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Week 2 Quiz

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Multiple Choice

1.0/1.0 point (graded)

In Lecture 3 we saw how the least squares linear regression solution from Lecture 2 could be given a probabilistic interpretation by assuming the errors to be...

- independent zero-mean Gaussian random variables with different noise variances.
 - correlated zero-mean Gaussian random variables with different noise variances.
 - independent zero-mean Gaussian random variables with shared noise variance. ✔
 - correlated zero-mean Gaussian random variables with shared noise variance.

Machine Learning Course: Getting

Started

▶ Week 1

▼ Week 2

Lecture 3 Least Squares Regression (cont'd), Ridge Regression

Lecture 4 Bias-Variance, Bayes Rule and MAP Inference

Week 2 Quiz

Quiz due Apr 11, 2017 07:30 MYT

Week 2 Discussion Questions

Submit

You have used 1 of 1 attempt

Week 3

Checkboxes

1/1 point (graded)

Using the probabilistic approach to linear regression from Lecture 3, as well as the notations we have been using for the linear regression problem thus far, click all equivalent ways for generating from p(y|X,w).

$$egin{aligned} \mathscr{Y}_i = x_i^T w + \epsilon_i, \;\; \epsilon_i \stackrel{iid}{\sim} N(0, \sigma^2), \;\; ext{for} \;\; i=1,\ldots,n. \end{aligned}$$

$$egin{aligned} oldsymbol{y}_i \overset{ind}{\sim} N(x_i^T w, \sigma^2), \;\; ext{for} \;\; i=1,\ldots,n \end{aligned}$$

- $lacksquare y \sim N(Xw, \sigma^2 I)$
- extstyle ext



Submit

You have used 1 of 1 attempt

Multiple Choice

1/1 point (graded)

Under the modeling assumption $y \sim N(Xw, \sigma^2 I)$, which of the following is true of the maximum likelihood solution for w?

$$ullet$$
 $\mathbb{E}[w_{ML}]=w, \ \ Var[w_{ML}]=\sigma^2(X^TX)^{-1}$ $ullet$

$$ullet \ \mathbb{E}[w_{ML}] = (X^TX)^{-1}X^Ty, \ \ Var[w_{ML}] = \sigma^2(X^TX)^{-1}$$

$$ullet$$
 $\mathbb{E}[w_{ML}] = (X^TX)^{-1}X^Ty, \ \ Var[w_{ML}] = \sigma^2X^TX$

$$igcup \mathbb{E}[w_{ML}] = w, \; Var[w_{ML}] = \sigma^2 X^T X^T$$

Submit

You have used 1 of 1 attempt

Multiple Choice

1/1 point (graded)

Given the model $y \sim N(Xw, \sigma^2 I)$, which of the following is true about the maximum likelihood estimator w_{ML} ?

- $igcup w_{ML}$ always has a unique solution
- ullet w_{ML} has the smallest variance among all estimators for w

$$ullet$$
 $\mathbb{E}[w_{ML}] = (X^TX)^{-1}X^Ty$

ullet w_{ML} is an unbiased estimator of w
led

Multiple Choice

1/1 point (graded)

Assume $w^* = rg \min_w \|y - Xw\|_2^2 + \lambda g(w)$, which of the following is true?

- ullet When $g(w) = \|w\|^2$, the magnitude of values in w^* tend to increase
- lacktriangle The solution for $oldsymbol{w^*}$ is analytical for arbitrary positive function $oldsymbol{g(w)}$
- ullet When $g(w) = \|w\|^2$, the values in w^* are more stable to variations in y and $X \checkmark$
- ullet The solution for w^* is always unique for arbitrary positive function g(w)

Submit

You have used 1 of 1 attempt

Multiple Choice

1/1 point (graded)

The solution to ridge regression is $w_{RR}=(\lambda I+X^TX)^{-1}X^Ty$. As λ increases, the value of $\|w_{RR}\|_2$

increases

decreases

Submit

You have used 1 of 1 attempt

Text Input 2.0/2.0 points (graded) We saw how for a model with parameters $m{ heta}$ that generates data $m{x}$, Bayes rule allows us to learn about $m{ heta}$ using:
A) prior distribution
B) likelihood distribution
C) posterior distribution
Use the letters A, B or C to identify the names of each of the distributions below.
p(heta x)
C
p(heta)
A
p(x heta)
B
Submit You have used 1 of 1 attempt
Checkboxes 2.0/2.0 points (graded) We've discussed a few perspectives of the linear regression problem thus far. These different perspectives have led to equivalent solutions. Check all equivalent solutions below. (Please note that this problem does not have partial credit.)
$ extbf{ extit{ extbf{ extbf{ extit{ extbf{ extb}}}}}}}}} } } } } } } } } } } } } } } $
$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $

 \square $w_{ML} \Leftrightarrow w_{MAP}$



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