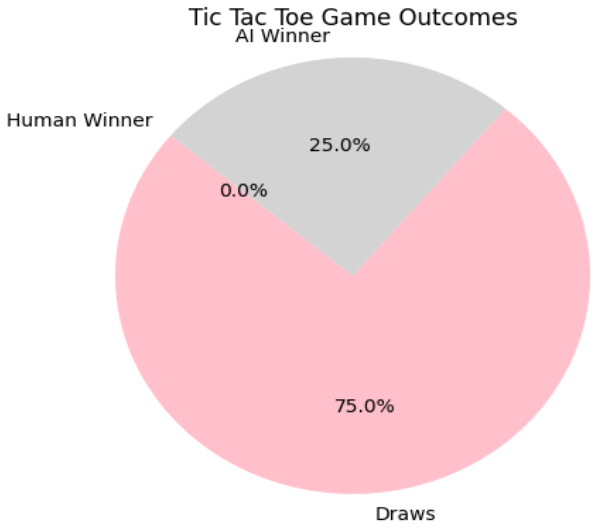
Assignment-2 Report

Reported by: Divyansh Mishra

Comparative Analysis of Minimax Algorithm and Reinforcement Learning in Tic Tac Toe:

1.) Minimax Algorithm is easier to implement and uses less space than reinforcement when the code runs.
2.) Minimax gives the optimal state where there is no chance for a human to win, either human losses or the match draws. Whereas in reinforcement learning AI does not give the optimal path, but gives the suitable one. In Reinforcement learning we can't say about the winning probability but what I observed from my code is shown below.
3.) Reinforcement took much time in learning while in minimax there is nothing to learn, just by using DFS it shows the optimal result.

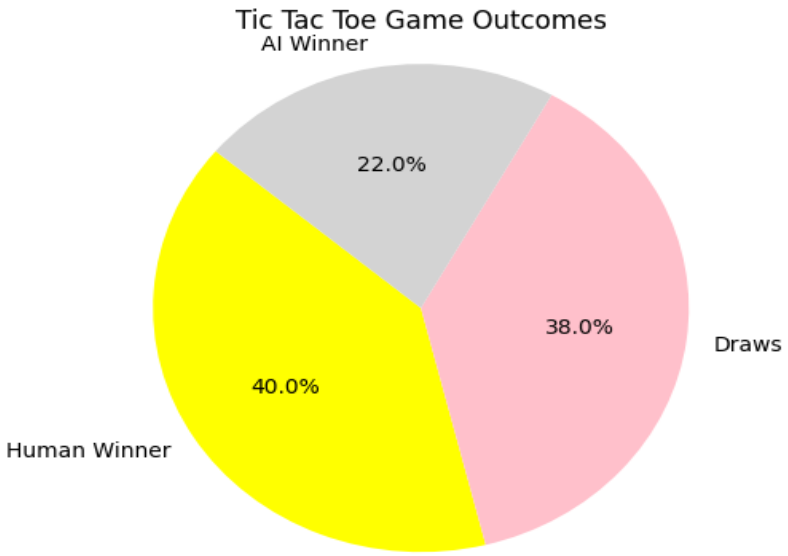
Minimax Analysis:



(Pie chart is made using plotly and the data observed by me.)

When I played with the minimax algorithm I was not able to win even once. This shows its optimality.

Reinforcement Learning Algorithm:



1) I took alpha = 0.23566 and got the above observation.
2) I analyzed the values but they never go to a fixed point even after iterating over 1000 times. It shows that usually in reinforcement learning we don't get a fixed saturation point exactly. Thus I defined the saturation point with +- 10e-4 error. (Found a good time to stop)
3) Values for every state were converging to some value but they were fluctuating with some error.

Which game do I prefer playing?

I would like to play the game made using reinforcement learning as there are chances to win and lose both. But in minimax, there is no chance to win, i.e. the result of the game is predefined so no reason to play.

Acknowledgement:

I learnt tkinter (A python library) for a GUI in python in the Diwali break. I took its help in making the minimax game.

For reinforcement learning I discussed with my friends and went through some websites like GFGs and other websites. My mentor also helped me a lot by discussing all the doubts in the class.

THANK YOU