

Assignment Chapter 4

1. Exercise 4-7.
 - (a) As presented in the text, best-first search uses the closed list to implement loop detection. What would be the effect of eliminating this test and relying on the depth test, $g(n)$, to detect loops? Compare the efficiencies of the two approaches.
 - (b) `best_first_search` does not test a state to see whether it is a goal until it is removed from the `open` list. This test could be performed when new states are generated. What effect would doing so have on the efficiency of the algorithm? Admissibility?
2. Exercise 4-10. Prove that the set of states expanded by algorithm A^* is a subset of those examined by breadth-first search.

Solutions

Exercise 4-7.

- (a) As presented in the text, best-first search uses the closed list to implement loop detection. What would be the effect of eliminating this test and relying on the depth test, $g(n)$, to detect loops? Compare the efficiencies of the two approaches. The depth test would detect loops, but it would eliminate only when the search had gone too deep without finding a solution, not because it had cycled. This would only be useful if the cycling states remained at the head of the open list and the depth cutoff was less than the average size of the closed list.
- (b) `best_first_search` does not test a state to see whether it is a goal until it is removed from the `open` list. This test could be performed when new states are generated. What effect would doing so have on the efficiency of the algorithm? Admissibility?

It would improve the efficiency, in some cases a lot. Once on the open list, it may take a while for a state to come to the front. This modification would not effect admissibility, because admissibility guarantees the goal state will be found on the optimal path.

Exercise 4-10. Prove that the set of states expanded by algorithm A^* is a subset of those examined by breadth-first search.

Use the the same proof as the “more informed” proof of Section 4.2.3 with $h_1(n) = 0$, the hueristic used by breadth-first search.