

## **Tutorial Sheet 1**

### **Search**

- Open Discussion: *What is Artificial Intelligence?*
- Watch the videos:
  - Holy Grail of AI: <https://www.youtube.com/watch?v=t1S5Y2vm02c>
  - Humans Need Not Apply: <https://www.youtube.com/watch?v=7Pq-S557XQU>
  - Artificial Intelligence: <https://www.youtube.com/watch?v=oYqXQw2CryI>
  - The long-term future of AI: <https://www.youtube.com/watch?v=CK5w3wh4G-M>

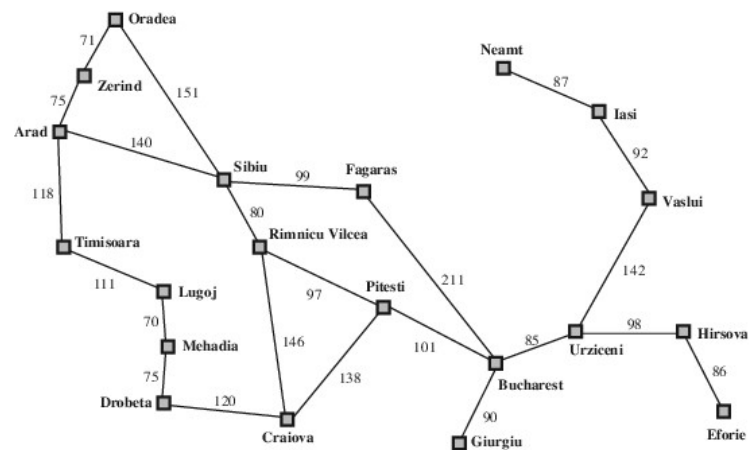
## **Exercises**

1. (RN) Define in your own words the following terms: state, state space, search tree, search node, goal, action, successor function, and branching factor.
2. (RN) What's the difference between a world state, a state description, and a search node? Why is this distinction useful?
3. Consider this problem: We have one 3 litre jug, one 5 litre jug and an unlimited supply of water. The goal is to be able to drink exactly one litre. Either jug can be emptied or filled, or poured into the other.

For this problem give:

- (a) An appropriate data structure for representing a state.
  - (b) The initial state.
  - (c) All the final goal state(s).
  - (d) A specification of the operators (or actions) which includes the preconditions that must be satisfied before the operator can be used and the new state generated.
  - (e) Draw the full state space.
  - (f) What is the solution to the problem.
  - (g) How did you find that solution? Would a computer be able to find it the same way? Explain either way. If not, how would you make an algorithm to find a solution given the search space?
4. Does a finite state space always lead to a finite search tree? How about a finite state space that is a tree?
  5. Consider the problem of getting from Arad to Bucharest in Romania. For this problem give:
    - Search state descriptions.
    - Initial State.

- Final goal search states.
- Operators (or actions).



Using your representation, how would you build a “search tree” starting from state “Arad”?

6. Why is search an important technique in AI and CS? When would you use search and when you wouldn't? Give concrete examples and reasons.
7. *You say more?* Lots of cool exercise in RN book, chapter 3....