Blake Johnson

9663980

Homework 3

Collaborator: Fernando Mendoza

1. Initial state { No squares are colored }

Goal state { Plane is colored with no colors adjacent }

Successor function { place one type of square for above an below and another type to the left and right of the square. The remaining tile color goes in the diagonal squares of the square }

Cost function { number of squares placed }

Initial state { Bananas are hanging from the roof }

Goal state { All bananas retrieved }

Successor function { 1BoxGoingUp->2BoxesGoingUp, 2BoxesGoingUp->ClimbAndGrab, ClimbAndGrab->2BoxesGoingDown, 2BoxesGoingDown->1BoxGoingDown, 1BoxGoingDown->MoveToNewLocation, MoveToNewLocation -> CheckForBanana, CheckForBanana->1BoxGoingUp, CheckForBanana->Test(allBananasRetrieved) }

Cost function { number of positions travelled to plus number of boxes stacked }

Initial state { all records need to be tested }

Goal State { Illegal records identified }

Successor function { Run a subset of the records to narrow down the number of possible illegal records}

Cost function { Number of subsets run to determine which record is illegal }

Initial state { all jugs are full}

Goal state { there is one gallon in a jug }

Successor function { Pour out the smaller two jugs, and fill them to the brim with water from the 12 gallon jug, leaving only one gallon left from the big jug }

Cost function { number of pours }

1. A. BFS-10,13,9,11,7,5,8,4,6,14,2,15,16,1,3,17,18,21,19,23,20,24,25,22,26,27,28,29,30.

DFS-10,9,7,5,4,6,2,1,3,21,19,20,22,24,23,25,26,28,30

IDS- Depth = 3: 10,9,7,13,11; Depth = 4: 10,9,7,13,11,5,8 Depth=5: 10,9,7,13,11,5,8,4,6,14

B. From 12 - 10,13,9,11,7,5,8,4,6,14,2,15,16,1,3,17,18,21,19,23,20,24,25,22,26,27,28,29,30

From 30 – 28,29,26,27,25,23,24,19,20,21,22,3,1,2,6,4,8,5,7,14,9,15,16,10,11,17,18,12,13

The node that the two searches meet at is node 1.

C. 12,10,9,7,5,11,13,4,6,2,8,14,16,18,1,3,21,19,23,25,27,29,15,17,20,22,24,26,28,30

D.

1. Yes this is admissible, since this estimate will always be less than the uniform(1) edge cost to reach the goal node. Since all nodes in F will need at least 1 edge to reach 30, they are admissible. Since all node in E will need at least one edge to get to cluster F and at least another to reach 30, 2 is admissible for group E. Since A will need at least one edge to get to group E, adding only one to the heuristic (3) is admissible for nodes in A. Since group B will need at least one edge to get to group A, we can admissibly add one to the heuristic (4) for the nodes in group B. Since groups C and D need at least one edge to get to group B, having a heuristic of 5 is admissible for both groups C and D.

2. Yes, this is consistent since values for the heuristics descend monotonically as we get near the goal node.

3. Cost(n) = g(n) + h(n)

1. a.

f(S) = g(S) + h(S)

f(S) = 0 + 7

f(A) = 7

f(E) = 7

b.

g(n) + h(n)

S: 0 + 7

A: 1 + 6

B: (SA)5 + 3

C: (SED)6 + 2, (SAED)10 + 2, (SABD) 12, (

D: (SE)5 + 3, (SAE) 9 + 3, (SAB)11 + 3

E: 2 + 5, 6 + 5

F: (SAB) 8 + 2

G: (SABF) 10, (SED) 10, (SEDC) 8, (SABDC) 14, (SABD) 16, (SAED) 14, (SAEDC) 12, (SABC) 8

5 .

1. ATE = Σni=1 (Ni,Yi)\*P/n - Σni=1 (Ni,Yi)\*(1-P)/n
2. ATE Estimator = Σni=1 (Ni,Yi)\*μ(Xi)/n - Σni=1 (Ni,Yi)\*(1-μ(Xi))/n
3. Regret bounding in reinforcement learning is the feedback of taking a non-optimal path. It is the difference between the estimated decision and the optimal or best decision. To explain to a doctor, imagine you are a new doctor who knows the basics of diagnosing patients, but doesn’t have much experience. The difference between that diagnosis and the diagnosis of the same situation by a tenured and experience doctor would be the regret bound in this case.