Unit 9 - Week 7

Assignment 7

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-09-18, 23:59 IST.

Topics: Monotone Condition, IDA*, RBFS, Pruning OPEN and CLOSED in A*

NOTE: Wherever you are required to type in the answer (instead of clicking on a button) please DO NOT ENTER ANY BLANKS. This assessment is evaluated by a program that does exact string matching. *An extra blank in the answer will result in even a correct answer being evaluated as wrong.*

This "no blanks" policy will hold THROUGHOUT this course.

In this assessment we continue with a state space that is a graph, and may have loops. The following policy applies throughout. If there is a tie between two or more nodes for being picked by the algorithm, then the tie is broken as followed – the node that comes earlier in the dictionary ordering is selected. For example, if there is a tie between M, F and R, then F is selected first because occurs earlier in the ordering A, B, .., Z

1) A heuristic function hm(N) is more informed than a heuristic function hl(N), where h(N) is an admissible function that computes the estimated distance of node N to the goal node *1 point*

- iff for every node N, hm(N) > hl(N)
- iff for some node N, hm(N) > hl(N)
- iff for every node N, hm(N) < hl(N)
- iff for some node N, hm(N) < hl(N)
- none of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
iff for every node N, hm(N) > hl(N)

2) If a heuristic function hm(N) is more informed than a heuristic function hl(N), and Am* uses hm(N) and Al* uses hl(N) where Am* and An* are two different instances of A* algorithm, then *1 point*

- Every node seen by Al* is also seen by Am*
- Every node seen by Am* is also seen by Al*
- Al* never visits more nodes than Am*
- Am* never visits more nodes than Al*

No, the answer is incorrect.
Score: 0
Accepted Answers:
Every node seen by Am is also seen by Al**
Am never visits more nodes than Al**

3) If monotone property holds for a particular heuristic function, then at the time when A* picks a node n for expansion which of the following hold(s)? *1 point*

- g(n) = g*(n)
- h(n) = h*(n)
- f(n) = f*(n)
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
g(n) = g(n)*

4) If monotone property holds for a particular heuristic function used by A*, which of the following are true, as search reaches closer to the goal? *1 point*

- The error in estimation of cost f(n) decreases monotonically
- The error in estimation of cost f(n) increases monotonically
- The f-value of the best node on OPEN monotonically increases
- The f-value of the best node on OPEN monotonically decreases
- The f-value of the best node on OPEN may increase or decrease

No, the answer is incorrect.
Score: 0
Accepted Answers:
The error in estimation of cost f(n) decreases monotonically
The f-value of the best node on OPEN monotonically increases

5) The space saving versions of A* become necessary when, *1 point*

- The problem sizes are always small and the heuristic function could be poor
- The problem sizes are always small and the heuristic function is perfect
- The problem sizes can become very large and the heuristic function is perfect
- The problem sizes can become very large and the heuristic function could be poor

No, the answer is incorrect.
Score: 0
Accepted Answers:
The problem sizes can become very large and the heuristic function could be poor

6) Which of the following statements are true w.r.t. IDA* and A*? *1 point*

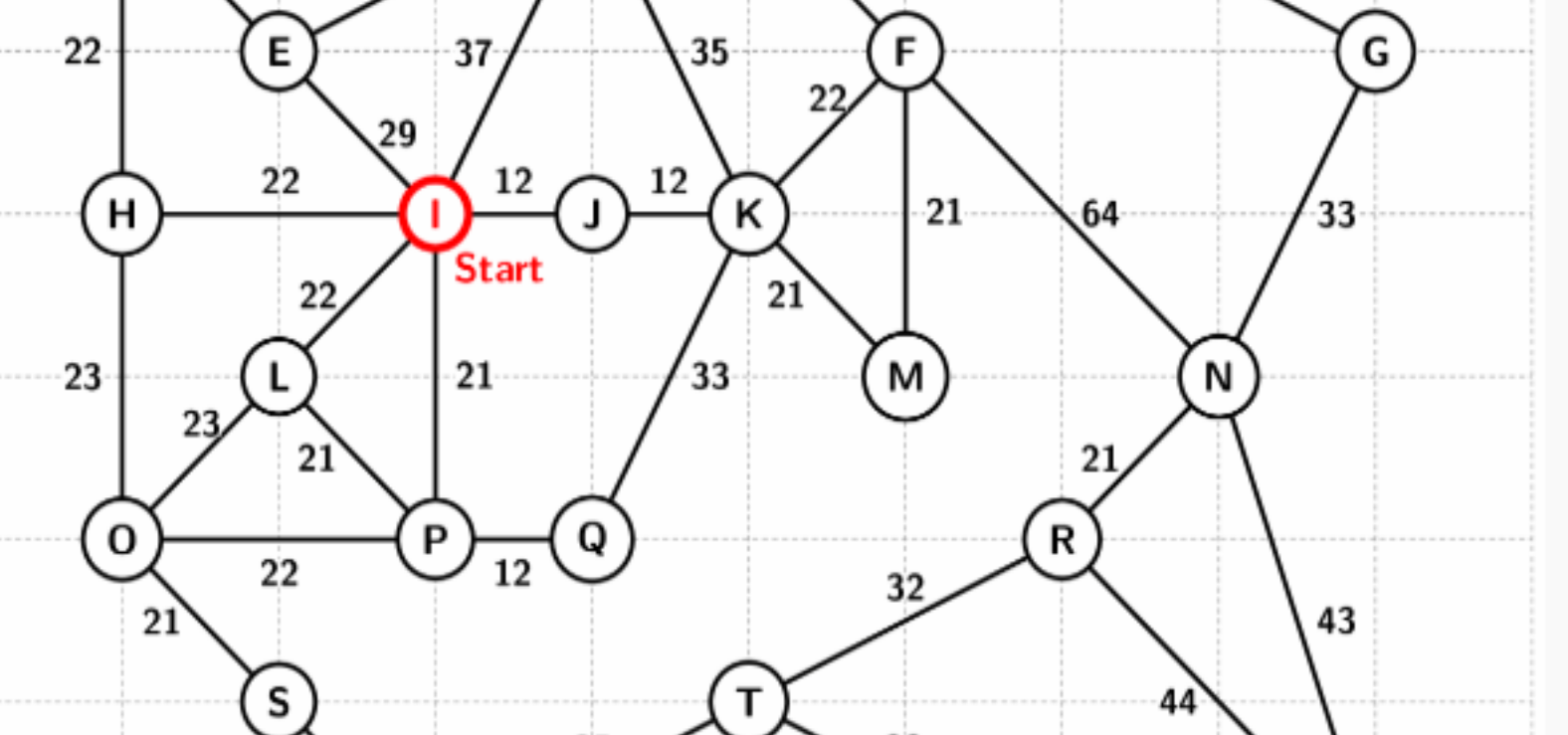
- IDA* always has lower space complexity than A*
- IDA* always has higher space complexity than A*
- IDA* has higher time complexity than A*
- IDA* loses admissibility if the value of δ is too high, where δ is the predetermined increment made to cutoff in each cycle

No, the answer is incorrect.
Score: 0
Accepted Answers:
IDA always has lower space complexity than A**
IDA has higher time complexity than A**
IDA loses admissibility if the value of δ is too high, where δ is the predetermined increment made to cutoff in each cycle*

The figure below is the same as the one used for assignment 6. Node I is again the start node and node X the goal node. Use the *Manhattan* Distance as the heuristic again.

For the questions below please enter the answer as a sequence of nodes separated by a comma. Please DO NOT enter any blanks. *For example*, if the answer (order of nodes) is A followed by C, followed by N, followed by D, the answer should be

Answer: **A,C,N,D**



7) List the order in which the Weighted A* algorithm with weight=2 explores the above graph till termination. Use Manhattan distance as the heuristic function. Please note the tie breaking policy described at the top

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) I,P,Q,J,K,M,F,N,X
(Type: String) I, P, Q, J, K, M, F, N, X

1 point

8) What is the path found (if any) by the Weighted A* algorithm in the previous question? If no path is found please enter 'NIL'

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) I,J,K,F,N,X
(Type: String) I, J, K, F, N, X

1 point

9) What is the cost of the path found (if any) by the algorithm Weighted A* in the previous question? If no path is found please enter 'NIL'

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 153

1 point

Compute the order in which IDA* visits the nodes for the problem (in the above figure) in the first five cycles, beginning with *bound = h(I)*. Nodes visited in **cycle 1** is: **I**. Now list the nodes visited in cycles 2 to 5.

Your answer must be a comma separated list. If there is a tie between more than one node then alphabetic order is to be followed

10) Nodes visited by IDA* in **cycle 2** are:

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) I,P
(Type: String) I, P

0.5 points

11) Nodes visited by IDA* in **cycle 3** are:

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) I,J,P
(Type: String) I, J, P

0.5 points

12) Nodes visited by IDA* in **cycle 4** are:

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) I,J,P,Q
(Type: String) I ,J, P, Q

0.5 points

13) Nodes visited by IDA* in **cycle 5** are:

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) I,J,K,P,Q
(Type: String) I, J, K, P, Q

0.5 points

14) List the first 3 nodes visited by Recursive Best First Search (RBFS) in the order they are visited

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) I,P,J
(Type: String) I, P, J

1 point

15) What is the *fourth* node visited by RBFS?

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) P

1 point

16) At the instant when RBFS is inspecting the *fourth* node what are the values of the first *four nodes*? List them in the order they were visited

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) 100,103,104,103
(Type: String) 100, 103, 104, 103

2 points

17) Identify the true statements with respect to Recursive Best First Search (RBFS) and Best First Search (BFS)? *1 point*

- RBFS is admissible while BFS is not admissible
- RBFS has lesser space complexity than BFS in general
- RBFS has higher time complexity than BFS in general
- RBFS uses edge costs only to find successor node while BFS uses only heuristic function

No, the answer is incorrect.
Score: 0
Accepted Answers:
RBFS is admissible while BFS is not admissible
RBFS has lesser space complexity than BFS in general
RBFS has higher time complexity than BFS in general

18) One employs the Divide-and-Conquer Frontier Search (DCFS) to find an optimal path when (choose all applicable options) *1 point*

- the CLOSED list is likely to become unmanageable
- the OPEN list is likely to become unmanageable
- the heuristic function satisfies the monotone condition
- the heuristic function overestimates the cost to the goal node
- none of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
the CLOSED list is likely to become unmanageable
the heuristic function satisfies the monotone condition

19) Which of the following statement(s) is/are true for Sparse-Memory Graph Search (SMGS)? *1 point*

- The boundary is defined as those nodes in CLOSED that have at least one successor still in OPEN
- The nodes in CLOSED that are not on the boundary are in the kernel
- The number of relay nodes on each path is exactly one
- Pruning of CLOSED always takes place around the halfway mark

No, the answer is incorrect.
Score: 0
Accepted Answers:
The boundary is defined as those nodes in CLOSED that have at least one successor still in OPEN
The nodes in CLOSED that are not on the boundary are in the kernel

20) Which of the following are true for the algorithms Beam Stack Search (BSS) and Divide-and-Conquer Beam Stack Search (DCBSS) *1 point*

- BSS finds the optimal path while DCBSS does not
- DCBSS finds the optimal path while BSS does not
- Both BSS and DCBSS find the optimal path
- Neither BSS and DCBSS find the optimal path

No, the answer is incorrect.
Score: 0
Accepted Answers:
Both BSS and DCBSS find the optimal path

21) Which of the following are true for the algorithms Beam Stack Search (BSS) and Divide-and-Conquer Beam Stack Search (DCBSS). Assume that the space required by the beam-stack data structure can be ignored *1 point*

- The space required by BSS grows exponentially with depth
- The space required by BSS grows linearly with depth
- The space required by BSS remains constant with depth
- The space required by DCBSS grows exponentially with depth
- The space required by DCBSS grows linearly with depth
- The space required by DCBSS remains constant with depth

No, the answer is incorrect.
Score: 0
Accepted Answers:
The space required by BSS grows linearly with depth
The space required by DCBSS remains constant with depth