

CS 438/697 Applied Machine Learning

Final Examination Review

Spring 2015

Wei Ding

❑ **Schedule**

The examination is close-book and close-note. However, you can prepare a cheat sheet using ONE piece of paper (size 8.50" * 11.00", double side, no less than 11-font size and single line space).

There are **65 minutes** for the Examination.

Class Time	Exam Time
4:00 PM	4:05 PM – 5:10 PM Thursday May 14
Must be at class room at 4:00 PM sharp	Assume it takes 5 minutes to distribute the examination papers

❑ **Preparation Materials**

Lecture notes, in-classes exercise, Textbook, homework assignments.

❑ **Topics**

1. Everything you have practiced in homework
2. All the questions we have practiced in the class
3. Clustering
 - Explain the difference between K-Means clustering and NMF
 - Understand how to compute a consensus matrix for a clustering result
4. Supervised Learning: Logistic Regression
 - Mathematic formula of the logistic regression model
 - Given a logistic function, understand how to draw its decision boundary
 - Understand that the decision boundary is a property not of the training set, but of the hypothesis and of the parameters, and that the training set may be used to fit the parameters.
 - Understand how to interpret the logistic regression cost function
 - Understand how to fit a logistic regression model with parameters using gradient descent
 - Understand how to do multi-classification using logistic regression
 - difference between classification and regression

5. Supervised Learning: Regularization
 - Using an example to explain what is the overfitting problem
 - Understand the “simpler” hypothesis for regularization
 - Understand the impact of Regularization Parameter λ (what would an extremely large value do? Why?)
 - How regularization is used in the linear regression
 - How regularization is used in the logistic regression
6. Supervised Learning: Neural Network : Models
 - The one learning algorithm hypothesis
 - Neuro-rewiring
 - What is a logistic unit in an ANN
 - Know how to write the matrix of weights controlling function mapping from the current layer to the next layer
 - Understand how to write forward propagation and its vectorized implementation.
 - Know how to calculate ANN examples step by step with the given parameters (**Slides 14 – 23 of Neural Networks Part II**)
7. Supervised Learning: Neural Network : Learning
 - Understand how to interpret the cost function of an ANN
 - Understand the relationship between over-fitting and size of the data set
 - Know how to write gradient computation for backpropagation
 - Understand the basic idea to use gradient descent together with backpropagation to learn an ANN
8. Advice for Applying Machine Learning
 - TBD (will do after we finish the class on May 12)