

61011 Lab - Week 2

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1 Introduction

The targets for this week are listed below. In addition, there are some Python notebooks to help to reinforce your understanding of the mathematical principles behind the Perceptron and Logistic Regression methods.

During (or before) the live Wednesday lab sessions, you may request help by entering your name on the following spreadsheet:

https://docs.google.com/spreadsheets/d/1Ux0iZjqvF1MPciMzm1w_o5DviDSpTyg1PkiPKdtRBfA/edit?usp=sharing.

When you join the weekly blackboard collaborate session, a teaching assistant will move you to a breakout room to discuss your issue.

Level 0

- Read and run the Python notebooks on the Perceptron and Logistic Regression.

Level 1

On a data set of your choice:

- Plot the train/test errors of a logistic regression, as the number of epochs increase.
- plot the train/test error over 10 repeats, shuffling the data each time, with error bars.
- Calculate the 5-fold cross validation error of a logistic regression—accounting for any sources of *variance* in the performance (e.g. random initial weights)—be sure to plot confidence intervals.
- Calculate the leave-one-out cross validation error of a logistic regression model

Level 2

- Investigate the sensitivity of the logistic regression to the amount of training data examples it sees.
- Investigate the idea of a ‘momentum’ parameter (google it) and implement it. You may wish to extend the logistic regression code in the standalone notebook.
- Investigate alternatives to gradient descent (e.g. conjugate gradient or Levenberg-Marquardt)