**George Gabricht - 56735102**
CompSci 171 - Summer 19

**Minesweeper Final AI Report**
**Team name: RogueRussian**

## I. Minimal AI

### I.A. Briefly describe your Minimal AI algorithm. What did you do that was fun, clever, or creative?

**Rather than looking for patterns on the board, I used logical deduction to eliminate which tiles by necessity HAD TO BE safe and which ones HAD TO BE mines and then when all else failed, made educated guesses.** So I would look at the number of the tile, look at how many mines were already uncovered, if they matched, then it was essentially a “0” and so all tiles around it that are not mines are safe. Then, I would look at # of uncovered tiles around it and if it equals # of unresolved mines, all of those tiles are mines. Else it recycled the tile in the queue and continues until no more moves are left, then guesses based on remaining uncovered tiles that aren’t determined to be mines. When no guesses are left, it leaves the map.

### I.B Describe your Minimal AI algorithm's performance:

| Board Size | Sample Size | Score | Worlds Complete |
|---|---|---|---|
| 5x5 | 1000 | 0 | 1000 |
| 8x8 | 1000 | 578 | 578 |
| 16x6 | 1000 | 1024 | 512 |
| 16x30 | 1000 | 45 | 15 |
| Total Summary | 4000 | 1647 | 2105 |

## II. Final AI

### II.A. Briefly describe your Final AI algorithm, focusing mainly on the changes since Minimal AI:

To improve my overall score and meet the requirements of the assignment, I focused on implementing various strategies that improved both the guessing aspects of the program as well as deductive reasoning involved. FIrst, I implemented identifiers/handlers for the 1-1 and 1-2 patterns, in which you can use 2 neighboring tiles to deduce a safe space or a mine is in

another, third tile. This proved very effective and drastically improved my score. Next, I implemented a method of calculating the local probabilities of unresolved tiles and used these probabilities to make educated guesses. Lastly, if the probability wasn't of much help, then the program would make an edge guess, as statistically, edges are safer tiles to choose from as if you don't land on a mine, you are more likely to open up large chunks of safe spaces.

### II.B Describe your Final AI algorithm's performance:

| Board Size | Sample Size | Score | Worlds Complete |
|---|---|---|---|
| 5x5 | 1000 | 0 | 1000 |
| 8x8 | 1000 | 749 | 749 |
| 16x6 | 1000 | 1330 | 665 |
| 16x30 | 1000 | 297 | 99 |
| Total Summary | 4000 | 2376 | 2513 |

### III. In about 1/4 page of text or less, provide suggestions for improving this project (*this section does NOT count as past of your two-page total limit.*)

Perhaps in classes in the future, show more code examples of how to implement the course material into the project. I found the course material very interesting and yet the way it was taught was very vague in some regards as far as a code implementation was concerned.