

A* Self-Test

Just for fun. Nothing to turn in. On the other hand, we won't provide sample solutions either.

Question 1:

Which problem(s) can arise if A* is used with a non-admissible heuristic function? Illustrate the problem(s) with a simple example.

Question 2:

Assume that A* uses a consistent heuristic function. Assume further that it expands node n at some point in time, the f -value of node n is $f(n)$, and the node corresponds to state s in the state space. The path from the root of the search tree to n corresponds to a path from the start state of the state space to s . Show that subsequent node expansions of A* cannot find a shorter path from the start state of the state space to s . (Hint: Assume that A* later expands a different node n' , the f -value of node n' is $f(n')$, and the node also corresponds to state s in the state space. Show first that $f(n) \leq f(n')$ and then that $g(n) \leq g(n')$.)
WHY IS THIS RESULT IMPORTANT? Which problems can arise if A* is used with an inconsistent but admissible heuristic function? Illustrate the problem(s) with a simple example. How can A* be changed to deal with the problem(s).

Question 3:

Assume that you are given two consistent heuristic functions h_1 and h_2 . Show that h_3 is consistent if $h_3(s) = \max(h_1(s), h_2(s))$ for all states s . WHY IS THIS RESULT IMPORTANT?