all the unvisited location have been traversed. But the problem of DFS is, it normally searches by moving forward but not by considering cost. We also analysis breadth first search algorithm [14] and heuristic search [13] algorithm to get out expected result. To get the optimized cost base solution, we analysis Dijkstra's Algorithm [14]. Dijkstra algorithms generally follows Greedy approach. It can find the minimum cost required to visit from one location to another location. But getting final cost visiting all location and return to source is not possible by Dijkstra algorithms. Dijkstra uses a priority queue, implemented with a heap.

Then we analysis Brute force algorithm. To get the best combination we try to use brute force algorithm. Because it consists of systematically enumerating all possible combination for the solution and checking whether each combination satisfies the problem's statement [16]. Our focus is to get the best combination of tourism cost and required time to travel and to get all possible combination we choose a pretrial part of brute force algorithm and DFS. And with the combination of both, we proposed out algorithms which provide our expected output.

3. Proposed Methodology

We cast the problem of visiting places as a graph with a group of nodes that connected to its neighbor node and consider path cost as its weight.

Our first algorithm finds all possible path to travel all node at least one time as well as calculate the total cost of the path. And using same procedure second algorithm find all paths to return to the source place from where the visiting of mode start. Thus, we describe below our algorithms using DFS algorithm and Brute force algorithm method to find the path and return to the source, this procedure repeated as many times as required until its find out the all possible path.

3.1. Description of the Core Algorithm

Our algorithm extends to DFS algorithm. It's a deep-down recursive algorithm. At each recursion generate a path and calculate the cost.

At first, we initialize the graph of the place and define the source place from where the recursion will start, define path index and cost as zero. At the beginning, it makes the source node as visited, add source node to the path and add cost to the total cost and increase the path index. Then it checked that all node visited or not, if all node visited then show the path and total cost of that path, if all node not visited, then find all the unvisited neighbor of the source node and iterate with all the node one by one, at the time of iteration unvisited node define as source node. After both operations make the source unvisited and deduct the cost as well as decrease the path index and return to its parent. This procedure will iterate repeatedly as many time as needed to find all path to visit all node from the source node.

The second algorithm works as the same as the first algorithm, iteration condition same. But it checked source node and destination node is same or not, if same then show the path and total cost of path. If not then find all the unvisited neighbor of the source node and iterate with all the node one by one, at the time of iteration unvisited node define as source node. And this will continue to find all path to return to the source.

3.1.1. Algorithm of the First Approach

Input: Weight graph G, start node

Output: all possible paths to visit all node from start node and total cost for all path

```
VisitAllNode (source, VISITED, PATH, pathIndex, cost)
VISITED [source] = visit
PATH [pathIndex] = source
pathIndex = pathIndex + 1
totalCost = totalCost + cost
if visited.allNodeVisited
        Print PATH
        Print totalCost
else
        for each node in source.allAdjacencyNode
                if node.notVisited
                        VisitAllNode (node,
VISITED, PATH, pathIndex, sourceToAdjacentNodeCost)
pathIndex = pathIndex - 1
VISITED [source] = unvisited
totalCost = totalCost – cost
```

3.1.2. Algorithm of The Second Approach

Input: Weight graph G = (V, E, p), source node, destination node.

Output: all possible path to go to destination node from source node and calculate total cost for all path

```
Algorithm ReturnToSourceNode(source, destination,
        VISITED, PATH, pathIndex, cost)
VISITED[source] = visit
PATH [pathIndex] = source
pathIndex = pathIndex + 1
totalCost = totalCost + cost
if source = destination
        print PATH
        print totalCost
else
        for each node in source.allAdjacencyNode
                if node.notVisited
ReturnToSourceNode (node, destination, VISITED,
        PATH, pathIndex,  sourceToAdjacentNodeCost)
pathIndex = pathIndex - 1
VISITED[source] = unvisited
totalCost = totalCost – cost
```

4. Experiments and Results

Here we are presenting our algorithms output with experimental data and result.

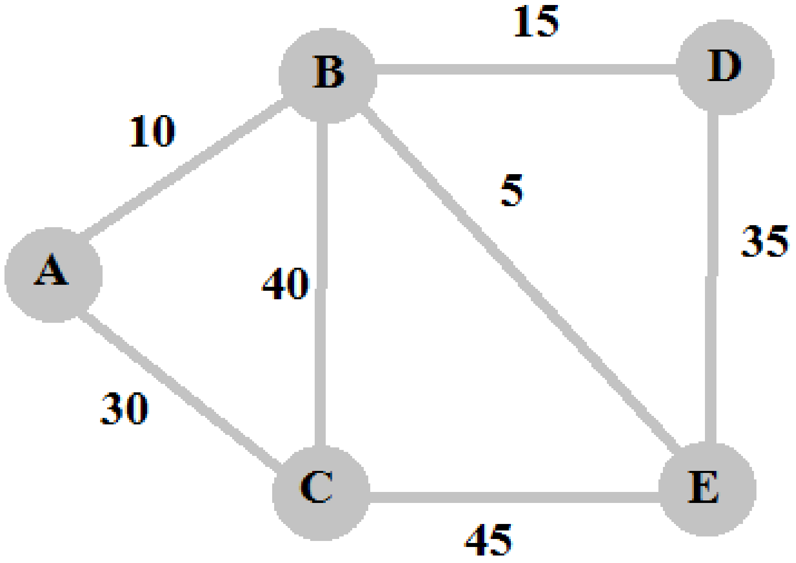
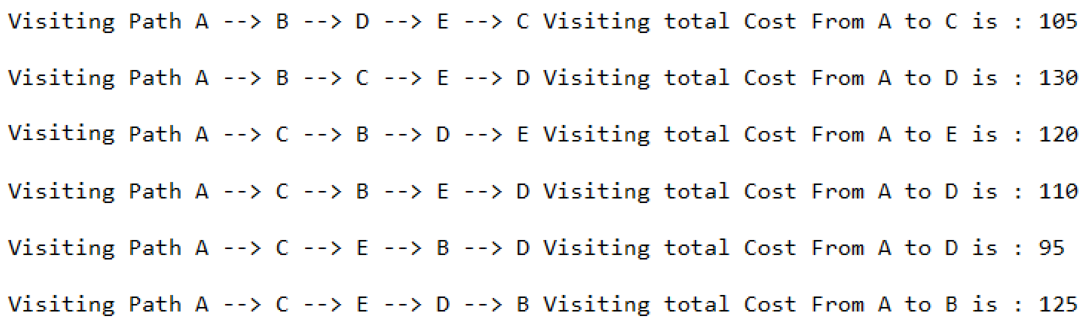


Fig.1. A graph with Five Node and Path Weight

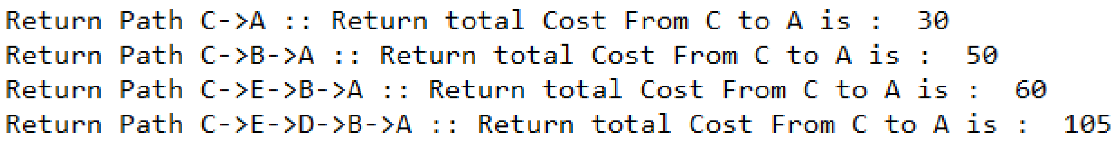
Suppose we have use a graph scenario in Figure 1, for evaluating our approach. In the graph, there are five nodes [A, B, C, D and E]. In this scenario, we take A as start node. Using the first algorithm we find 6 possible paths to visit all node with deferent cost. The result has been shown in Figure 2.



```
Visiting Path A --> B --> D --> E --> C Visiting total Cost From A to C is : 105

Visiting Path A --> B --> C --> E --> D Visiting total Cost From A to D is : 130

Visiting Path A --> C --> B --> D --> E Visiting total Cost From A to E is : 120

Visiting Path A --> C --> B --> E --> D Visiting total Cost From A to D is : 110

Visiting Path A --> C --> E --> B --> D Visiting total Cost From A to D is : 95

Visiting Path A --> C --> E --> D --> B Visiting total Cost From A to B is : 125
```

Fig.2. All Path to Visit All Node from A

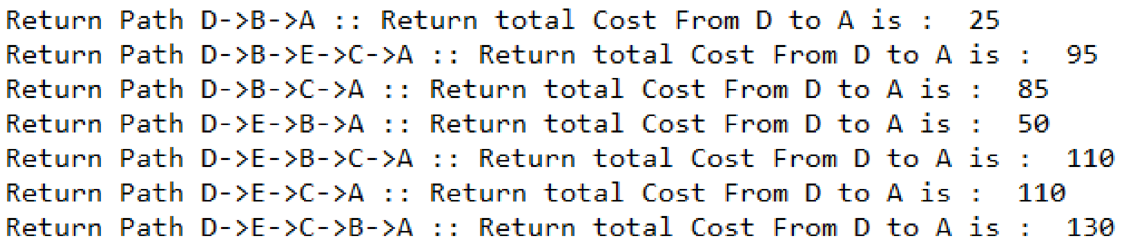
For the second algorithm, we consider C as the source node and destination node is A. Here we find 4 possible way to reach A. result shows in Figure 3.



```
Return Path C->A :: Return total Cost From C to A is :  30
Return Path C->B->A :: Return total Cost From C to A is :  50
Return Path C->E->B->A :: Return total Cost From C to A is :  60
Return Path C->E->D->B->A :: Return total Cost From C to A is :  105
```

Fig.3. All Path from C to A

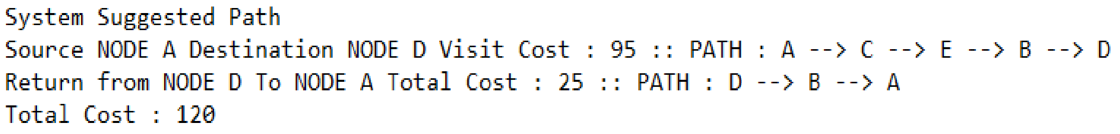
If we take source node as D and destination node is A, here we find 7 possible ways to reach A. Result has been shown in Figure 4. Similarly, all return path will be calculated using the procedure of this algorithm.



```
Return Path D->B->A :: Return total Cost From D to A is :  25
Return Path D->B->E->C->A :: Return total Cost From D to A is :  95
Return Path D->B->C->A :: Return total Cost From D to A is :  85
Return Path D->E->B->A :: Return total Cost From D to A is :  50
Return Path D->E->B->C->A :: Return total Cost From D to A is :  110
Return Path D->E->C->A :: Return total Cost From D to A is :  110
Return Path D->E->C->B->A :: Return total Cost From D to A is :  130
```

Fig.4. All Path from D to A

Finally, our algorithm will be suggested for visiting path of source to destination and return destination to source. Result has been shown in figure 5.



```
System Suggested Path
Source NODE A Destination NODE D Visit Cost : 95 :: PATH : A --> C --> E --> B --> D
Return from NODE D To NODE A Total Cost : 25 :: PATH : D --> B --> A
Total Cost : 120
```

Fig.5. Decision Taking

5. Future Work

We want to implement our Artificial Intelligence and Expert System through a tourism website, which will include all information based on crowd sourced and overall cost of a tour for the desired place. A perfect result will be generated through more data of information, we will suggest best tour place to the user within his/her budget. We will use map API to get proper direction. Our main future goal is to implement our algorithm through a mobile application which automatically takes the user locations using GPS and system will take the suggestion from user also. Transport cost price and hotel cost price will be automatically updated with our API provided to hotel and transport service provider.

6. Conclusion

In this paper, we proposed a new method for travel. Contrary to previous work based on the graph traversing we proposed a very efficient method, which extends DFS algorithm. Among the benefits, our approach was to find the maximum results to visit all the place for the tourist to make his/ her own tour plan that which route will be best for his/her. And suggest the best path within given cost.

7. Limitation

Our algorithm gives multiple path to visit all node which is achieved, but our algorithm cannot give the lowest total cost to travels all node.

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