Artificial Intelligence 1 Supervisior: Marton Havasi
Lectures 1-4 25/04/2018

Core questions (expected)

1. Compare and contrast the four definitions of AI. (8 marks)
2. What do we mean by a problem being 'AI-complete'? (3 marks)
3. Give pseudocode for breath-first search and depth first search. What does it mean for a search algorithm to be optimal? Which of these is optimal? (6 marks)
4. Prove that the A* algorithm is optimal if the heuristic function is admissible. (8 marks)
5. You are tasked with writing a path finding algorithm for an intercontinental missile. The missile is unarmed and its purpose is to deliver food and medication to the needy. Your advisors have identified n possible target cities for the missile, each with a different population. Your goal is to maximize the expected number of people that receive the aid.

   However, there are a few difficulties.

   - The missile has a limited range r (miles travelled).
   - The missile is not well tested, therefore there is a probability p of failing for every mile travelled.
   - An evil power is trying to intercept the missile. For each mile travelled in its airspace, it is shot down with probability q.
   - Your country has made very limited technological progress since the cold war so it is crucial that your algorithm can run on limited memory.

   Design a path finding algorithm to solve the problem. What is your cost function and what heuristic would you use? (8 marks)
6. Explain (with pseudocode) how Simulated Annealing works. Discuss its advantages and shortcomings. (6 marks)
7. 2001 paper 9 question 8 Link (20 marks)

Tryhard questions (optional)

1. 2001 paper 8 question 8 Link (20 marks)