Puzzle 1

CS 463, Fall 2016, Program 1

Due **before the beginning of class on Wednesday, Sept. 7th**.

Consider the Atomic Chaos. You will, in the next assignment, be asked to program a particular style of solver for it. For this first assignment, you have some programming and some problem solving.

Some of the problem solving is hard, and you are strongly encouraged to discuss the assignment, both in person and using the class discussion boards. You **MUST** credit anyone with whom you discuss the assignment on a technical level, and any online sources. Not doing so constitutes plagiarism and will result in an undroppable failing grade on the assignment.

Programming

Design and implement data structures for the puzzle itself, produce some (possibly crude) GUI for sanity checks, and write a program to to randomize the puzzle.

The GUI could be very simple, with each ball in the puzzle represented by a single letter or number representing its color. Plain text is fine. If you use someone else's code (just for the GUI---the rest must be your own code!), **CITE YOUR SOURCE**: url, author, title of link, and dates posted (if known) and read.

The randomizer function should take as input the the number of moves. A move consists of flipping the puzzle over or rotating it one cylinder (and allowing balls to drop). **Here's the hard part:** you need to figure out how to undo moves!!! I think that this will take a major group effort. If you simply randomly assign balls/colors to positions, you may get unsolvable instances --- either because there is no path to a solution, or because the path to the solution is so long that it will break the algorithm you will be asked to implement in Program 2.

Problem Solving

Come up with at least one heuristic evaluation function for the puzzle, and explain both the heuristic and why you believe that that heuristic is admissable. **A heuristic, in this context, is NOT an algorithm. It is an approximation of the number of steps to the solved state. Read the book, about and before the discussion of the A* algorithm.**

To hand in, in a zip file:

- A description in English of your data structure;
- code for the data structures;
- an example of the GUI output;
- a description of the randomizer;
- code for the randomizer;
- your heuristic, clearly described and justified, including an argument that it is admissable;
- a statement of what you learned from this assignment.