CS6364, Fall 2013
Prof. D. Moldovan
Homework 1
Due September 20th, 2013 4:00 pm

Submit your solutions via eLearning.

Problem 1. 8-puzzle programming (30 points)

Right a console program to solve the 8-puzzle problem, described on page 102 in the textbook. The program should allow the tiles to be in any initial state. The goal state is shown below on the right-hand side:

1	2	3
8	6	4
	7	5

Example of initial position

1	2	3
8		4
7	6	5

Goal state

Algorithm

Use hill-climbing search with Manhattan distance heuristic. Implement a backtracking mechanism, when the depth of the search tree reaches 30 without reaching the goal, the algorithm backtracks. (Depth is number of steps along the path from the root).

You can use one of the following programming languages: C++, Java, Python. For any other language get TA approval.

Input: initial position on the board written as a sequence of numbers in the following way:
1. 0 (zero) denotes empty cell
2. Cell values are written row by row from left to right, comma-separated
For example, the goal state position is written as: 1,2,3,8,0,4,7,6,5

Output:
1. "No solution", if the algorithm fails, or
2. A sequence of positions corresponding to a solution path in a search tree, each state on a new line. For example, for the initial position given above expected output looks like:
<div align="center">
1,2,3,8,6,4,0,7,5
1,2,3,8,6,4,7,0,5
1,2,3,8,0,4,7,6,5
</div>

Delivery:
1. source code
2. build and run scripts
3. executable file
4. ReadMe with description of the program architecture and on what platform it should be tested (Windows/Linux are fine)

Grading policy:
3 points – following the input and output format
3 points – coding style, comments, architecture etc.
24 points – correct results on a set of 24 initial positions, one point each.

Problem 2. Missionary and cannibals (10 points)

Problem 3.9 a, c (no programming) from the textbook