

CSE 5525 Artificial Intelligence II

Quiz #1: A* Search and Minimax

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1 Pancake Heuristics

The pancake problem is a well-known optimization problem that is described as follows: a chef has a stack of pancakes, all of which have different sizes. The chef can flip the top k pancakes, reversing their order. The cost of flipping k pancakes is k . The chef's goal is to order the pancakes from the smallest on the top to the largest at the bottom with the minimal cost. More formally, the search states are all permutations σ of $(1, 2, 3, \dots, n)$, and the goal state is $(1, 2, 3, \dots, n)$.

Here are two heuristics for the pancake problem:

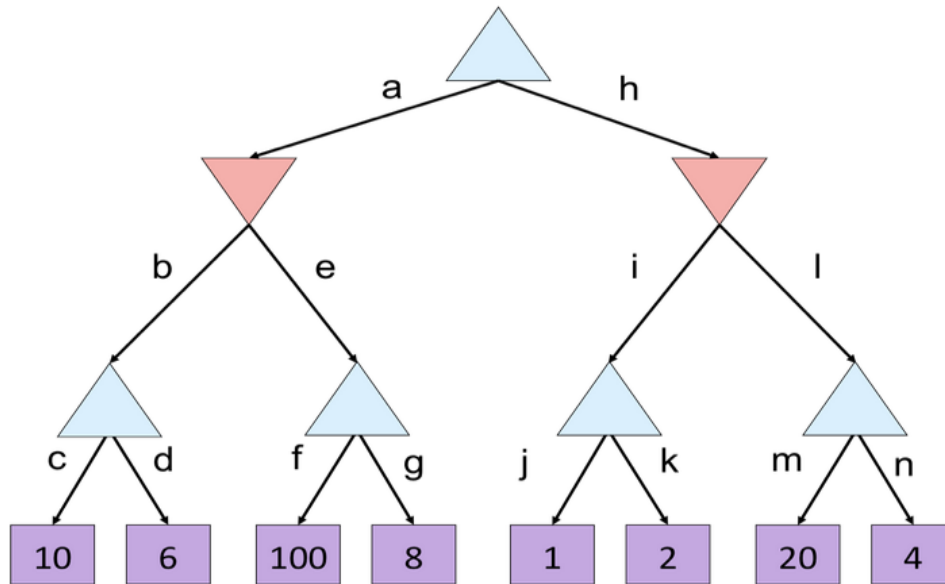
H_a - the largest pancake that is out of the place (largest i such at $i \neq \sigma_i$)

H_c - the number of pancakes out of position (count of all i such at $i \neq \sigma_i$)

Questions:

- 1) Is H_a admissible? Why?
- 2) Is H_c admissible? Why?
- 2) Does H_a dominates H_c ? Why?

2 Alpha-Beta Pruning



Questions: Triangles with the point up are *MAX* and Triangles with point down are *MIN*. Given the game tree above, which branches of a, b, c, \dots, n will be pruned based on the Alpha-Beta algorithm?