

- What is Artificial Intelligence?
- Agents acting in an environment

Learning objectives: at the end of the class, you should be able to

- describe what an intelligent agent is
- identify the goals of Artificial Intelligence
- classify the inputs and the outputs of various agents

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- Artificial Intelligence is **the synthesis and analysis of computational agents that act intelligently**.
- An **agent** is something that **acts** in an environment.
- An agent acts **intelligently** if:
  - ▶ its actions are appropriate for its goals and circumstances
  - ▶ it is flexible to changing environments and goals
  - ▶ it learns from experience
  - ▶ it makes appropriate choices given perceptual and computational limitations

# Examples of Agents

- **Organisations** Microsoft, Al Qaeda, Government of Canada, UBC, CS Dept,...
- **People** teacher, physician, stock trader, engineer, researcher, travel agent, farmer, waiter...
- **Computers/devices** thermostat, user interface, airplane controller, network controller, game, advising system, tutoring system, diagnostic assistant, robot, Google car, Mars rover...
- **Animals** dog, mouse, bird, insect, worm, bacterium, bacteria...
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Can a book or article *do* things?  
Convince? Argue? Inspire? Cause people to act differently?

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  - ▶ analyze natural and artificial agents
  - ▶ formulate and test hypotheses about what it takes to construct intelligent agents
  - ▶ design, build, and experiment with computational systems that perform tasks that require intelligence

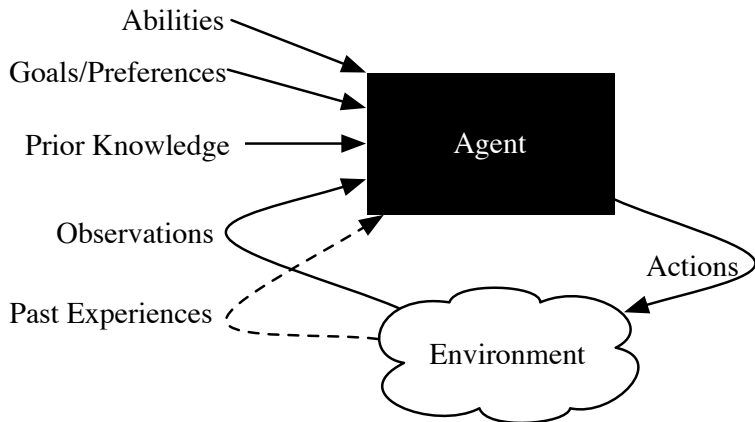
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- **Engineering goal:** design useful, intelligent artifacts.
- Analogy between studying flying machines and thinking machines.

# Agents acting in an environment



# Inputs to an agent

- **Abilities** — the set of possible actions it can perform
- **Goals/Preferences** — what it wants, its desires, its values,...
- **Prior Knowledge** — what it comes into being knowing, what it doesn't get from experience,...
- **History** of observations (percepts, stimuli) of the environment
  - ▶ (current) **observations** — what it observes now
  - ▶ **past experiences** — what it has observed in the past

# Example agent: robot

- **abilities:** movement, grippers, speech, facial expressions, . . .
- **goals:** deliver food, rescue people, score goals, explore, . . .
- **prior knowledge:** what is important feature, categories of objects, what a sensor tell us, . . .
- **observations:** vision, sonar, sound, speech recognition, gesture recognition, . . .
- **past experiences:** effect of steering, slipperiness, how people move, . . .

# Example agent: teacher

- **abilities:** present new concept, drill, give test, explain concept, . . .
- **goals:** particular knowledge, skills, inquisitiveness, social skills, . . .
- **prior knowledge:** subject material, teaching strategies, . . .
- **observations:** test results, facial expressions, errors, focus, . . .
- **past experiences:** prior test results, effects of teaching strategies, . . .

# Example agent: thermostat

- abilities:
- goals:
- prior knowledge:
- observations:
- past experiences:



# Example agent: autonomous car

- abilities:
- goals:
- prior knowledge:
- observations:
- past experiences:

# Example agent: medical doctor

- abilities:
- goals:
- prior knowledge:
- observations:
- past experiences:

# Example agent: Apple Inc.

- abilities:
- goals:
- prior knowledge:
- observations:
- past experiences:

# Other Agents

- user interface
- bee
- smart home
- ...
  
- abilities:
- goals:
- prior knowledge:
- observations:
- past experiences:

# Example agent:

- abilities:
- goals:
- prior knowledge:
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- past experiences:

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