

## 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

Introduction to AI

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

Learn fr. mistake  
 comm/language  
 suggestions  
 evaluate  
 ↑ then act  
 interpret data

Introduction to AI

### Intelligent behaviors (by Joshua)

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

Introduction to AI

What are some examples of intelligence displayed by C3PO & R2D2?



Star Wars

Take instruction, act  
collaboration  
 have emotions  
 personalities  
 speech  
 sense of self

Introduction to AI

### Intelligent behaviors (by C3PO & R2D2)

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

Introduction to AI

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

Introduction to AI



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



Introduction to AI

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

Introduction to AI

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

Introduction to AI

Real AI (right now)

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

Introduction to AI

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

Introduction to AI

### AI topics in this course

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

- Natural language understanding  
(Computational linguistics, machine translation)
- Information retrieval
- Reinforcement learning in robotics
- Historical, cultural, and ethical issues

Introduction to AI

### What are some ethical issues with AI?

Introduction to AI