

CAP 6617, Advanced Machine Learning, Spring 2021

Place: Zoom (Online)

Time: MWF 4 (10:40-11:30 a.m.)

Instructor:

Arunava Banerjee

Office: CSE E336.

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Office hours: Tuesday 2:00 p.m.-4:00 p.m.

Pre-requisites:

- There is no official pre-requisite for this course, although it is recommended that one take CAP6610 (Machine Learning) before this course. Specifically, knowledge of calculus and linear algebra is necessary since we shall be discussing advanced topics.

Reference: *Machine Learning: A Probabilistic Perspective*, Murphy, ISBN-10: 0262018020.

Reference: *Pattern Recognition and Machine Learning*, Bishop, ISBN 0-38-731073-8.

Reference: *Pattern Classification, 2nd Edition*, Duda, Hart and Stork, John Wiley, ISBN 0-471-05669-3.

Tentative list of Topics to be covered

- Reproducing Kernel Hilbert Space
- Recent topics in Deep learning such as Transformers
- Dirichlet processes and non-parametric Bayesian methods.
- Manifold learning including local linear embedding, isomap, laplacian eigenmap.
- Graphical models and Variational Inference
- Monte-Carlo, Markov Chain methods (Gibbs samplers and Metropolis-Hastings)

The above list is tentative at this juncture and the set of topics we end up covering might change due to class interest and/or time constraints.

Please return to this page at least once a week to check updates in the table below

Evaluation:

- Class participation and presentations

Course Policies:

- **Late assignments:** All homework assignments are due before class.
- **Plagiarism:** You are expected to submit your own solutions to the assignments. While the final project and presentation will be done in groups, each member will be required to demonstrate his/her contribution to the work.
- **Attendance:** There is no official attendance requirement. If you find better use of the time spent sitting thru lectures, please feel free to devote such to any occupation of your liking. However, keep in mind that it is your responsibility to stay abreast of the material presented in class.
- **Cell Phones:** Absolutely no phone calls during class. Please turn off the ringer on your cell phone before coming to class.

Academic Dishonesty: See <http://www.dso.ufl.edu/judicial/honestybrochure.htm> for Academic Honesty Guidelines. All academic dishonesty cases will be handled through the University of Florida Honor Court

procedures as documented by the office of Student Services, P202 Peabody Hall. You may contact them at 392-1261 for a "Student Judicial Process: Guide for Students" pamphlet.

Students with Disabilities: Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

Announcements

Readings

Article	Due Date
ISOMAP	2021
Local Linear Embedding	2021
Reducing the Dimensionality of Data with Neural Networks	2021
A Generalized Representer Theorem	2021
Deep Belief Networks	2021
Dirichlet Process	2021
Polya Tree	2021
The Infinite Gaussian Mixture Model	2021
Laplacian Eigenmap	2021
Factor Graphs and the Sum-Product Algo	2021
Variational Inference	2021
Latent Dirichlet Allocation	2021
Understanding Metropolis Hastings	2021
Statistical view of Boosting	2021
Restricted Boltzmann Machine	2021
Transformer (Deep Learning)	2021

List of Topics covered

Week	Topic
Jan 10 - Jan 16	<ul style="list-style-type: none"> Intro and list of topics to be discussed in class.