CIT, DEPARTMENT OF COMPUTING

COMP9016 Lab #2

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1 PROBLEM SOLVING AND SEARCH

1.1 GETTING TO GRIPS WITH SEARCH

It is critical for the successful completion of the first assessment that you have a competent understanding of search. It will be nessecary to be able to develop and implement a number of search algorithms in python. So to start you on your journey.
Launch your IDE, Jupyter Notebook. Navigate to and click on "search.ipynb" - You are to review this notebook as it will provide you with a grounding in the practical implementation of search.

1.2 #INTRO - APPROACHES TO SEARCH

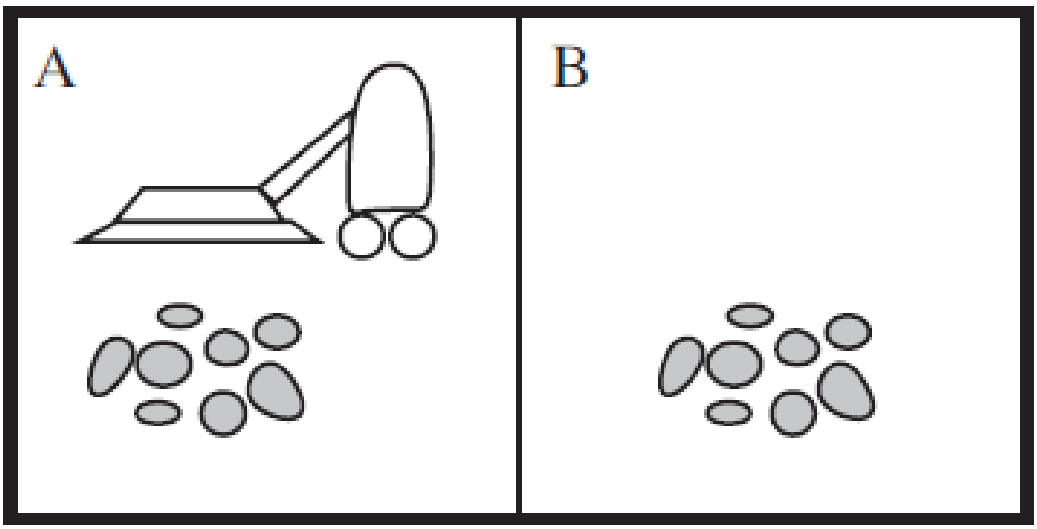
In reviewing the the notebook cover everything up to heuristic search, informed search strategies. (Up as far as 8. Iterative Deepening Search)
Note: If you have time, and are willing, I highly recommend completing the rest of Chapter 3 and 4 - thereafter review the rest of this notebook.

1.3 Q#1 - MISSIONARIES AND CANNIBALS

The missionaries and cannibals problem is usually stated as follows. Three missionaries and three cannibals are on one side of a river, along with a boat that can hold one or two people. Find a way to get everyone to the other side without ever leaving a group of missionaries in one place outnumbered by the cannibals in that place. This problem is famous in AI because it was the subject of the first paper that approached problem formulation from an analytical viewpoint (Amarel, 1968).

1. Formulate the problem precisely, making only those distinctions necessary to ensure a valid solution. Draw a diagram of the complete state space.
2. Implement and solve the problem optimally using an appropriate search algorithm. Is it a good idea to check for repeated states?
3. Why do you think people have a hard time solving this puzzle, given that the state space is so simple?

1.4 Q#2 - The Vacuum World



Consider the vacuum-world problem defined in Figure 2.2.

1. Which of the algorithms defined in this chapter would be appropriate for this problem? Should the algorithm use tree search or graph search?
2. Apply your chosen algorithm to compute an optimal sequence of actions for a 3ÃŮ3 world whose initial state has dirt in the three top squares and the agent in the center.
3. Construct a search agent for the vacuum world, and evaluate its performance in a set of 3ÃŮ3 worlds with probability 0.2 of dirt in each square. Include the search cost as well as path cost in the performance measure, using a reasonable exchange rate.
4. Compare your best search agent with a simple randomized reflex agent that sucks if there is dirt and otherwise moves randomly.
5. Consider what would happen if the world were enlarged to n ÃŮ n.

1.5 Review

Congrats on having completed your lab on search, this is a necessary topic for pursuing some of our later work as part of COMP9016!