

Homework Assignment 2
600.335 / 435 Artificial Intelligence Spring 2017
Due: Wednesday March 15, 2019

March 4, 2019

Game Playing

In the past weeks, we discussed intelligent agents and how they can use tree searching techniques to solve abstracted problems. In this assignment, you will implement chess-playing agent and answer some theoretical questions.

Question 1. Open the following google colaboratory notebook. Follow all the steps specified in it. Include link to your solved notebook in your submission. Optional: implement your own chess-playing agent and we will run a small competition between agents of other students (you can work in teams).

Question 2. Why do we assume that we play against an optimal opponent in the minimax algorithm. What happens otherwise?

Question 3. What kind of node exploration is the minimax algorithm using? Depth-first or breadth-first?

Question 4. What is the time complexity of the naive minimax algorithm? Prove it.

Question 5. Explain why minimax algorithm with $\alpha - \beta$ pruning is more efficient than naive minimax. What is the complexity and why it depends on the ordering of the elements?

Question 6. Why did we introduce EVAL function instead of UTILITY for some games? Explain what is a good EVAL function for chess and how it affects the minimax algorithm.

Question 7. What is a Horizon effect and Quiescence?

Question 8. Under what kind of transformation the behaviour of minimax algorithm is preserved in case of a game with no chance nodes? In case of a game with chance nodes?

Question 9. How can we improve minimax algorithm with $\alpha - \beta$ pruning in games with chance nodes?