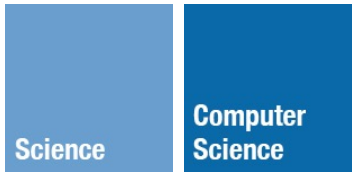
Machine Learning



CS 100: Introduction to the Profession

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"When programmable computers were first conceived, people wondered whether such machines might become intelligent, over a hundred years before one was built (Lovelace, 1842). Today, artificial intelligence (AI) is a thriving field with many practical applications and active research topics. We look to intelligent software to automate routine labor, understand speech or images, make diagnoses in medicine and support basic scientific research.

In the early days of artificial intelligence, the field rapidly tackled and solved problems that are intellectually difficult for human beings but relatively straightforward for computers — problems that can be described by a list of formal, mathematical rules. The true challenge to artificial intelligence proved to be solving the tasks that are easy for people to perform but hard for people to describe formally — problems that we solve intuitively, that feel automatic, like recognizing spoken words or faces in images."

- Goodfellow, Bengio, Courville. *Deep Learning*.

Types of Learning

- *Supervised*: human indicates desired output for given input to AI
- *Reinforcement*: human indicates when AI is doing good/bad in an environment
- *Unsupervised*: no human feedback

Common ML Problems

- *Categorization*: assign discrete labels to different inputs (e.g., spam/ham)
- *Regression*: assign continuous "scores" to inputs (e.g., strength of a chess move)
- *Clustering*: grouping like inputs together (e.g., biological classification)

Related Fields

- Computer Science
- Mathematics
  - Statistics & Probability
- Specific domains:
  - Biology, Finance, Robotics, etc.