

CSC 425/525 Homework #2 (Chapters 3 and 4)

Due: Wednesday, February 1

Word process your answers (answers to 1 and 3 can be hand drawn). Undergraduates answer questions 5 of the 6 questions, graduate students answer all 6.

1. Draw the search space for the missionaries and cannibals problem as described on slide 3 of the chapter 3 power point notes. If a state is reached along multiple paths, do not expand it after having done so once.
2. Do question 7 on page 122.
3. We want to build a search space for a person taking a trip to NYC. The person has three options: flying, driving, taking the bus. Each of these might have additional requirements (traveling by plane or bus requires getting a ticket, driving by car requires filling the tank). The person also needs to book lodging, bring money and pack. Packing may require doing laundry and bringing money may involve going to the bank, etc. Draw an And/Or graph to represent the search space of what options the person has and what activities the person needs to do in order to have a successful trip. You do not need to make a search space that covers every contingency but make sure your tree has at least 3-4 levels with several AND and several OR branches.
4. Starting at node A of the search space shown in figure 3.29 (page 122), provide the
 - a. depth-first search
 - b. breadth-first searchUse alphabetical ordering for the order that nodes are checked when there are options such as after A in DFS, the options are B, C and D. The algorithm would order them as B first.
5. In the game of checkers, you want to move your piece in each turn in such a way that you can “capture” other pieces by jumping over them and landing at the end of the board so that your piece can now move in both directions while avoiding your piece being captured. Provide a heuristic function given the state of the board and a position you are considering moving, what its worth will be. The function can be considered $h(\text{board}, a, b)$ where a and b are the row and column of the piece being considered. The value of $\text{board}[a][b]$ will be either “empty”, “my piece”, “your piece”, “my king” or “your king” depending on the piece on that board position.
6. Given the search space at the top of the next page, do the following searches starting at node A until you reach the goal node of M. As with #4 above, for DFS use alphabetical ordering to decide which node is examined next, and for b and c, if there is a tie, the winner goes to the node whose letter is alphabetically less (for instance, D before E).
 - a. Depth-first search
 - b. Best-first search where the heuristic is $a * b$ for the node storing values (a, b)
 - c. Best-first search where the heuristic is $3 * a - b$ for the node storing values (a, b)

