Tutorial - Week 3

Uninformed Search

Activity 1

Activity 1. The "Missionaries and Cannibals" problem is usually stated as follows: Three missionaries and three cannibals are on one side of the 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, and draw a diagram of the complete state space.

2. 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?

Activity 2

For the route from Arad to Bucharest, what order are nodes in the state space expanded for each of the following algorithms when searching for the shortest path between Arad and Bucharest? Where there is a choice of nodes, take the first one by alphabetical ordering. Make sure you understand the key properties of the different algorithms, as listed below.

(i) Depth-First Search

(ii) Breadth-First Search

(iii) Uniform-Cost Search

(iv) Iterative Deepening Search