

CS 4710 Project Proposal*

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1 Motivation and Statement of the Problem

We love Minesweeper! We attend AI lectures but always fail to focus because we are always distracted by Minesweeper! In order to terminate this distraction, we have decided to design an algorithm to solve Minesweeper so that we don't spend time solving Minesweeper manually in class and end up not learning the materials. More importantly, it is a classic game that a lot of people play, and while it is an interesting problem, it is doable in the period of time given to us for this assignment.

2 Proposed Approaches

In our research, we found a few methods to creating a Minesweeper AI that would be suitable for our project. The first is based upon this [Harvard CS50](#) assignment [1]. It describes a method called a knowledge-based agent that stores "knowledge" of the game state at any time and accept new information to update the internal knowledge. This works well for a minesweeper game as if we can define a way to represent knowledge of cells with bombs, we can use this to determine which cell next to click. When this happens, we now have access to more information which we use to update our internal logic and repeat until the game is finished. Another approach to an AI for minesweeper is to calculate the probability that a square contains a bomb [2]. One brute force way to do this is to simulate all possible bomb locations and count how many contain a bomb in the given square. There are a few possible optimizations of this which can be explored, but this provides another way to solve the game of Minesweeper. In either case, probability will need to be involved as games are not always deterministically solvable. This is because from the information given to the player, it may not be fully constrained.

References

- [1] Brian Yu and David J. Malan. *Minesweeper - CS50's Introduction to Artificial Intelligence with Python*.
- [2] Code Bullet. *I created a PERFECT minesweeper AI*. Youtube, Apr 2018.

*The two authors contributed equally.