CSI 5325 Assignment 2

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Assigned: 2019-02-08; Due: 2019-02-21

Instructions

The instructions for this assignment are the same as for all assignments in this course; for details refer to Assignment 1. As a refresher: use \LaTeX, make your document beautiful (proofread it!), use well-labeled figures to illustrate things, turn in a hardcopy and an email copy, and keep attachments small.

Graded problems (online)

• (10 points each) Do the following two problems on Kattis: ‘Gradient Descent’ and ‘Linear Regression’. I recommend doing them in that order. There will be a little extra credit for the student(s) scoring lowest on Gradient Descent and lowest on Linear Regression.

For the Linear Regression problem, if you’re using gradient descent, you may want (or need) to do the following to get your gradient descent to converge well:

– Pick the learning rate carefully.
– Normalize each of the features (e.g. zero mean and unit standard deviation) before gradient descent, do the gradient descent, and then convert the weights back to the original (un-normalized) representation to print them out. This requires quite a bit of algebra but may be very helpful.

Alternatively, you can write your own one-step pseudoinverse solution.

Graded problems (from the book)

Do the following exercises from your textbook. Do not just give your answers; show your work (in \LaTeX) and explain/analyze your results.

• (10 points) Problem 1.12 – For this problem, you can assume that $h$ is just a scalar value (it takes no input $x$). Consider using derivative calculus.

• (20 points) Problem 2.24

• (10 points) Problem 3.1
Ungraded problems

You are expected to know how to do these, but they will be ungraded.

- Problem 2.1
- Problem 2.11
- Problem 2.12