Assignment 2
CSC416
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CHAPTER 2: Uniformed Search Intelligence

Abstract

In this chapter, we learned about uninformed search, which are algorithms that do not rely on any special knowledge about a problem domain and a big characteristic of this kind of algorithm is that they often require inordinate amounts of space and time.

Questions:

1. **Why is search an important component of an AI system?**

   Because all current systems are based on data saving and retrieving, making data organizing and searching an important component in AI systems in particular.

2. **What is a state-space graph?**

   It's a representation of a problem whereby possible alternative paths leading to a solution can be explored and analyzed.

3. **Describe the generate-and-test paradigm.**

   A straightforward way to solve a problem is to propose possible solutions and then to check whether each proposal constitutes a solution.

4. **Describe the greedy algorithm in a sentence or two.**

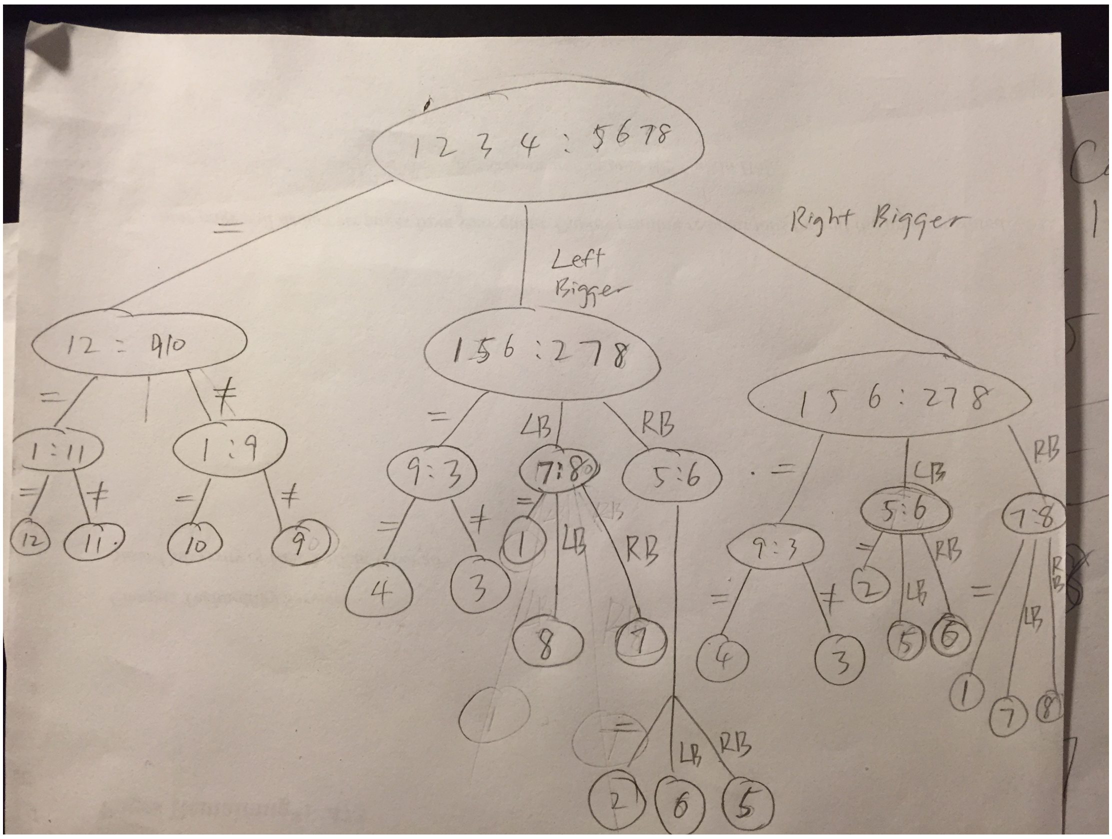
   It's an algorithm of trying to find a global optimum by selecting local optimums in the path to the final destination.

5. **Name three blind search algorithm.**

   Depth first search (dfs), breadth first search (bfs) and depth first search with iterative deepening (dfs-id).

Exercises:

1. **Solve the False Coin Problem for 12 coins. Only three combinations of coins are permitted to be weighed. Recall that a balance scale returns one for three results: equal, left side is lighter, or left side is heavier.**



2. **Solve the Mini False Coin Problem weighing only twice, or prove that this is not possible.**

   By looking at the graph in the book, the only possibility for us to find the false coin in two steps is when in the first try the two sides of the scale have the same weight. So only weighing twice in a mini false coin problem is not sufficient to achieve the goal for all possible solutions.

3. **A farmer with a wolf, a goat and a container of cabbage are on the west bank of the river. On the river is a boat in which the farmer and one of the other three (wolf, goat, or cabbage) can fit. If the wolf is left alone with the goat, the wolf will eat the goat. If the goat is left alone with the container of cabbage, the goat will eat the cabbage. Your goal is to transfer everyone to the other side of the river safely. Solve the problem using:**

   a. **Depth first search.**

      Open = [S]; Closed = [];

Open = [W1,G1,C1]; Closed = [S];
Open = [G1,C1]; Closed = [S,W1];
Open = [W2,C2,C1]; Closed = [S,W1,G1];
Open = [C2,C1]; Closed = [S,W1,G1,W2];
Open = [G3,C1]; Closed = [S,W1,G1,W2,C2];

b. Breadth first search.

Open = [S]; Closed = [];
Open = [W1,G1,C1]; Closed = [S];
Open = [G1,C1]; Closed = [S,W1];
Open = [C1,W2,C2]; Closed = [S,W1,G1];
Open = [W2,C2]; Closed = [S,W1,G1,C1];
Open = [C2]; Closed = [S,W1,G1,C1,W2];
Open = [G3]; Closed = [S,W1,G1,C1,W2,C2];

4. **Label the maze in figure 2.37.**

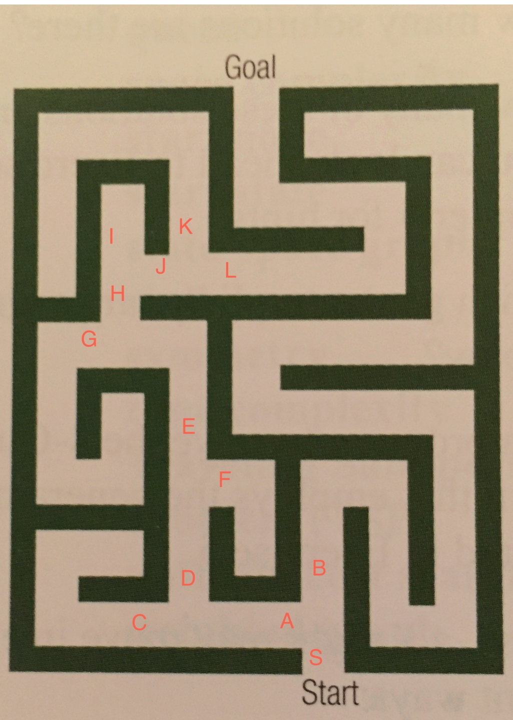


Figure 2.37
A maze.

5. **Use bfs and then dfs to get from the start to the goal, for the maze in Figure 2.37.**

Dfs:

Open = [S]; Closed = [];

Open = [A,B];	Closed = [S];
Open = [C,D,B];	Closed = [S,A];
Open = [D,B];	Closed = [S,A,C];
Open = [E,F,B];	Closed = [S,A,C,D];
Open = [G,H,F,B];	Closed = [S,A,C,D,E];
Open = [H,F,B];	Closed = [S,A,C,D,E,G];
Open = [I,J,F,B];	Closed = [S,A,C,D,E,G,H];
Open = [J,F,B];	Closed = [S,A,C,D,E,G,H,I];
Open = [K,L,F,B];	Closed = [S,A,C,D,E,G,H,I,J];
Open = [L,F,B];	Closed = [S,A,C,D,E,G,H,I,J,K];

Bfs:

Open = [S];	Closed = [];
Open = [A,B];	Closed = [S];
Open = [B,C,D];	Closed =[S,A];
Open = [C,D];	Closed =[S,A,B];
Open = [D,E,F];	Closed =[S,A,B,C];
Open = [E,F];	Closed =[S,A,B,C,D];
Open = [F,G,H];	Closed =[S,A,B,C,D,E];
Open = [G,H];	Closed =[S,A,B,C,D,E,F];
Open = [H,I,J];	Closed =[S,A,B,C,D,E,F,G];
Open = [I,J];	Closed =[S,A,B,C,D,E,F,G,H];
Open = [J,K,L];	Closed =[S,A,B,C,D,E,F,G,H,I];
Open = [K,L];	Closed =[S,A,B,C,D,E,F,G,H,I,J];
Open = [L];	Closed =[S,A,B,C,D,E,F,G,H,I,J,L];