TDT4136 - Assignment 4

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Deliverables

1. See attached code.

2. The representation of the egg carton puzzle is just an 1d array where the rows come in sequential order. The objective function handles the implicit structure with a double for loop over the array.

   The objective function evaluates the sum of the eggs in each direction and subtracts k. Then takes the absolute value of the result. This ensures that only a optimal solution will give a perfect score. If any of the rows have more than k eggs it adds a fixed amount to the score.

   Neighbor generation is realized by picking a random place in the egg carton and adding an egg if there is no egg already there, or removing it if there is.

3. The solutions to all the problems might not be optimal. Better solutions might be found by fine tuning the threshold, amount of neighbors generated and/or the rate of temperature change.

```
M=5, N=5, K=2
1 0 0 1 0
1 0 0 0 1
0 1 0 0 0
0 0 1 1 0
0 0 1 0 1

M=6, N=6, K=2
0 0 0 0 0 1
0 0 1 0 0 0
1 0 1 0 0 0
0 0 0 1 0 0
0 1 0 0 0 0
0 0 0 1 0 1
```

```
M=8, N=8, K=1
1 0 0 0 0 0 0 0
0 0 1 0 0 0 0 0
0 0 0 0 0 0 0 0
0 1 0 0 0 0 0 0
0 0 0 1 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0

M=10, N=10, K=3
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 1 1 0 0
0 0 0 0 0 0 0 1 1 0
0 0 0 0 0 0 1 1 0 1
0 0 1 0 0 0 0 0 0 0
1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 1
0 1 0 1 0 1 0 0 0 0
0 0 0 0 0 1 0 0 0 1
0 0 0 0 0 0 0 0 0 0

Threshold not reached, solution might not be optimal and/or violates one of the
constraints
M=10, N=10, K=3
0 0 1 1 0 0 0 0 0 0
0 0 1 1 0 0 0 0 1 1
1 0 0 1 0 0 1 0 0 1
1 0 0 0 1 1 0 1 0 1
1 1 0 0 0 1 1 0 1 0
1 0 1 1 0 0 1 0 0 0
0 1 1 0 1 1 0 0 1 0
1 1 1 1 0 0 0 0 1 1
0 0 0 0 1 0 0 0 0 0
0 0 0 1 1 1 0 1 1 1
```

4. Both a heuristic function and an objective function says something about the 'fitness' of a state. A heuristic function says how far you are from a predefined goal, while an objective function tells you how good your state is.