

DEFINITION

ALGORITHM A, ADMISSIBILITY, ALGORITHM A*

Consider the evaluation function $f(n) = g(n) + h(n)$, where

n is any state encountered in the search.

$g(n)$ is the cost of n from the start state.

$h(n)$ is the heuristic estimate of the cost of going from n to a goal.

If this evaluation function is used with the `best_first_search` algorithm of Section 4.1, the result is called *algorithm A*.

A search algorithm is *admissible* if, for any graph, it always terminates in the optimal solution path whenever a path from the start to a goal state exists.

If algorithm A is used with an evaluation function in which $h(n)$ is less than or equal to the cost of the minimal path from n to the goal, the resulting search algorithm is called *algorithm A** (pronounced “A STAR”).

It is now possible to state a property of **A*** algorithms:

All **A*** algorithms are admissible.

DEFINITION

MONOTONICITY

A heuristic function h is monotone if

1. For all states n_i and n_j , where n_j is a descendant of n_i ,

$$h(n_i) - h(n_j) \leq \text{cost}(n_i, n_j),$$

where $\text{cost}(n_i, n_j)$ is the actual cost (in number of moves) of going from state n_i to n_j .

2. The heuristic evaluation of the goal state is zero, or $h(\text{Goal}) = 0$.

DEFINITION

INFORMEDNESS

For two A* heuristics h_1 and h_2 , if $h_1(n) \leq h_2(n)$, for all states n in the search space, heuristic h_2 is said to be *more informed* than h_1 .

