Introduction to Artificial Intelligence

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

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

Intelligent behaviors (by Joshua)
• Game playing (tic-tac-toe, global thermonuclear war)
• Natural language understanding
• Dialogue management
• Learning (“Learn, dammit!”)
• …

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

Intelligent behaviors (by C3PO & R2D2)
• Vision/perception
• Grasping/manipulation
• Navigation
• Speech recognition
• Emotion (e.g., fear)
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”
• 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

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

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

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, …)

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, knowledgement representation
• Empirical AI: (90s-present) learning, data-driven, probabilistic/statistical
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

What are some ethical issues with AI?