A-star

This is a specific case of the Best-first search that uses the following evaluation function:

$$f(n) = g(n) + h(n)$$

Where:

- $g(n)$ is the cost to reach n.
- $h(n)$ = estimated movement cost to move from n to the final destination. Heuristic function.

So that $f(n)$ is the expected cost of the most convenient walk from the initial state to the goal state that covers node n.

At each step we the choose the node from the frontier with minimal value of $f(n)$.

Whether A* is cost-optimal depends on certain properties of the heuristic:

- Admissibility
- Consistency

Admissibility and consistency

An heuristic function is said to be admissible if it never overstimates the cost of reaching the goal.

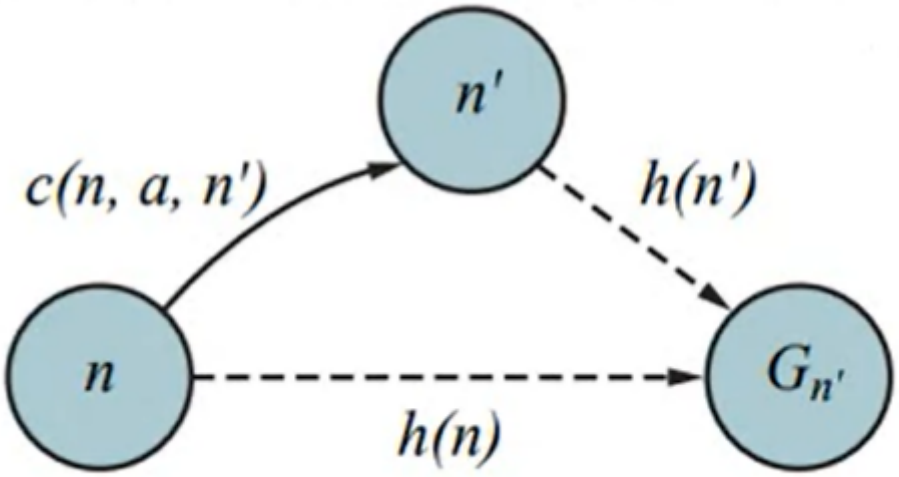
Let H(n) be the actual path from n to G.
h(n) must never surpass H(n).

An admissible heuristic is one that never overestimates the cost to reach a goal.
So an admissible heuristic must be "optimistic".

Admissibility: h(n) is <= to the minimum path cost from n to the goal

Consistency:
For every node n and its successor n' of n generated by action a,

$$h(n) \leqslant c(n, a, n') + h(n')$$



Every consistent heuristic is admissible but not viceversa.

With a consistent heuristic, the first time we reach a state, it us on the optimal path.

If there is a cost-optimal path on which h(n) is admissible for all nodes on the path, that path will be found no matter what.
If the optimal solution has cost C*, the second best has cost C2, abd h(n) overestimates by never more than C2-C*, then jyuhghhjhb