

Foundations of Artificial Intelligence

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Exercise Sheet 1

Due: March 10, 2021

Exercise 1.1 (1+1+1+1 marks)

Characterize the following AI systems with respect to the four categories (acting humanly, thinking humanly, thinking rationally, acting rationally) that have been introduced in the lecture. Justify your answers.

- (a) Pepper ([https://en.wikipedia.org/wiki/Pepper_\(robot\)](https://en.wikipedia.org/wiki/Pepper_(robot)))
- (b) self-driving cars
- (c) R1/XCON (slide set A2, slide 12)
- (d) AlphaGo (<https://en.wikipedia.org/wiki/AlphaGo>)

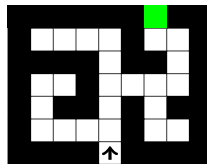
Exercise 1.2 (1.5+1.5 marks)

Investigate to which extent the following tasks can nowadays be performed automatically by computers, particularly in comparison to humans. Describe your findings in 2-4 sentences and provide sources for your statements.

- (a) paint a (digital) picture
- (b) prove a mathematical theorem

Exercise 1.3 (2+1 marks)

Consider an agent trying to reach the goal in a 2D labyrinth grid. It can move forward, turn 90° to the left or right, detect whether an adjacent cell is blocked and detect if it is at the goal location. The starting location is always in the south edge with the agent facing north and the adjacent east and west cells blocked, and the goal is always on an edge.



- (a) Provide a description of a possible implementation such that the agent is a *reflexive* agent. Also describe the idea of your implementation in one to two sentences.
Hint: You are allowed to combine several actions into one action.
- (b) Does your agent still work as intended if the turning action has a chance to fail? What if the wall sensors are faulty?

Submission rules:

- Upload a single PDF file (ending .pdf). If you want to submit handwritten parts, include their scans in the single PDF. Put the names of all group members on top of the first page. Use page numbers or put your names on each page. Make sure your PDF has size A4 (fits the page size if printed on A4).
- Only upload one submission per group. Do not upload several versions, i.e., if you need to resubmit, use the same file name again so that the previous submission is overwritten.