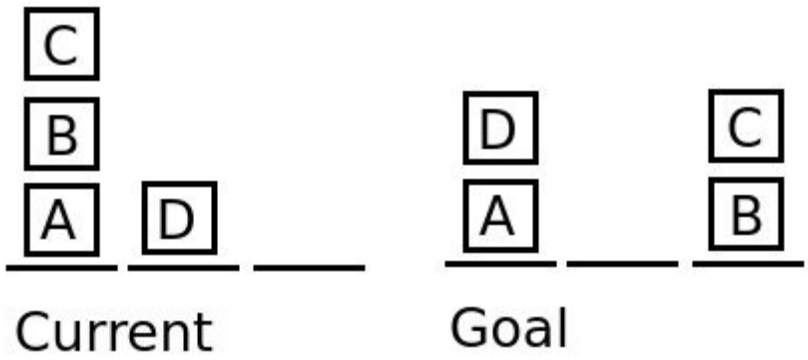
Which heuristics did you use for the A* algorithm?

For the consistent heuristic, we used the quantity of stacks that are in an incorrect state; in other words, the stacks that do not are in their required configuration by the goal state, add 1 to the heuristic calculated at any given state. There is a special case we need to be aware of: when there is a stack in the final state that can be occupied with any boxes (or none), depicted as *'X'*, the stack is not checked in the heuristic function.

For the inconsistent heuristic, we decided to use the sum of Manhattan distances from the current state in which every box is to its final position. This heuristic proved to be inconsistent in the following case:



h(n) = 0+3+3+2 = 8

In this case, the heuristic is greater to the optimal solution, which can be completed with a cost of 4.

Test your program with a couple of different problems. Increase the size of the problem to test the limits of your program. Make a table comparing how many nodes are searched to find the answer for each problem. For this table, you should compare a number of different problems (at least 3) to avoid a statistical bias. Which of the four algorithms searches the least nodes and which one take the most?

Why does this happen?

fd

Which algorithms are optimal? Why?

fds

In your opinion, what are the benefits of simpler algorithms versus more complex ones?

We think that for every problem, there is a clever way to solve it, but it depends not just in the problem but its constraints, like the time that we can use to solve the problem, as well as the processing power we have, also the data that is provided beforehand plays an important role. Simpler algorithms often mean that is easier to any person to understand it, thus being easier to implement.

Another important thing to consider is that simpler algorithms with more data provided can beat complex algorithms with less data. This is because it can reveal a nonlinear relationship or behavior when more data is provided. This is explained further in the article Garrett Wu made, called "Why More Data and Simple Algorithms Beat Complex Analytics Models"