E9205 AUG 3:1

MACHINE LEARNING FOR SIGNAL PROCESSING

Instructor

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Department: ELECTRICAL ENGINEERING

Course Time: MON,WED 330-500PM

Lecture venue: B303, EE, IISC

Detailed Course Page: http://leap.ee.iisc.ac.in/sriram/teaching/MLSP_17/

Announcements

Brief description of the course

Machine learning methods for signal analysis, modeling and information extraction.

Prerequisites

Random Process/Probablity and Statistics

Linear Algebra/Matrix Theory

Basic Digital Signal Processing/Signals and Systems

Syllabus

Introduction to real world signals - text, speech, image, video.

Feature extraction and front-end signal processing - information rich representations, robustness to noise and artifacts, signal enhancement, bio inspired feature extraction.

Basics of pattern recognition, Generative modeling - Gaussian and mixture Gaussian models, hidden Markov models, factor analysis.

Discriminative modeling - support vector machines, neural networks and back propagation.

Introduction to deep learning - convolutional and recurrent networks, pre-training and practical considerations

in deep learning, understanding deep networks.

Deep generative models - Autoencoders, Boltzmann machines, Adverserial Networks.

Applications in computer vision and speech recognition.

Course outcomes

Students would learn the theory and practice of machine learning methods.

Grading policy

Assignments 15%

Midterm exam. 20%

Final exam. 35%

Project 30%

Assignments

Analytical and Coding Assignments.

Resources

â€œPattern Recognition and Machine Learningâ€•, C.M. Bishop, 2nd Edition, Springer, 2011.

â€œNeural Networksâ€•, C.M. Bishop, Oxford Press, 1995.

â€œDeep Learningâ€•, I. Goodfellow, Y, Bengio, A. Courville, MIT Press, 2016. html

â€œDigital Image Processingâ€•, R. C. Gonzalez, R. E. Woods, 3rd Edition, Prentice Hall, 2008.

â€œFundamentals of speech recognitionâ€•, L. Rabiner and H. Juang, Prentice Hall, 1993.