

ColumbiaX: CSMM.102x Machine Learning

Help



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Lecture 5 Bayesian **Linear Regression**

Lecture 6 Sparse **Linear Regression**

Week 3 Quiz

Quiz due Apr 11, 2017 05:00 IST

Week 3 Project: **Linear Regression**

Project due Apr 11, 2017 05:00 IST

Week 3 Discussion Questions

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Week 3 Quiz

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Multiple Choice

1/1 point (graded)

Assume that $y \sim N(Xw, \sigma^2 I)$ is the likelihood model for the problem we are considering. Then the MAP solution $w_{MAP} = rg \max_{w} \ln p(w|y,X)$ is: (1) always the same, and (2) unbiased, for any prior p(w).

- (1) TRUE, (2) FALSE
- (1) TRUE, (2) TRUE
- (1) FALSE, (2) TRUE
- (1) FALSE, (2) FALSE

Submit

You have used 1 of 1 attempt

Checkboxes

0/1 point (graded)

Which of the following are MAP solutions of a model with likelihood p(y|w,X) and prior p(w)?

- $\equiv \arg\max_{w} \ln p(y|w,X)$

- Week 11
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Numerical Input

2.0/2.0 points (graded)

Let the vector $w\in\mathbb{R}^3$ have a Gaussian distribution $w\sim N(\mu,\Sigma)$ where $\mu=[1,~2,~3]^T$ and $\Sigma=\mathrm{diag}(1,~1,~2)$.

1. The mean of $w_1+2w_2+3w_3= ext{enter below}$



2. The variance of $w_1 + 2w_3 = {
m enter \ below}$



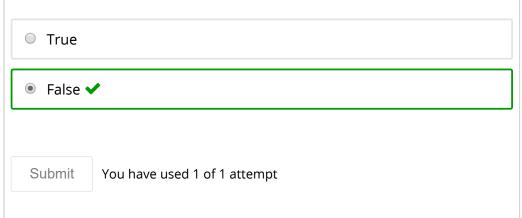
This question tests a fundamental property of the Gaussian distribution that could be considered a probability prerequisite. The information is not directly from the slides, but is very easily found online.

Submit You have used 1 of 1 attempt

Multiple Choice

1/1 point (graded)

For a model with likelihood p(y|w,X) and prior p(w), given the training pairs (y,X) we test a new observation (y_0,x_0) by predicting y_0 given x_0 . To compute this predictive distribution we need to calculate $p(y_0|w,x_0,y,X)$.



Correct (1/1 point) Checkboxes 0/1 point (graded) Active learning for linear regression can be treated as a clever way to sequentially enlarge the training data by measuring new observation pairs (y,x). Which of the following are NOT active learning strategies? lacksquare Pick $oldsymbol{x}$ uniformly at random from the choices and measure $oldsymbol{y}$ Pick \boldsymbol{x} to significantly reduce uncertainty according to some measure lacktriangle Pick $oldsymbol{x}$ by asking someone (e.g., an expert) for advice and measure $oldsymbol{y}$ lacksquare Pick $oldsymbol{x}$ for which we were the most incorrect in the prediction of $oldsymbol{y}$ × Submit You have used 1 of 1 attempt ★ Incorrect (0/1 point) Checkboxes 0/1 point (graded) For X an n imes d matrix and y an n-dimensional vector, it is possible that the linear system $oldsymbol{y} = oldsymbol{X} oldsymbol{w}$ may have multiple solutions when lacksquare The null space of X is empty $ightharpoons XX^T$ is invertible You have used 1 of 1 attempt Submit

Multiple Choice

1/1 point (graded)

The vector $oldsymbol{w}$ that satisfies the least squares solution of the linear system ypprox Xw has the smallest ℓ_2 norm among all solutions.

- True
- False

Submit

You have used 1 of 1 attempt

Checkboxes

1/1 point (graded)

Which of the following will likely give a sparse solution for w?

- $extbf{ extit{ iny arg min}}_w \|y Xw\|_2^2 + \lambda \|w\|_{1/2}$
- $lacksquare rg \min_{w} \|y Xw\|_1 + \lambda \|w\|_2^2$
- $lacksquare rg \min_{w} \|y Xw\|_2^2 + \lambda \|w\|_3^3$
- $extbf{ extit{ iny arg min}}_w \|y Xw\|_1 + \lambda \|w\|_{3/4}$

Submit

You have used 1 of 1 attempt

Correct (1/1 point)

Multiple Choice

1/1 point (graded)

Week 3 Quiz | Week 3 Quiz | CSMM.102x Courseware | edX For an optimization problem of the form $rg \min_{w} \|y - Xw\|^2 + \lambda \|w\|_p$ the values of \boldsymbol{p} for which we can NOT guarantee an optimal solution are: p>2 p < 1
✓</p> 0 1You have used 1 of 1 attempt Submit

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