CS 7A - Spring 2015 - Sam Lloyd's 14-15 Puzzle. Due 4/9/15

Slider Puzzle With AI

According to the Wolfram Mathworld page, you can determine whether an arrangement of the 15 puzzle is solvable by looking at the sum formed by counting the number of numbers to the right and below each number in the arrangement that is smaller than that number (therefore out of order.) Add to that the row number of the blank tile. The puzzle is solvable only if this sum is even.

For example, in the arrangement at right, the counts are 12, 9, 9, 5, 4, 4, 3, 3, 0, 3, 3, 2, 1, 1, and 0. That is there are 12 numbers beyond the 13 that are less than 13, 9 numbers beyond the 10 that are less than 10, 9 number beyond the 11 that are less than 11, and so on. In this case, the sum (called the inversion number) is 59. Now we also need to consider whether there are an odd number of rows and where the blank is. This formula does the trick:

13	10	11	6
5	7	4	8
1	12	14	9
3	15	2	

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( (grid width odd) && (#inversions even) ) || ( (grid width even) && ((blank on odd row from bottom) == (#inversions even)) )
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1. Write code to test the inversion number for each possible move at each step and to choose the best move accordingly. The algorithm will solve the reverse puzzle (the tiles in the opposite order) using artificial intelligence. This is clearly a challenge, so be sure to think deeply about what you (your algorithm) is doing. Work with the 3x3 puzzle until you can get it going.

   Submit the code using your initials in the usual format: say GH_fifteenAI.cpp