**CSCI-580 Fall 2014 Project 1**

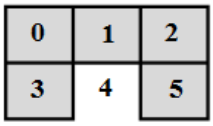
In this project you will practice implementation of an algorithm for a robot localization problem (see Lecture 7, example 3 for the algorithm description). Given a grid world, a sensory error and a sequence of observations, a robot must estimate the room it is in at the time of the last observation.

A grid world is represented by an ***n*** x ***m*** matrix ***M*** of integers, each of which in binary shows that there are obstacles in directions <North, South, West, East> (in this order). In other words, M[i][j] = 10 means that at location [i][j] of the grid there are obstacles to the North and West of this location (since 10 in binary is 1010 and binary 1 represents an obstacle). A sequence of observations is given in capital letters: NW, NS, for example. NW means that there are obstacles to the North and West.

The matrix M is given in the input file "input.txt" and the sensory error together with a sequence of observations are given in a command line. For example, if the content of input.txt file is:

```
10  12  9
 7  15  7
```

which corresponds to the grid world below,




and a command line used is (*robot* is an executable program):

./*robot* input.txt 0.1 NW NS

(where 0.1 is the sensory error and NW NS is the given sequence of observations at time 1 and 2),

then the output is:

(0, 1) 0.998408

The output shows that the robot is in row 0 and column 1 of the grid world and that the state estimation probability at time 2 at this location equals to 0.998408, the maximum state estimation probability over all locations.

If more than one location has the maximum probability, output all of the locations corresponding to the maximum state estimation probability in the format shown above (one location per line).

**Submission includes:**

1. A personal demonstration of your running program to the instructor (10 minutes).
2. Zipped code submitted via Blackboard.

**Grading rubric:**
1. Code is up to 50%.
2. Demo is up to 50%.