Batch: B1 **Experiment Number: 04**

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Aim of the Experiment: : Implementation of Informed search algorithm- A*

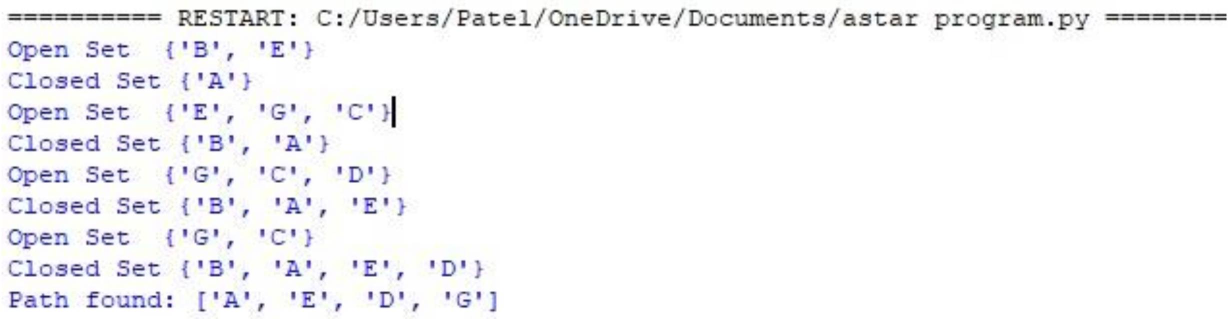
Program/ Steps:

```
def aStarAlgo(start_node, stop_node):


 open_set = set(start_node)

 closed_set = set()

 g = {}

 parents = {}

 g[start_node] = 0

 parents[start_node] = start_node



 while len(open_set) > 0:

 n = None

 for v in open_set:

 if n == None or g[v] + heuristic(v) < g[n] + heuristic(n):

 n = v



 if n == stop_node or Graph_nodes[n] == None:

 pass

 else:

 for (m, weight) in get_neighbors(n):
```

```
if m not in open_set and m not in closed_set:
open_set.add(m)
parents[m] = n
g[m] = g[n] + weight
else:
if g[m] > g[n] + weight:
g[m] = g[n] + weight
parents[m] = n
if m in closed_set:
closed_set.remove(m)
open_set.add(m)



if n == None:
print('Path does not exist!')
return None
if n == stop_node:
path = []
while parents[n] != n:
path.append(n)
n = parents[n]
path.append(start_node)
path.reverse()
print('Path found: {}'.format(path))
return path
```

```
 open_set.remove(n)
 print("Open Set ",open_set)
 closed_set.add(n)
 print("Closed Set",closed_set)
 print('Path does not exist!')
 return None
def get_neighbors(v):
 if v in Graph_nodes:
 return Graph_nodes[v]
 else:
 return None
def heuristic(n):
 H_dist = {
 'A': 11,
 'B': 6,
 'C': 99,
 'D': 1,
 'E': 7,
 'G': 0,

 }
 return H_dist[n]
Graph_nodes = {
 'A': [('B', 2), ('E', 3)],
 'B': [('C', 1),('G', 9)],
 'C': None,
 'E': [('D', 6)],

 'D': [('G', 1)],



}

aStarAlgo('A', 'G')
```

Output/Result:



```
========== RESTART: C:/Users/Patel/OneDrive/Documents/astar program.py ========
Open Set  {'B', 'E'}
Closed Set {'A'}
Open Set  {'E', 'G', 'C'}
Closed Set {'B', 'A'}
Open Set  {'G', 'C', 'D'}
Closed Set {'B', 'A', 'E'}
Open Set  {'G', 'C'}
Closed Set {'B', 'A', 'E', 'D'}
Path found: ['A', 'E', 'D', 'G']
```

Post Lab Question-Answers:

Outcomes:

CO2: Analyze and formalize the problem (as a state space, graph, etc.) and select the appropriate search method and write the algorithm.

Conclusion (based on the Results and outcomes achieved):

I have executed the program of A* algorithm for graph traversal and printed the open and closed nodes.

References:

- Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Second Edition, Pearson Publication
- Luger, George F. Artificial Intelligence : Structures and strategies for complex problem solving , 2009 ,6th Edition, Pearson Education