

Report for Assignment-01 Artificial Intelligence

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Problem:3 : “Electric Vehicles”

Solution Approach:

As per the Given constraints we have taken time as a universal variable such that if $t=0$ is the starting time then $t=Tr$ is the time when the last vehicle reaches its final destination city. Also we have assumed another condition that for every vehicle we are charging that amount of battery with which it covers the distance for the another node. Also by taking time in this manner and also observing the nodes of every vehicle we can get maximum value of Tr is as minimum as possible.

So for the given constraints we have assumed it as a 2 linear equations:

Equation 1: $y = mx + c$

y = total charge,

m = charging rate(Cr)

x = time taken

c = initial charge(Br).

Equation 2: $y' = m'x'$

y' = total charge,

m' = discharging rate(Dr)

x' = time taken

So net charge is the result of equation 1 and 2.

And by given average speed (constant for all the cars) we can calculate our required distance).

So the algorithm is as follows:

Defining a path_plot function which uses info of city and vehicle



Calculating Heuristics of distances in each city



Applying A* Algorithm to get the optimal path for the node



Optimisation of charge and time for the optimal path found.



Now getting the travel time of each car and reporting the final minimised Tr

Results obtained:

PYTH 3.6 (Python 3.6)



Code gets autosaved every second



```
1 class city:
2     def __init__(self, num: int, dist_arr: list):
3         self.num = num
4         self.dist = dist_arr #dist_mat[num] #distance from other cities (list)
5
6
7 class car:
8     def __init__(self, source: city, dest: city, Bat_in: float, discrg_rate: float, max_
9         #given
10        self.src = source
11        self.dest = dest #destination city
12        self.init_chrg = Bat_in #initial charge in the battery
13        self.discrg_rate = discrg_rate #discharge rate
14        self.max_cap = max_cap #maximum charge in battery
15        self.crg_rate = crg_rate #charging rate
16        self.avg_speed = avg_speed
17
18        #found
19        self.tot_time = None
20        self.path = list()
21
22
23
```

171:25



Open File

☐ Custom Input

Run

Status Successfully executed Date 2021-03-28 14:07:20 Time 0.03 sec Mem 17.968 kB



Output

```
[1]
[2]
[0]
```