CSCI 381 Machine Learning
Spring 2023

Prolegomena unit:

- ▶ Course introduction (**today**)
- ▶ Basich machine learning terminology (Wednesday)
- ▶ Lab: Python libraries (Friday)

Today:

- ▶ What machine learning is all about
- ▶ Syllabus and course details
- ▶ Machine learning in context of related fields

One example of where a handcoded approach will fail is in detecting faces in images. Today every smartphone can detect a face in an image. However, face detection was an unsolved problem as recently as 2001. The main problem is that the way in which pixels are "perceived" by the computer is very different from how humans perceive a face. This difference in representation makes it basically impossible for a human to come up with a good set of rules to describe what constitutes a face in a digital image.

Müller and Guido, Introduction to Machine Learning with Python, 2017, pg 2

Methods of statistical inference help us in estimating the characteristics of a population based upon the data collected from (or the evidence produce by) a sample. Statistical techniques are useful in both the planning of the measurement activities and the interpreation of the collected data.

Trivendi, Probability and Statistics, 1982, pg 469.

The basic problem of statistical inference is the inverse of probability: Given the outcomes, what can we say about the process that generated the data? . . . Data analysis, machine learning, and data mining are various names given to the practice of statistical inference, depending on the context.

Wasserman, All of Statistics, 2004, pg ix.

Machine learning is essentially a form of applied statistics with increased emphasis on the use of computers to statistically estimate complicated functions and a decreased emphasis on proving confidence intervals around these functions.

Goodfellow, Deep Learning, 2016, pg 95.

There's a joke that says a data scientist is someone who knows more statistics than a computer scientist and more computer science than a statistician.

Joel Grus, Data Science from Scratch, 2015, pg 1

he problem of searching for patterns in data is a fundamental one and has a long and successful history. For instance, the extensive astronomical observations of Tycho Brahe in the 16th century allowed Johannes Kepler to discover the empirical laws of planetary motion, which in turn provided a springboard for the development of classical mechanics. Similary, the discovery of regularities in atomic spectra played a key role in the development and verification of quantum physics in the early twentieth century. The field of pattern matching [used as a synonym for machine learning] is concerned with the automatic discovery of regularities in data through the use of computer algorithms and with the use of these regularities to take actions such as classifying the data into different categories.

Bishop, Pattern Recognition and Machine Learning, 2006, pg 1

Coming up:

Learn Python

Take first-day-of-class quiz (due classtime Wednesday)

Do Python warm-up assignment (due Friday)