Minesweeper Final AI Report

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I. Minimal AI

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

We create a board inside of MyAI class to keep tracking the game board and update information on it.
There are basic rules for minesweeper, we call them rules of thumb:
1. If EffectiveLabel(x) = NumUnMarkedNeighbors(x), then all UnMarkedNeighbors(x) must be mines.
2. if EffectiveLabel(x) = 0, then all UnMarkedNeighbors(x) must be safe

We implemented two functions that are used to get an action: thumbsRule() and randomMove().
thumbsRule(): It iterates through the uncovered frontier and see if we can apply the rules on the tile. If we find a safety tile, then we return an action to uncover it.
randomMove(): It will return a random move if we can not apply rules of thumb to the uncovered frontier.

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

Board Size	Sample Size	Score	Worlds Complete
5x5	1000	1000	1000
8x8	1000	239	239
16x16	1000	394	197
16x30	1000	6	2
Total Summary	4000	1639	1438

II. Final AI

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

Firstly, we fixed some small bugs in Minimal AI. Now our thumbsRule() works as exactly as what we want.
When comes to random move, it will first avoid the tiles in the covered frontier and do random move on the tiles that not include in the covered frontier . Under circumstance that there is only the covered frontier, then we will do random move in the covered frontier.

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

Board Size	Sample Size	Score	Worlds Complete
5x5	0	0	0
8x8	1000	618	618
16x16	1000	1032	516
16x30	1000	93	31
Total Summary	3000	1743	1165

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.*)

If we have more time, we would implement model checking for our AI. Because we only implemented rules of thumb and random move, our AI passed the test for 8x8 and 16x16. However, it is not enough for 16x30. If we implemented model checking, the performance of our AI will be much better.