CSCE 5215/4930 Introduction to Machine Learning

Theory and practice of machine learning. Linear regression, logistic regression, decision trees, neural network learning, support vector machines, kernel methods, bagging, boosting, random forests, ensemble learning, deep learning, unsupervised learning including k-means and hierarchical agglomerative clustering, semi-supervised learning, active learning, and reinforcement learning. Practical applications of machine learning algorithms. Topics in experimental design and computational learning theory.

Syllabus

1 ML Overview
2 Designing a Learning System & ML Algorithms Overview
SUPERVISED LEARNING
3 Linear Regression
4 Perceptron and Classification
5 Logistic Regression and Classification
6 Experimental Design
7 Evaluation
8 Artificial Neural Networks
10 Instance-based learning
11 Bias and Variance
12 Recurrent and Convolutional Neural Networks
13 Deep Learning
14 Deep Neural Networks
15 Support Vector Machines
17 Computational Learning Theory
18 Kernel methods
19 Decision Trees
20 Ensemble methods and Bagging
21 Random Forests and Boosting
UNSUPERVISED LEARNING
23 K-means clustering
24 Hierarchical Agglomerative clustering
25 Expectation Maximization
26 Dimensionality Reduction, PCA
OTHER TOPICS
27 Active and Semi-Supervised Learning
28 Learning from large datasets
29 Reinforcement Learning Overview

Final Exam: 10:30am to 12:30pm, Tuesday, December 12
Recommended Reading:
Grading:

10%  Class participation

20%  Homework assignments (your two lowest scores will be thrown out)

25%  Exams (10% Midterm, 15% Final)

25%  Project

10%  Significant constructive feedback on peer projects

10%  Area of excellence (your grade for this will equal your best grade from Assignments, Exams, or Project)