Foundations of Artificial Intelligence

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Exercise Sheet 1
Due: Wednesday, April 27, 2016

Exercise 1.1 (Potentials and Limits of AI)

Examine the AI literature or the Internet to discover to what extent the following tasks can currently be solved by computers/robots:

(a) Playing the board games Checkers and Go.

(b) Playing Poker.

(c) Performing real-time natural language processing.

(d) Autonomy of unmanned ground and aerial vehicles (UGVs and UAVs).

(e) Automatic face recognition.

(f) Playing video games (e.g., classical Atari games) like a human.

Write down your findings in 2–3 sentences each.

Exercise 1.2 (Performance and Utility)

(a) What is the difference between a performance measure and a utility function?

(b) Describe the relation between the performance measure and the utility function for a learning agent.

Exercise 1.3 (Rational Agents)

(a) Write down a PEAS (**P**erformance **E**nvironment **A**ctuators **S**ensors)-Description for each of the following agents:

   (i) Playing foosball (table soccer)
   (ii) Shot put athlete
   (iii) Playing the 2048 Game (`http://gabrielecirulli.github.io/2048`)

(b) Characterize the environments of the agents in (a) according to the following criteria:

   - fully observable vs. partially observable
   - deterministic vs. stochastic
   - static vs. dynamic
   - discrete vs. continuous

Exercise 1.4 (Formalizing problems)

Formalize the following problems as precisely as possible, by defining the initial state, the state space, the set of actions, the goal test and the path cost function:

- You want to solve Rubik's Cube.
  `http://en.wikipedia.org/wiki/Rubik%27s_Cube`

- You have to color a map of Europe with only four colors. In order for the national borders to be recognizable, no two neighboring countries may be assigned the same color.

The exercise sheets may and should be worked on in groups of three (3) students. Please write all your names and the number of your exercise group on your solution.