

## Introduction to Artificial Intelligence

# AI

### What is intelligence?

From the dictionary...

- The capacity to acquire and apply knowledge
- The faculty of thought and reason
- Superior powers
- Information (especially secret information)

Let's observe some intelligent behaviors

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What are some examples of intelligence displayed by Joshua, the WOPR?

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### Intelligent behaviors (by Joshua)

- Game playing (tic-tac-toe, global thermonuclear war)
- Natural language understanding
- Dialogue management
- Learning ("Learn, dammit!")
- ...

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What are some examples of intelligence displayed by C3PO, R2D2, BB-8?



Star Wars

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### Intelligent behaviors (by C3PO, R2D2, BB-8)

- Vision/perception
- Grasping/manipulation
- Navigation
- Speech recognition
- Emotion (e.g., fear)

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### How do you know if an entity is intelligent?

#### The Turing Test

- “Can a machine think?” “If a machine could think, how could we tell?”
- Based on the “the imitation game”  
<http://www.cnet.com/videos/what-is-the-turing-test/>
- The Loebner prize awards the “most human-like” computer, the first formal implementation of the Turing Test.
- Roots of the field of Natural Language Processing

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- CAPTCHA
- Completely Automated Public Turing Test for Telling Computers and Humans Apart



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### What is the goal of research in artificial intelligence?

- Not to create C3PO ☹️
- Engineering: create artifacts that display useful intelligent behavior
- Science (1): understand intelligence
- Science (2): understand human intelligence

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### Some questions AI might try to answer

- Given these symptoms, what illness do I have?  
➡️ **Diagnosis, general analysis**
- Is the next hurricane/earthquake/... the big one?  
➡️ **Prediction**
- ➡️ How can this team of robots work with me?  
• **Adaptation and learning**

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### Real AI (right now)

- **Language technology** (speech recognition, machine translations, ...)
- **Game playing** (world-class chess, Jeopardy, ...)
- **Robots!** (Mars rovers, DARPA grand challenge, Roomba, ...)
- **Information retrieval** (search, constructing meaning out of the retrieved data, ...)

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### E.g., Information retrieval + computer vision



Photosynth, Microsoft Pix Camera

### Extremely brief history of AI

- Alan Turing's 1950 paper "Computing Machinery and Intelligence"
- "Artificial Intelligence"—coined in 1956
  - Use of computers for modeling certain problem-solving tasks that were, prior to the invention of the computer, thought to be uniquely human.
- **Classic AI:** (60s-80s) models of intelligence, search, games, knowledge representation
- **Empirical AI:** (90s-present) learning, data-driven, probabilistic/statistical

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### AI topics in this course

(There's not enough time for all of AI!)

- Natural language understanding (Computational linguistics, machine translation)
- Information retrieval
- Supervised learning
- **Historical, cultural, and ethical issues**

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### What are some ethical issues with AI?

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### A few ethical issues

- Far-off
  - What if we invent the Terminator?
  - Do robots have civil rights?
- Now
  - Governments and businesses can (do) read your email and online activities. Is this good?
  - Who is liable if a robot driver has an accident?

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