

CSCI 447 Exam 2 Outline

I. Neural Networks

A. Perceptron

1. Error Driven Classification
2. Linear Classifiers
3. Weight Updates
4. Improving the Perceptron

B. Multi-Layer Networks

1. Overview
2. Representation
3. Computing Output – Feed Forward
4. Vectorizing Across Examples
5. Activation Functions
6. Gradient Descent
7. Backpropagation

C. Deep Networks

1. Deep L-Layer Network
2. Forward Propagation
3. Matrix Dimensions
4. Why Deep Representation?
5. Building Blocks
6. Backpropagation
7. Parameters vs. Hyperparameters
8. Brain Analogy

D. Convolutional Networks

1. Overview
2. Architecture
3. Intuition
4. Example
5. Visualization

E. Recurrent Networks

1. Introduction
2. Sequence Data
3. Sequential Memory
4. Recurrent Neural Networks
5. Vanishing Gradient
6. LSTMs and GRUs

G. Support Vector Machines

1. Optimization Objective
2. Large Margin Intuition
3. Math Behind Large Margin Classification
4. Kernels
5. Using an SVM

H. Network Considerations

1. Setting up the Network
 - a. Bias / Variance

- 2. Regularization
 - a. Dropout
- 3. Optimization

II. Bayesian Networks

A. Overview

- 1. Representation
- 2. Conditional Independences
 - a. D-Separation

B. Inference

- 1. Probabilistic Inference
 - a. Inference by Enumeration
 - b. Variable Elimination
 - 1. Factors

C. Learning the Network

- 1. Learning the Parameters
 - a. Complete Data
 - b. Incomplete Data
- 2. Learning the Structure