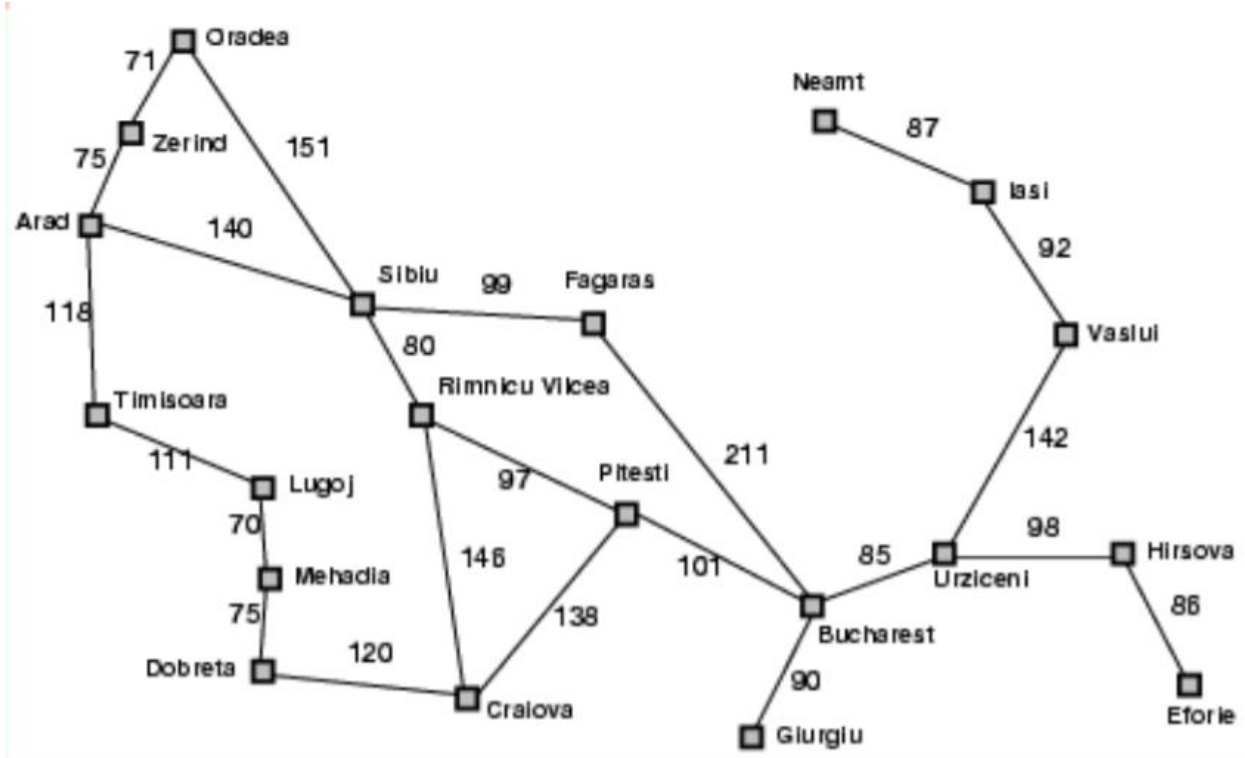
Artificial Intelligence Project

ASSIGNMENT

This assignment wishes to send the user from Arad to Bucharest in the map of Romania using the **Greedy Best First Search** with the Straight line distance to reach Bucharest as the Heuristic Function for the Problem.

PROBLEM

Figure shows the map of ROMANIA and starting state of your agent is Arad .Your agent must reach Bucharest.



Straight–line distance to Bucharest	
Arad	366
Bucharest	0
Craiova	160
Dobreta	242
Eforie	161
Fagaras	176
Giurgiu	77
Hirsova	151
Iasi	226
Lugoj	244
Mehadia	241
Neamt	234
Oradea	380
Pitesti	10
Rimnicu Vilcea	193
Sibiu	253
Timisoara	329
Urziceni	80
Vaslui	199
Zerind	374

The heuristic function h(n) is the straight line distances to reach Bucharest. Your agent should solve the above problem using Greedy Best First Search algorithm . Utilize C/C++ programming language to implement your agent.

Understanding the Problem

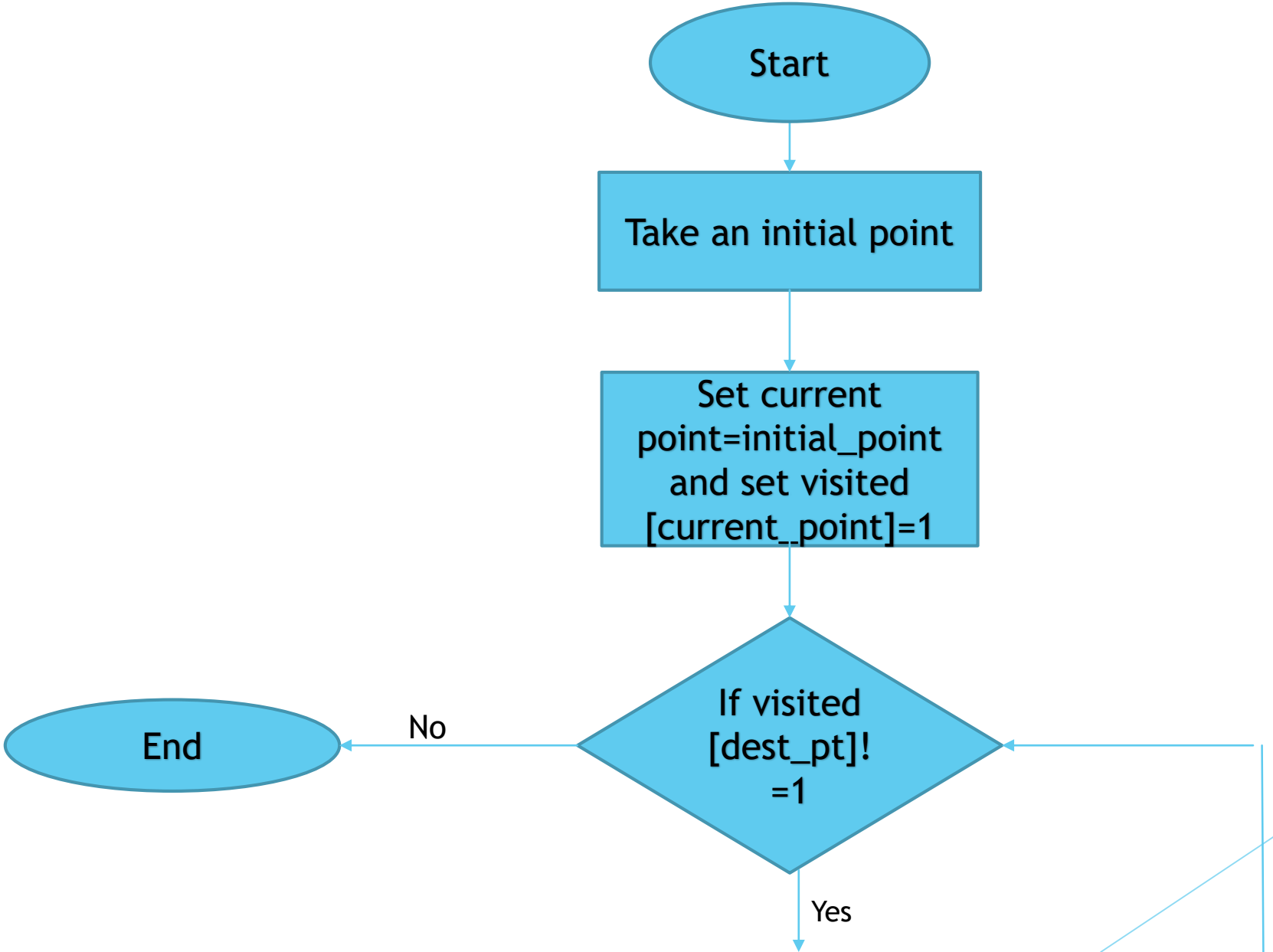
Here we have to move from Arad to Bucharest, for this we have to calculate the shortest path between Arad and Bucharest using Greedy Best First Search Algorithm.

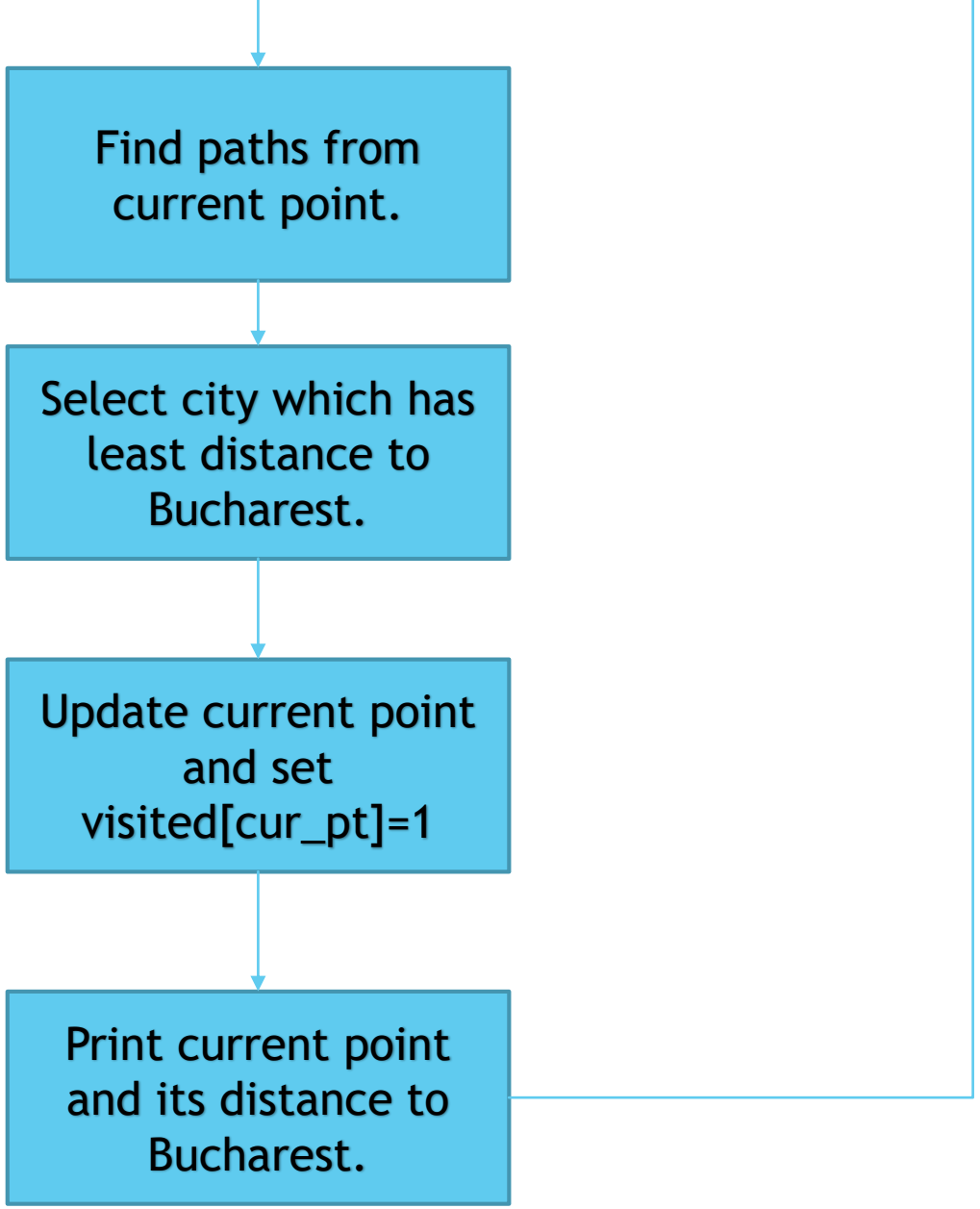
Greedy Best First Search Algorithm

Greedy best-first search tries to expand the node that is closest to the goal, on the grounds that this is likely to lead to a solution quickly. Thus, it evaluates nodes by using just the heuristic function; that is, f(n)=h(n).

- ✓It expands the node that is estimated to be closest to goal .
- ✓It completely ignores g(n) i.e. the cost to get to n .

Flow Chart


Start
Take an initial point
Set current point=initial_point and set visited [current_point]=1
If visited [dest_pt]! =1
No
End
Yes


Find paths from current point.
Select city which has least distance to Bucharest.
Update current point and set visited[cur_pt]=1
Print current point and its distance to Bucharest.

OUTPUT

```
List of States..
Arad
Bucharest
Craiova
Dobreta
Eforie
Fagarus
Giurgiu
hirsova
Lasi
Lugoj
Mehadia
Neamt
Oradea
Pitesti
RimnicuVilcea
Sibeu
Timisora
Urziceni
Valsui
Zerind

Enter the Initial Place:
```

```
Enter the Initial Place: Arad

Starting.. Greedy BFS for the Map of Romania!

St. line Distance from Bucharest        State(Node)
366                                     Arad
253                                     Sibeu
176                                     Fagarus
0                                       Bucharest
Total no of Steps=3
```

Observations

- We found that the Greedy Best First Search is not giving an optimal solution to the problem provided.
- At times, it covers more distance than the optimal distance to reach Bucharest (Destination).
- The heuristic function taken considers only the straight line distance from Bucharest and goes to the next state irrespective of how much distance it has to travel from the current node to the next node [g(n)].
- If we travel from some other state to Bucharest, it may give the optimal Solution.

CONCLUSION

- Time complexity of Greedy BFS is O(b^m) ,
  m->depth of tree , b->branch factor
- It does not provide optimal solution.
- It is more efficient than that of Bredth First Search and Depth First Search.