CMSC 170: Introduction to Artificial Intelligence

Laboratory Exercise Journal

Accomplish this journal while working on or when you are done with the laboratory exercise for the week.

1. Problems encountered. Explain the **specifics** of the problem/s. *You may include code snippets and/or screenshots.* (Minimum of 2 sentences)

   The first problem I encountered was how to find the best move using the minmax algorithm given. The algorithm was given in the handout and slides but I had a hard time figuring out how to use it. After solving this first problem, I had another issue in getting the successors of the board. Whenever I try to get the successors of the board, the global variable 'states' is also being modified, even though the variable is locally scoped.

2. How the problems were resolved and what are the **specific fixes** done. *You may include code snippets and/or screenshots.* (Minimum of 3 sentences)

   For the first problem, I was able to find a way with the use of this link. In the findBestMove function, it also takes the successors and finds the best value or the most optimal move in the board. In this, it calls the minmax function which starts the recursive calls of each successor.

   For the second problem, I realized that I was not 'undoing' the move when looking for the successors of the board. However, the logic I did for the successors is same as the one in the link above, where it calls the minmax function whenever it encounters a blank tile, and then undoing the move.

3. Learnings from the exercise / lesson. Explain in your own words. *Avoid merely listing laboratory topics like "I learned how to use Inheritance. I learned about Encapsulation."* Explain and analyze. (Minimum of 5 sentences)

   In this exercise, I learned how to implement the minmax algorithm in tic tac toe game. The algorithm decides which move is the best for the AI (minimizing move) using recursive calls and works upward from the terminal state. It uses the utility of the terminal state when it reaches the end. I also learned that this algorithm can also be used in other games such as Chess, Checkers, etc. I also learned that through Alpha-Beta Pruning, we can further reduce the runtime of the program which has O(bm) runtime.