Practical 3

Aim: To implement A\* Algorithm using Romania Map.

Code:

*import* queue *as* Q

dict\_hn={'Arad':336, 'Bucharest':0, 'Craiova':160, 'Drobeta':242,'Eforie':161, 'Fagaras':176, 'Giurgiu':77, 'Hirsova':151, 'Lasi':226,'Lugoj':244, 'Mehadia':241, 'Neamt':234,

         'Oradea':380, 'Pitesti':100, 'Rimnicu':193, 'Sibiu':253, 'Timisoara':329, 'Urziceni':80, 'Vaslui':199, 'Zerind':374}

dict\_gn=dict(

Arad=dict(Zerind=75, Timisoara=118, Sibiu=140),

Bucharest=dict(Urziceni=85, Fagaras=211, Giurgiu=90, Pitesti=101),

Craiova=dict(Drobeta=120, Rimnicu=146, Pitesti=138),

Drobeta=dict(Mehadia=75, Craiova=120),

Eforie=dict(Hirsova=86),

Fagaras=dict(Sibiu=99, Bucharest=211),

Giurgiu=dict(Bucharest=90),

Hirsova=dict(Urziceni=98, Eforie=86),

Lasi=dict(Vaslui=92, Neamt=87),

Lughoj=dict(Timisoara=111, Mehadia=70),

Mehadia=dict(Lugoj=70, Drobeta=75),

Neamt=dict(Lasi=87),

Oradea=dict(Zerind=71, Sibiu=151),

Pitesti=dict(Rimnicu=97, Craiova=138, Bucharest=101),

Rimnicu=dict(Sibiu=80, Pitesti=97, Craiova=146),

Sibiu=dict(Fagaras=99, Rimnicu=80, Oradea=151, Arad=140),

Timisoara=dict(Arad=118, Lughoj=111),

Urziceni=dict(Hirsova=98, Bucharest=85, Vaslui=142),

Vaslui=dict(Lasi=92, Urziceni=142),

Zerind=dict(Arad=75, Oradea=71)

)

def get\_fn(citystr):

    cities=citystr.split(',')

    hn=0

    gn=0

    ctr=0

*while* ctr!=len(cities)-1:

        gn=gn+dict\_gn[cities[ctr]][cities[ctr+1]]

        ctr=ctr+1

    print('-----------g(n) for ',citystr,' is ',gn)

    hn=dict\_hn[cities[len(cities)-1]]

    print('-----------h(n) for ',citystr,' is ',hn)

    print('-----------f(n) for ',citystr,' is ',(hn+gn))

    print('-----------')

*return* (hn+gn)

def expand(mycities, cityq, goal):

    tot,citystr=mycities

    cities=citystr.split(',')

    city2expand=cities[len(cities)-1]

*if* city2expand==goal:

        ans='The A\* path is '+citystr+' with the value as '+str(tot)

*while* not cityq.empty():

            cityq.get()

*return* ans

    print('Expanded city-----------------------',city2expand)

*for* cty *in* dict\_gn[city2expand]:

        cityq.put((get\_fn(citystr+","+cty),citystr+","+cty))

def main():

    start='Arad'

    goal='Bucharest'

    cityq=Q.PriorityQueue()

    cityq.put((get\_fn(start),start))

*while* not cityq.empty():

        mycities=cityq.get()

        ans=expand(mycities, cityq, goal)

    print('#########',ans)

main()

Output:

