Computational Intelligence

LMU Munich
winter term 2024/2025

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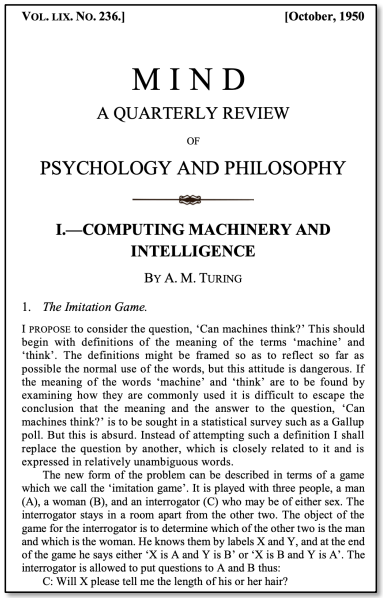
Reading Exercise #1

Discussion on 2024-11-07



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MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY

I.—COMPUTING MACHINERY AND INTELLIGENCE

BY A. M. TURING

1. *The Imitation Game.*

I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, 'Can machines think?' is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.

The new form of the problem can be described in terms of a game which we call the 'imitation game'. It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman. He knows them by labels X and Y, and at the end of the game he says either 'X is A and Y is B' or 'X is B and Y is A'. The interrogator is allowed to put questions to A and B thus:

C: Will X please tell me the length of his or her hair?

2022

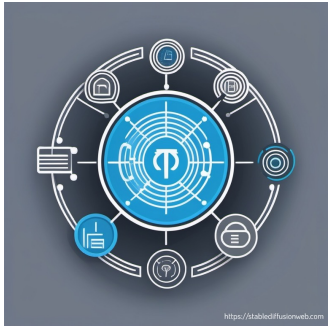
prompt

computational intelligence

Input prompt

2023


https://stablediffusionweb.com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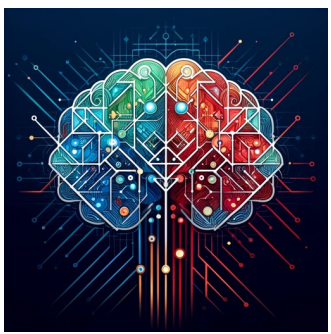
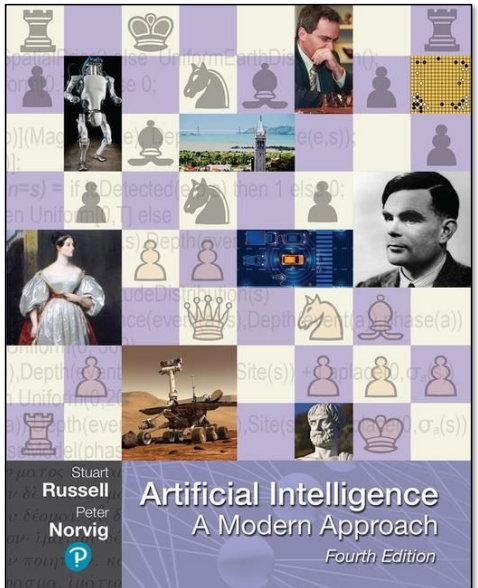
2024



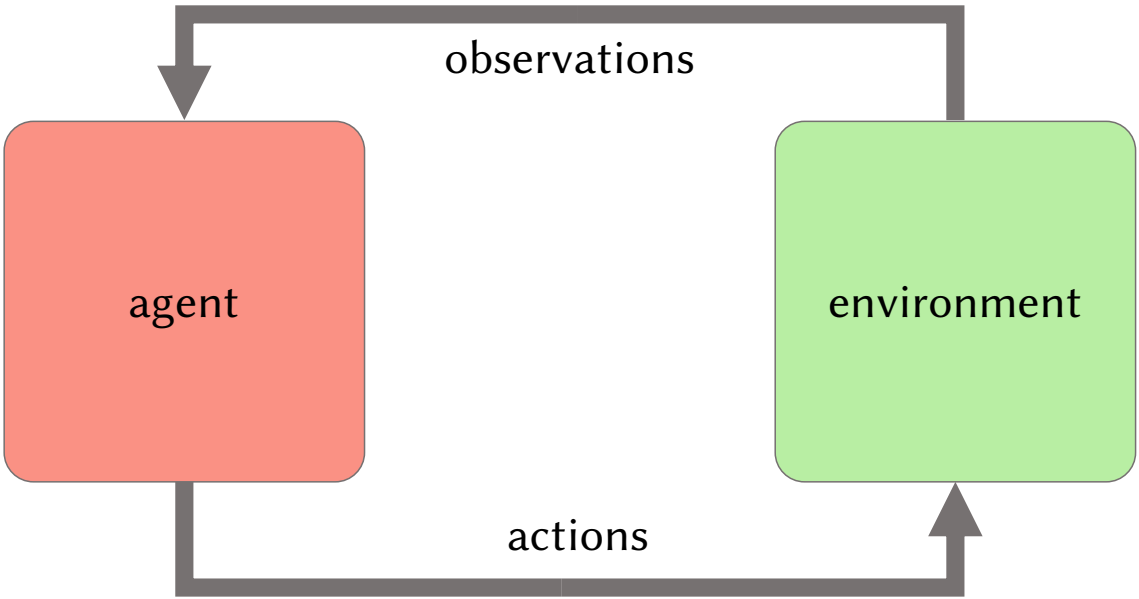
The Agent Model

Russell, Norvig.
Artificial Intelligence:
A Modern Approach
1995, 2003, 2009, 2020.

https://inst.eecs.berkeley.edu/~cs188/fa22/



Let's start with everything...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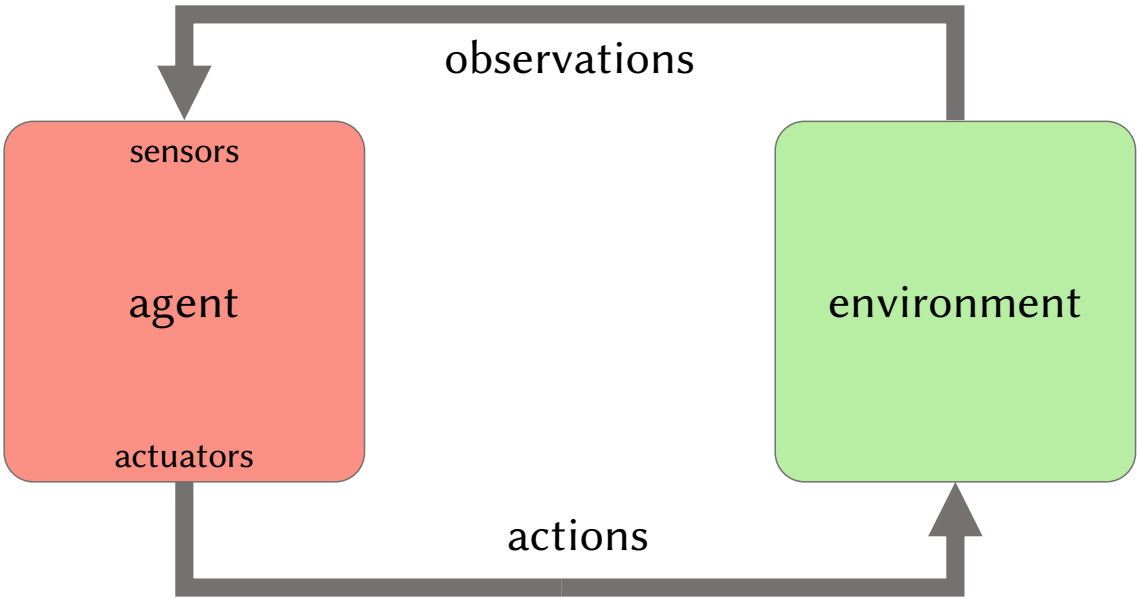
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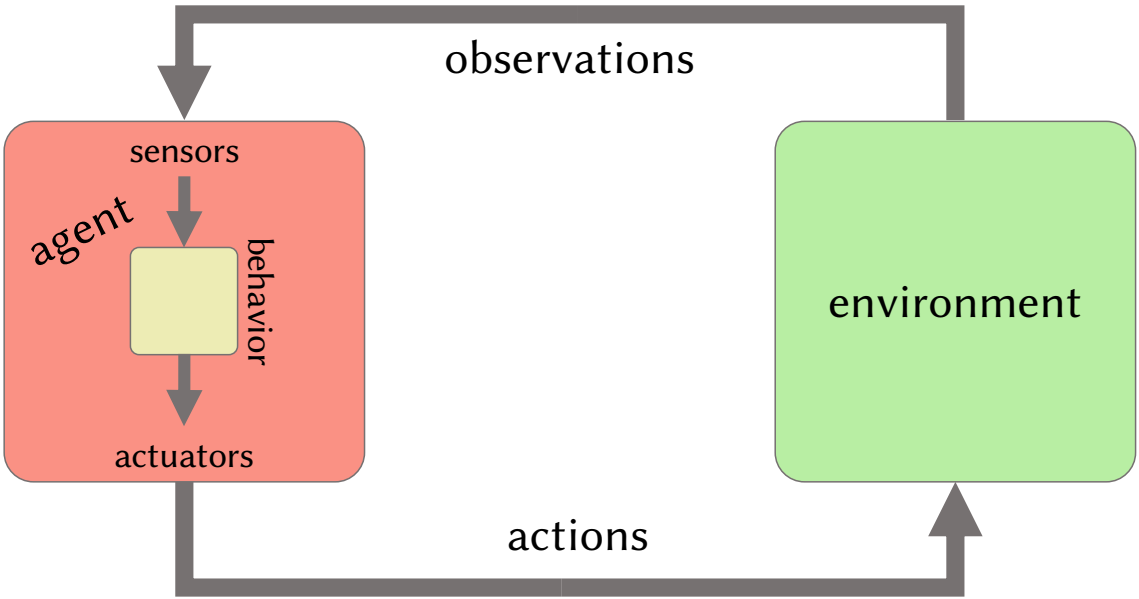
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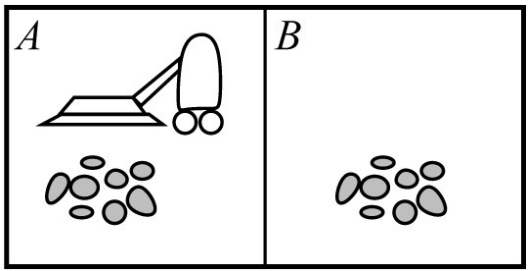
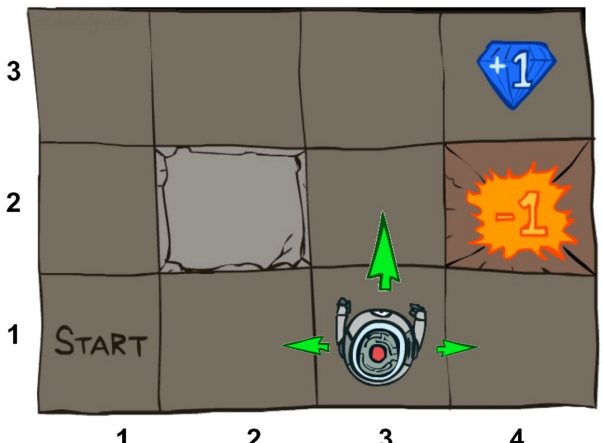
running example #1

The Vacuum World



running example #2

The Basic Grid World



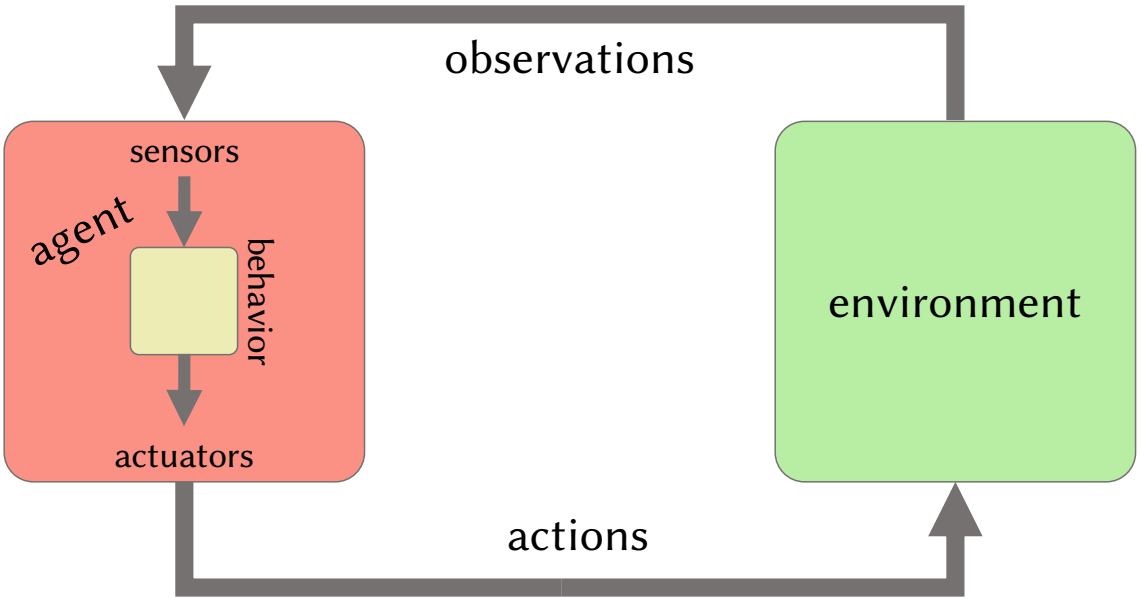
running example #3

Resource/Stock Trading

chatgpt.com

More Examples

running example #4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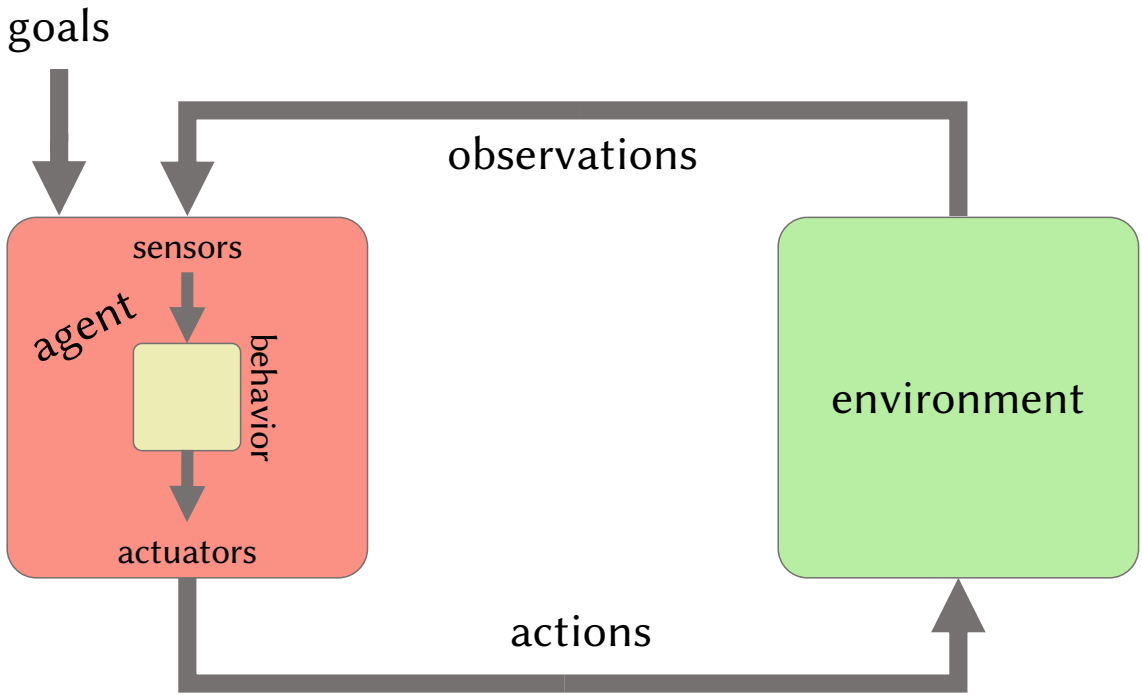
Definition 1 (agent)**.** Let $\mathcal{A}$ be a set of actions. Let $\mathcal{O}$ be a set of observations. An agent A can be given via a policy function $\pi : \mathcal{O} \to \mathcal{A}$. Given a time series of observations $\langle o_t \rangle_{t \in \mathcal{Z}}$ for some time space $\mathcal{Z}$ the agent can thus generate a time series of actions $\langle a_t \rangle_{t \in \mathcal{Z}}$ by applying $a_t = \pi(o_t)$.

How can policies be represented?

What should a policy do?


goals
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The Goal Class Hierarchy

Goal Class 0: No Goals

"I know one thing that I know nothing"

Goal Class 0: No Goals

"I know one thing that I know nothing"

"standard programming"

full autonomy

open-endedness

self-organization

meta-goals

The Goal Class Hierarchy

Goal Class 1: Goal Predicate

"I know it is good when I see it!"