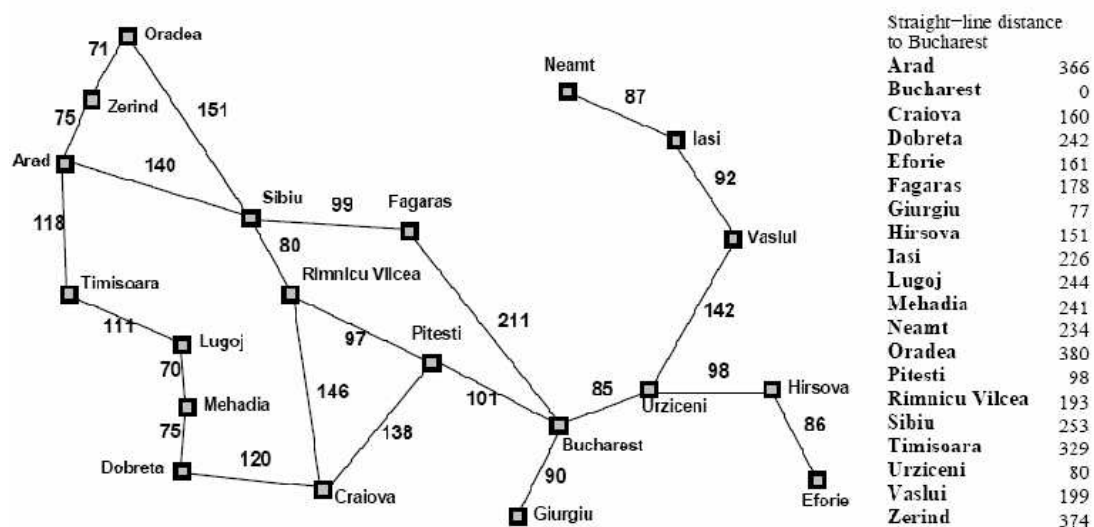


COS30019 - Introduction to Artificial Intelligence
Tutorial Problems Week 4

Task 1: Consider the problem of getting from Arad to Bucharest in Romania and assume the straight-line distance (SLD) heuristic will be used.

1. Give the part of the search space that is realized in memory and the order of node expansion for:
 - a. Greedy search assuming that a list of states already visited is maintained.
 - b. A* search assuming that a list of states already visited is maintained.
2. How would the above searches differ if the list of states already visited is NOT maintained?
3. How do the above searches perform for planing a trip from Iasi to Fagaras?



To provide you with the heuristics for Task 1.3, please use the following as the straight-line distance (SLD) between relevant cities and Fagaras:

Iasi	180
Neamt	160
Vasiul	200
Urziceni	175
Bucharest	178
Hirsova	255
Pitesti	130
Giurgiu	270
Eforie	320

Task 2:

1. Suppose we run a greedy search algorithm with $h(n) = -g(n)$. What sort of search will result?
2. Suppose we run an A* algorithm with $h(n) = 0$. What sort of search will result?
3. Explain why the set of states examined by A* is often a subset of those examined by breadth-first search.

Task 3: 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.

1. Implement and solve the problem optimally using an appropriate search algorithm. Is it a good idea to check for repeated states?
2. Is there a heuristic that would be useful for the missionaries and cannibals problem? The generalized missionaries and cannibals problem (n missionaries and n cannibals)?