B.E. CSE VI Sem C1

AI Lab --20CSC29

Lab Assignment

Last Date for submission: 13/4/23

Note: This Assignment is treated as Lab (Mid-1) Test 1 for 15M (Max)

Batch	Roll numbers	Roll Numbers	Roll Numbers	Use the Below Question No. For your Submission
1	1601-20-733-001	1601-20-733-026	1601-20-733-050	**1**
2	1601-20-733-002	1601-20-733-027	1601-20-733-051	**2**
3	1601-20-733-003	1601-20-733-028	1601-20-733-052	**3**
4	1601-20-733-004	1601-20-733-029	1601-20-733-053	**4**
5	1601-20-733-005	1601-20-733-030	1601-20-733-054	**5**
6	1601-20-733-006	1601-20-733-031	1601-20-733-055	**6**
7	1601-20-733-007	1601-20-733-032	1601-20-733-056	**1**
8	1601-20-733-008	1601-20-733-033	1601-20-733-057	**2**
9	1601-20-733-009	1601-20-733-034	1601-20-733-058	**3**
10	1601-20-733-010	1601-20-733-035	1601-20-733-059	**4**
11	1601-20-733-011	1601-20-733-036	1601-20-733-060	**5**
12	1601-20-733-012	1601-20-733-037	1601-20-733-181	**6**
13	1601-20-733-013	1601-20-733-038	1601-20-733-184	**1**
14	1601-20-733-014	1601-20-733-039	1601-20-733-301	**2**
15	1601-20-733-015	1601-20-733-040	1601-20-733-302	**3**
16	1601-20-733-016	1601-20-733-041	1601-20-733-303	**4**
17	1601-20-733-017	1601-20-733-042	1601-20-733-304	**5**
18	1601-20-733-019	1601-20-733-043	1601-20-733-305	**6**
19	1601-20-733-020	1601-20-733-044	1601-20-733-306	**1**
20	1601-20-733-021	1601-20-733-045		**2**
21	1601-20-733-022	1601-20-733-046		**3**
22	1601-20-733-023	1601-20-733-047		**4**
23	1601-20-733-024	1601-20-733-048		**5**
24	1601-20-733-025	1601-20-733-049		**6**

1. Solve N-Puzzle problem for (N=8, 15, 24..) using:-
   Breadth First Search Algorithm
   Depth First Search Algorithm
   A* Algorithm
   Solve NxN Search based problem using above mentioned algorithms such that no two-neighbours can have same color.
2. Implement alpha-beta pruning in a tic-tac-toe game AI:
   a. Implement the minimax algorithm for the AI to make moves in the game.
   b. Add alpha-beta pruning to improve the performance of the AI by reducing the number of nodes that need to be searched.

c. Test the AI against a version without alpha-beta pruning to see the difference in performance.

3. Design a game with an AI that uses alpha-beta pruning:
   a. Create a simple game that can be played against an AI.
   b. Implement alpha-beta pruning in the AI to improve its performance.
   c. Test the game and AI with a group of players to collect feedback and make improvements.
4. Implement the A Star Algorithm to find the shortest path between two points on a 2D grid with obstacles.
   a. Compare the performance of A Star with Dijkstra's Algorithm for finding the shortest path on the same grid.
   b. Modify the A Star Algorithm to handle multiple goals and find the shortest path to any one of them.
   c. Implement the A Star Algorithm to solve the 8-puzzle problem, where the goal is to rearrange a 3x3 grid of numbered tiles in order.
   d. Extend the A Star Algorithm to work on a 3D grid with obstacles and find the shortest path between two points.
5. Multiple bombings have been sighted in different locations of the Hyderabad. Each located at position *(xi, yi)*, having possible casualty counts of *ci*. Bomb at each location has a time *ti* to go off.The city has only a single bomb squad team. Time taken to diffuse a bomb is constant. The time taken by the team to reach from a place to another place is proportional to the distance between the two points.
   Your task is to design a search algorithm with proper heuristics that may help in minimising thecasualty count. Reason out why you have picked certain heuristic. Analyse the space and time complexity of your algorithm.
6. DRDO created a missile called Octopus. Octopus can fire 8 missiles in 8 different directions simultaneously up to range 10K kms. Now, DRDO wants to test this missile and have taken to destination **D**. Since this weapon is one of the best researches done by scientists, therefore, many enemies want to steal this weapon. Because of this, DRDO encrypted octopus missile launching commands and can be only decrypted through particular 2 keys. So, even if enemies stole it they are not able to use.

   Now, Octopus has safely reached to its destination **D** and now its time to transfer keys from station $\mathbf{S}_i$ and $\mathbf{S}_j$ to **D**. Keys can be transferred with either gap of 1 station or gap of 4 stations. There are 50 such stations which are connected to each other in a linear fashion i.e. $\mathbf{S}_m$ is connected to $\mathbf{S}_{m+1}$ and D is at 50th station. Also, transfer of two keys should happen simultaneously from station i.e., While Key 1 is enroute, Key 2 need to enroute too.

   Write a search algorithm to find the minimum number of transfers needed and its sequence required to reach destination **D** from $\mathbf{S}_i$ and $\mathbf{S}_j$ where **i** and **j** lie in the range **[1,49]**. Assume that keys are sent from both the stations simultaneously and need to reach the destination at the same time. If the solution is not possible then give output -1. Also Reason out, why the approach will give correct output

Note: Every one of you need to submit the
And need to be submitted

1. soft copy in the given link
2. hard copy physically to me.

Write neatly in A4 Size Papers in every page your name roll number and subject details should be there.

******** All the Best *******