Spring 2022, AMAT 810,
Advanced Topics in Machine Learning

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Textbook

Probabilistic Machine Learning, An Introduction by Kevin Murphy

Nonlinear Dimensionality Reduction by John Lee and Michel Verleysen

Data-driven Science and Engineering: Machine Learning, Dynamical Systems and Control by Steven Brunton and J. Nathan Kutz

Description

This course is the second part of a two-semester sequence that focuses on theoretical and practical aspects of machine learning. The course will have two parts. The first part will introduce more algorithms for unsupervised data analysis, including manifold learning, spectral clustering, autoencoders, diffusion maps and graph embeddings. The second part will focus on data-driven methods on science and engineering. I will bring the machine learning integrate modeling and control of dynamical systems with modern methods in data science. I will highlight many of the recent advances in scientific computing that enable data-driven methods to be applied to a diverse range of complex systems. The topics I plan to cover are compressed sensing, data-driven dynamical systems, reservoir computing, and physics informed machine learning. Recommended course background: AMAT592 or I CSI 436 or any other machine learning courses.