HW #3

Monday, February 4, 2019 12:02 AM

We have examined various search algorithms, some uninformed, some informed. We saw a few that use a Priority Queue, with the primary difference in the priorities given to states as they were added to the priority queue. Consider an algorithm for which the priority of a state n is given by:

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f(n) = (2 - w) * g(n) + w * h(n)
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Assume that h(n) is an admissible heuristic. g(n) is the cost along the current path of getting to state n from the start. w is a real-valued parameter.

a. For what range of values of w is this algorithm guaranteed to be optimal? Hint: answer b, c, and d first. Your answer to those parts, if correct, will help you answer part a.

The algorithm would be considered optimal for any number between 0 and 1

b. If w = 0, then what search algorithm is this equivalent to in terms of order that states will be expanded?

$f(n) = (2-w) \times g(n) + w \times h(n)$

$w=0$

$(2-0) \times g(n) + 0 \times h(n)$

$2 \times g(n) + 0 \qquad 2 \times g(n) \longrightarrow 2g(n)$

This is Uniform-Cost Search
Ex. Breadth First Search

c. If w = 1, then what search algorithm is this equivalent to?

$f(n) = (2-1) \times g(n) + 1 \times h(n)$

$1 \times g(n) + 1 \times h(n)$

$g(n) + h(n)$

This is A* Search

d. If w = 2, then what search algorithm is this equivalent to in terms of order that states will be expanded?

$f(n) = (2-2) \times g(n) + 2 \times h(n)$

$\cancel{0 \times g(n)} + 2 \times h(n)$

$2\,h(n)$

This is best-first-Greedy Search