Vũ Quang Minh
18110150

Homework

4.2 Heuristic path algorithm

$$f(n)=(2-w)g(n)+wh(n)$$

For what value of w is this algorithm guaranteed to be optimal?

g(n): a path cost to n from a start state
h(n): a heuristic estimate of cost from n to a goal state

if *h(n)* is admissible, the algorithm is guaranteed to be optimal

$$f(n)=(2-w)[g(n)+wh(n)/(2-w)]$$

which behaves exactly like A* search with a heuristic

$$f(n)=g(n)+wh(n)/(2-w)$$

To be optimal, we require $w/(2-w)<=1 \iff w<=1$

For w=0: $f(n)=2g(n)$ → Uniform -cost search
For w=1: $f(n)=g(n)+h(n)$ → A* search
For w=2: $f(n)=2h(n)$ → Greedy best search

4.3 Prove each of the following statements:

a. Breadth first search is a special case of uniform-cost-search

when all step costs are equal (let's assume equal to 1), g(n) is just a multiple of depth n. Thus, breadth-first search and uniform-cost search would behave the same in this case

$$f(n)=g(n)=1*(\text{depth of } n)$$

b. Breadth-first search, depth-first search, and uniform-cost search are special cases of best-first search.

- BFS: $f(n)=depth(n)$
- DFS: $f(n) = -depth(n)$
- UCS: $f(n) = g(n)$

c. Uniform-cost search is a special case of A* search

A* search: $f(n)=g(n)+h(n)$
Uniform-cost search: $f(n)=g(n)$

Thus, for $h(n)=0$, uniform cost search will produce the same result as A* search