CENG462 - HW1 Report

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HAMMING DISTANCE

Hamming Distance computes between iterable objects of equal length, by evaluating mismatches and matches between corresponding positions of the inputs. Number of mismatches will be the output of this function. In our case, number of misplaced blocks will be the heuristic function.

PROOF OF ADMISSIBILITY

Suppose P is the problem given in the Homework.
Let h*(x) = Minimum cost of any solution path from x.
Let Q be a relaxation of P which allows a block to move any other place in the grid.
Every solution path from x in P is also a solution path in Q. Some of the solutions in Q may cost less then h*(x).
Suppose we found an optimal solution at x in problem Q which has the cost of h(x).
Then $h(x) \leq h^*(x)$. Means h(x) is admissible.

An admissible heuristic never overestimates the cost of reaching goal from any node and h(goal)=0.

In general,
$0 \leq h(x) \leq h^*(x)$

For example,
State

0	1	1	1	1
0	1	1	1	1
0	0	2	2	3
0	0	2	2	0
4	4	4	0	5

Goal

0	1	1	1	1
0	1	1	1	1
2	2	3	0	0
2	2	0	0	5
0	0	4	4	4

In this situation, calculated h(State) = 4, but solution length from this state to goal is 8. Clearly, Number of Misplaced Blocks is an admissible Heuristic for this problem.

In our problem, cost of moving one block to its correct place is not equal to 1 except for being adjacent in the current state and the goal. However, our relaxed problem Q assumes that, moving misplaced blocks costs 1. Clearly, it can not overestimate the cost of reaching the goal state. It proves my heuristic is admissible.