

0 Introduction

Sunday, January 5, 2020 10:23 PM

MAT 1801 - Winter 2020 - Prof. Yun William Yu

Applied Mathematics II: Foundations of data science

Outline

- Welcome
- What is data science and what role does math play?
- Course topics
- Syllabus

Data science

Data science is study of methods for extracting usable information from large quantities of data. These days, it is often associated with machine learning and statistics, but the underlying foundations are mathematical in nature, drawing from linear algebra, probability, graph theory, and algorithms.

Course topics

• Core

- ↳ High-dimensional space
- ↳ Singular value decomposition

• Topics

- ↳ Random walks and Markov chains
- ↳ Streaming, sketching, and sampling
- ↳ Clustering
- ↳ Random graphs
- ↳ Matrix factorization
- ↳ Hidden Markov models and Graphical Models
- ↳ Wavelets
- ↳ Persistent homology / computational topology
- ↳ "Machine learning" (SVMs, decision trees, deep learning)

Syllabus:

- 30% HW assignments (11, lowest dropped)
- 30% Term test (March 26)
- 30% Final project report
- 10% Final project presentation