

Assignment 3

Implement uniform cost search and find the path from S-G2 for a given graph.

Code:

```
# keywords
# S->0 , A->1 , B->2 , C->3 , D->4 ,
# E->5 , F->6 , G1->7 , G2->8 , G3->9

g = {
    0:[(1,5),(2,9),(4,6)],
    1:[(7,9),(2,3)],
    2:[(1,2),(3,1)],
    3:[(0,6),(6,7),(8,5)],
    4:[(3,2),(5,2)],
    5:[(9,7)],
    6:[(4,2),(9,8)],
    7:[],
    8:[],
    9:[]
}

g1 = {
    1:[(2,1),(4,2),(3,3)],
    2:[(1,1),(4,4),(5,1)],
    3:[(1,3),(4,2),(7,3)],
    4:[(1,2),(2,4),(3,2),(7,5),(5,1),(6,1)],
    5:[(2,1),(4,1),(6,3),(8,2)],
    6:[(4,1),(5,3),(7,2),(8,2),(9,2)],
    7:[(3,3),(4,5),(6,2)],
    8:[(5,2),(6,2)],
    9:[(6,2)]
}

class pqueue:
    def __init__(self):
        self.q = {}
    def insert(self,cost,dest):
        if(dest in self.q):
            self.q[dest]=min(self.q[dest],cost)
            if(self.q[dest]>cost):
                return True
            else:
                return False
        else:
            self.q[dest]=cost
            return True
    def get(self):
        self.q = {k:v for k,v in sorted(self.q.items(),key=lambda x:x[1])}
```

```
x = list(self.q.items())[0]
del self.q[x[0]]
return x
def empty(self):
    if(len(self.q)==0):
        return True
    return False
def ucs(g,s,t):
    pq = pqueue()
    visited = []
    parent = {}
    pq.insert(0,s)
    while(not pq.empty()):
        x = pq.get()
        if(x[0]==t):
            visited.append(x[0])
            pth = []
            cur = x[0]
            while(cur!=s):
                pth = [cur]+pth
                cur = parent[cur]
            pth = [s]+pth
            return x[1],pth
        elif(x[0] in visited):
            continue
        else:
            for nd in g[x[0]]:
                res = pq.insert(x[1]+nd[1],nd[0])
                if(res):
                    parent[nd[0]]=x[0]
            visited.append(x[0])

cost,path = ucs(g,0,8)
print("Sarthak Kapaliya")
print("20BCP072")
print("Source: 0", "Target: 8")
print("Min Cost: ",cost)
print("Path: "," -> ".join(list(map(str,path))))
```

Output:

```
[Running] python -u "f:\IMP DOCUMENT\College material\SEM#6\Artificial-Intelligence-Lab-Sem6\ucs.py"
Sarthak Kapaliya
20BCP072
Source: 0 Target: 8
Min Cost: 13
Path: 0 -> 4 -> 3 -> 8

[Done] exited with code=0 in 0.122 seconds
```