

# Programming Assignment 1

AI2017

Deadline: 27 Aug 2017

Please do not cheat

Do not forget to write your name and roll number on your answer sheet. No queries will be entertained later regarding this.

**Q1.** Your company owns an autonomous shuttle and you want it to pick your employees from different locations in the city to office. The locations of shuttle's start point, the office, and every employee's pick-up point are given. Consider figure env\_question1.png to be your environment, green square is shuttle's start location, red square is the office location, blue stars are employees and black rectangles are blockage on the free space. Assume no traffic and blank space is free space. Implement and compare any two of BFS, DFS, and iterative deepening search algorithm to find an optimal path to pick all employees. The optimal path is the path that takes minimum time to reach office and which will traverse all employees. Assume constant speed of the vehicle. Assume any missing information (for example, speed of car and units) and explicitly state the assumptions in your report.

Assume environment to be in two dimension with height=50units and width=50units. Data given in figure is:

Start location = [0,0] % (x,y)

Destination = [49,49] % (x,y)

Employee locations = [ 2.0718 11.8728

6.0529 18.0802

34.0681 39.0431

34.9527 43.2153

43.0132 5.8689] % (x,y) for each employee

Obstacles = [ 0.3516 27.0283 5 20  
12.4915 42.9151 20 5  
42.8790 27.5943 5 20  
19.1758 0.8208 20 15  
14.2609 19.8585 5 20  
35.5917 21.7453 5 20  
22.5180 27.5943 10 10] % (x,y,w,h) for each obstacle

**Q2.** Your friend has given you a list of tourist places in Delhi along with their user ratings. Based on the list you want to plan a route which will take you to maximum number of places in a single day of 12 hours. You will also get a reward (=rating of the place) on reaching that place. Your goal is to cover maximum number of places (to grab larger reward) and the constraint is within 12 hours. Your start and goal location will be your home (at [0,0]). Implement an intelligent search algorithm using A\* to find such a path that can be traversed in a day and which will provide maximum reward. Assume that you will spend 0 minutes at each place and no place can be traversed more than once. Clearly specify your solution approach and the heuristic function selected (NOTE: you may also want to use information gain as a heuristic). Also justify your approach.

NOTE: Assume all places to be point locations. No node can be traversed more than once. Assume speed of the vehicle is always 10m/s. Each unit in the environment provided is 1 KM (kilometre). Assume no traffic and blank space is free space. State any other assumptions in your reward. Reward is the user rating of the tourist spot

Assume environment to be in two dimension with height=100KM and width=100KM. Take following data for validation:

Start location = [0,0] % (x,y)

Destination = [0,0] % (x,y)

Tourist spot locations and ratings are in ratings.txt