COMS 572: Lab #2

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Problem 1

Compare the effect of increasing search depth and improving the evaluation function.
Answer:

1. Search depth:

   When I set the search depth to 2, the AI bot player can be easily beaten by me because it only calculate the game state up to 2 steps. If I prepare a trap and use one of my piece as a lure, it will always go into the trap and easily lose two more pieces as a price. However, when the search depth is more than 6, the simple trap I made will not work because the AI knows that even it captures the "lure" piece for next step, it would pay the price with two more pieces which leads to a lower evaluation score.

   Conclusion: the deeper Alpha-Beta search goes, the stronger the AI performs.

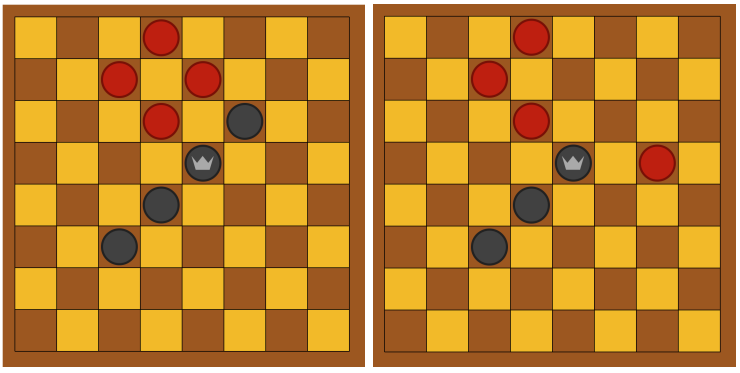
2. Evaluation function:

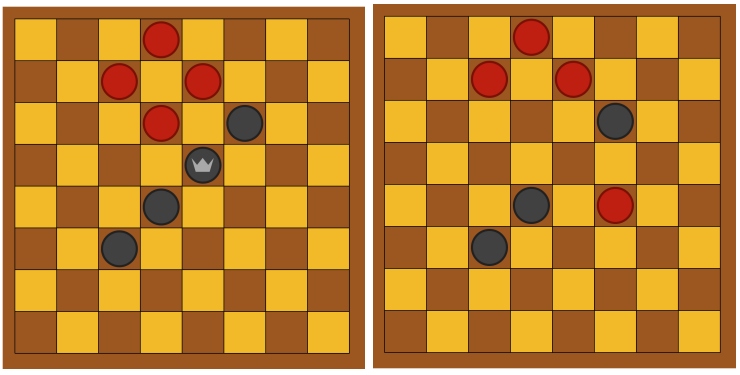
   (a) Difference of pieces in number

   (b) $2 *$ (difference of kings)+difference of men

   (c) If next state is lose, return -1000, otherwise, return $2 *$ (difference of kings)+difference of men

   With evaluation function (a), the AI can do simple maths and take continuous jumps first if it's possible. However, when facing the situation where two pieces have the same opportunity to capture same amount of opponent's pieces, one captures opponent's king but on does not, it will chose randomly. In the same situation, evaluation function (b) will make a wiser move to caputure opponent's king before other moves.


AI move with evaluation function (a)


AI move with evaluation function (b)

   Sadly, these two evaluation functions would not consider the situation where next state would be a losing state because of the number of possible moves drops to zero. The evaluation function (c) will solve this situation with picking the right moves to avoid dead-lock losing states.

   Conclusion: the more information is taken into consideration, the better the evaluation function works.