MATH 8670: Advanced Machine Learning

TR 7:00 PM - 8:15 PM | Dr. Xiaoyue Cheng

Description:
Advanced Machine Learning is the second part of our machine learning course sequence, following MATH/STAT 4450/8456 (Introduction to Machine Learning). This course will focus on machine learning techniques that investigate variable association, like unsupervised learning and graphical models.

Tentative topics:
1. Clustering: k-means, hierarchical clustering, model-based clustering
2. Dimension reduction: principle component analysis, self-organizing maps, multidimensional scaling
3. Other unsupervised learning methods: association rules, page rank
4. Mixture models and EM algorithm
5. Graphical models: Bayesian networks
6. Sequential data analysis: markov models, hidden markov models
7. Sampling methods: rejection sampling, importance sampling
8. Image processing: edge detection, image segmentation, morphology

Pre-requisites:
MATH 4750 or permission of instructor.

Software: R or Python.

Textbooks:
1. The Elements of Statistical Learning: Data Mining, Inference, and Prediction
2. Pattern Recognition and Machine Learning
3. Bayesian Reasoning and Machine Learning
4. Machine Learning: a Probabilistic Perspective

Teaching presentation:
Students will be assigned academic papers on machine learning topics to (1) read and learn, (2) reproduce the results, and (3) lead a discussion in class.

Research project:
Each student will complete a project using machine learning methods on some research topic.
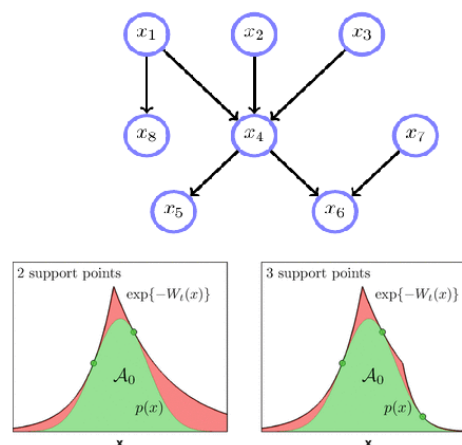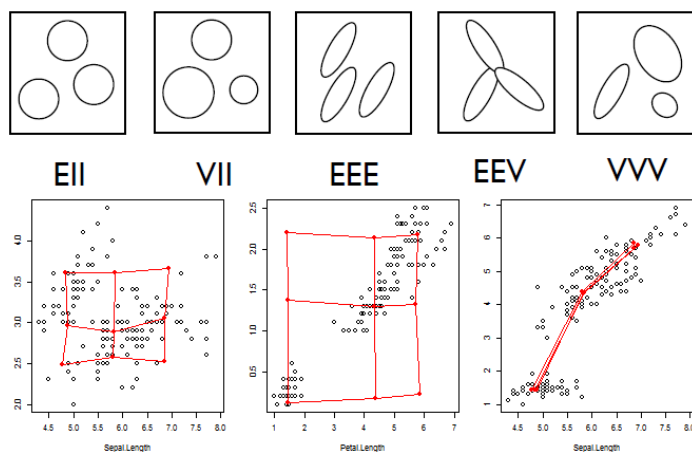
For More Information:

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