CS 189: Introduction to Machine Learning

Fall 2017

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Homework 0

Due on Friday, August 25th, 2017 at 10 p.m.

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Solutions by

NAME

12345678

Problem 1: Getting Started

1. Before you start your homework, write down your team. Who else did you work with on this homework? List names and email addresses. In case of course events, just describe the group. How did you work on this homework? Any comments about the homework?

2. Please copy the following statement and sign next to it:
   I certify that all solutions are entirely in my words and that I have not looked at another student's solutions. I have credited all external sources in this write up.

3. How many hours did the homework take you to finish?
   ◯ 1   ◯ 2   ◯ 3   ◯ 4   ◯ 5   ◯ 6   ◯ 7   ◯ 8   ◯ 9   ⊘ 10+

Problem 2: Sample Submission

Please submit a plain text file to the Gradescope programming assignment "Homework 0 Test Set":

1. Containing 5 rows, where each row has only one value "1".

2. No spaces or miscellaneous characters.

3. Name it "submission.txt".

Problem 3: Eigendecomposition Review

Compute eigenvectors and eigenvalues for the following matrix. Show your work.

$$\begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}$$

Suppose we have training data consisting of n points (x_i, y_i), which we have modeled as coming from $y_i = ax_i + b$. We will do standard linear ordinary least-squares regression on the data to recover estimates for a and b. Say that y_i are actually coming from $y_i = ax_i + b + \varepsilon_i$, for some unknown disturbance process ε_i.

1. Can an adversary force the linear regression to recover any desired a, b by setting exactly 1 of the ε_i to be a selected non-zero value?

2. What if the adversary sets 2 of the ε_i?

3. How many does the adversary need to change and how would it do it?

Problem 5: Your Own Question

Write your own question, and provide a thorough solution.

Question

Solution