Connecting with Computer Science

Minds and Machines
Learning Goal

• Make strong and articulate arguments for and against the intelligence of proposed systems (human, computer, combinations, or other) in your own words but appealing to the ideas laid out by Turing and Searle
We started off this course by asking when is something a computer
Now we'll ask the opposite question: when is a machine intelligent?

Commander Data

- A fully functional android from the Star trek series

- Is Commander Data intelligent?
  
  http://www.youtube.com/watch?v=3PMIDidyG_I
Let's try a more structured approach

- In order to answer this question fully, we need to define intelligence
- The readings define two different ideas of Artificial Intelligence (AI)
  - Weak AI – is epitomized by the Turing article
  - Strong AI – is epitomized by the Searle article
Before we cover what Turing thinks, let's cover who Turing was:

- Considered the father of theoretical CS and AI
- Helped explain that it's impossible to prove if an arbitrary algorithm will ever stop; this used a notion of a "universal (Turing) machine"
- Was a code breaker in WWII
- Committed suicide at age 41 after being prosecuted for homosexuality (was given a posthumous pardon by Queen Elizabeth II in 2013)
- The equivalent of the Nobel Prize for computer scientists is called the Turing award after him
The Turing Test: a great example of weak AI

- Weak AI doesn't care whether a machine *is* intelligent or not; it cares whether a machine *acts* like it's intelligent.
- "I propose to consider the question, "Can machines think?" The problem can be described in terms of the ‘imitation game’.
- "I believe that in about fifty years' time it will be possible to programme computers to make them play the imitation game so well that an average interrogator will not have more than 70 percent chance of making the right identification after five minutes of questioning." – Alan Turing, 1950.
Strong AI argues the machine must think and understand to be intelligent

"The aim of [Schank's machine] is to simulate the human ability to understand stories… Partisans of strong AI claim [...]  

1) that the machine literally understand the story and provide the answers to questions, and

2) that what the machine does explains the human ability to understand the story…

Meet Watson: Going from Sci-Fi to reality!

- Jeopardy! IBM Watson
  http://www.youtube.com/watch?v=seNkJyG3gL&t=1m15s
- Preparing Watson
  http://www.youtube.com/watch?v=39AtGQgJgsl&t=1m40s
- While Watson won, it did make an embarrassing mistake…
  http://www.youtube.com/watch?v=7h4baBEi0iA
  Why Watson, why!
  http://www.youtube.com/watch?v=IlM7O_bRNg&t=3m20s

A cool article on this:
Exercise: Is an Ant Hill Intelligent?

argue for and against the intelligence of the ant hill

• You run across an ant hill and see that the ants are doing something strange. After a moment, you realize that they are forming words with their bodies. When you write something in the dirt, they trace across the pattern to "read" it and respond to you in turn. With time, you form a friendship with the ant hill, and the two (million and one?) of you write a hit Broadway musical together. Over the years you know the hill, you notice that individual ants from the hill or even small groups seem to exhibit no ability to communicate.

• Are the ants intelligent?
• Is the hill intelligent?

based on a story in Gödel, Escher, Bach: An Eternal Golden Braid
Exercise: Intelligent or Not?

• Born in 2007, you grow up never learning how to do long-hand arithmetic. However, you're able to perform complex mathematical operations using your smart phone, and you can explain what it means to add, multiply, exponentiate, and so forth.

• Do you understand arithmetic?
Exercise: Intelligent or Not?

As a neurologist, you often meet with people with severe impairments to their mental functions. One day, you meet a person whose ability to form long-term memories has been permanently destroyed by an injury. Roughly every five to twenty minutes, the person "disengages" from the world around them and forgets everything back to the moment of their injury.

Is this person (still) intelligent?
Exercise: Intelligent or Not?

Same situation as above, but this person is able with practice to extend their lucid periods to roughly two hours and to form long-standing relationships and projects by keeping many short-hand notes and pictures. (This is based on the movie Memento.)

Is this person (still) intelligent?
Learning Goal revisited

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