Looking Ahead

The Next Step

- CS 106A
  Programming Methodology
- CS 106B
  Programming Abstractions
- CS 106X
  Programming Abstractions (Accelerated)

The Systems and Theory Core

- CS 106B/X Programming Abstractions
- CS 107 Computer Organization and Systems
- CS 110 Principles of Computer Systems
- CS 103 Mathematical Foundations of Computing
- CS 109 Introduction to Probability for Computer Scientists
- CS 161 Design and Analysis of Algorithms

Choose a Track for Focused Depth

- AI
- Biocomputation
- Graphics
- HCI
- Information Systems

Artificial Intelligence and the Turing Test

- In 1950, Alan Turing posed a thought experiment to address a question that underlies the field of Artificial Intelligence.

Computing Machinery and Intelligence

A. M. Turing

1. The Imitation Game
   I propose to consider the question, “Can machines think?”
   (A revised form of the question) can be described in terms of a game which we call the 'imitation game'. It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman.
   We now ask the question, “What will happen when a machine takes the part of A in this game?”
A Dialogue in the Imitation Game

In his paper, Turing suggests the following as a possible dialogue between the interrogator and the unknown subject:

Eliza

In the mid-1960s, MIT Professor Joe Weizenbaum write a new famous program called Eliza, which would mimic—at least in minor formulaic ways—the style of a Rogerian psychotherapist.

Note: The Eliza program is built into GNU Emacs; to run it, type ESC-X Doctor RET.

Solving Chess

- In 1950, Claude Shannon wrote an article for Scientific American in which he described how to write a chess-playing computer program.
- Shannon’s strategy was to have the computer try every possible move for white, followed by all of black’s responses, and then all of white’s responses to those moves, and so on.
- Even with modern computers, it is impossible to use this strategy for an entire game, because there are too many possibilities.

Deep Blue Beats Gary Kasparov

In 1997, IBM’s Deep Blue program beat Gary Kasparov, who was then the world’s human champion. In 1996, Kasparov had won in play that is in some ways more instructive.

Computer-Assisted Pharmaceutical Design

- Designing new therapeutic drugs is an expensive, time-consuming process, in which computation can be of tremendous value.
- Most proteins are large molecules with a rigid, complex structure.
- Many drugs operate by blocking a reaction site in a protein. Such inhibitor drugs tend to be small and flexible.
- Understanding whether a drug molecule can fit into a reaction site is analogous to determining whether a robot arm can move in a particular way.

Stanley’s Victory in the Desert

- Professors Jean-Claude Latombe and Lydia Kavraki

Positions evaluated: $10^{30}$

... millions of years later...