CC 5.1.1: Introduction to Statistical Learning

Introduction to Statistical Learning, Question 1

1/1 point (graded)

What is the difference between supervised and unsupervised learning?

Unsupervised learning uses qualitative inputs, whereas supervised learning uses quantitative inputs.

Supervised learning uses qualitative inputs, whereas unsupervised learning uses quantitative inputs.

Unsupervised learning matches inputs and outputs, whereas supervised learning discovers structure for inputs only.

Supervised learning matches inputs and outputs, whereas unsupervised learning discovers structure for inputs only.
correct

Introduction to Statistical Learning, Question 2

1/1 point (graded)

What is the difference between regression and classification?

Classification can be supervised or unsupervised, whereas regression can be supervised only.

Regression uses a continuous loss function, whereas classification uses a categorical loss function.

Regression results in continuous outputs, whereas classification results in categorical outputs.
correct

Regression uses continuous input, whereas classification uses categorical input.
Introduction to Statistical Learning, Question 3

1/1 point (graded)
What is the difference between least squares loss and
$0-1$
loss?

Least squares loss is used for supervised learning, whereas
$0-1$
loss is used for unsupervised learning.

Least squares loss is used for regression, whereas
$0-1$
loss is used for classification.

Least squares loss is used to estimate the expected value of outputs, whereas 0–1loss is used to estimate the probability of outputs.
correct

Least squares loss is used for quantitative outputs, whereas 0–1loss is used for qualitative outputs.

Least squares loss is used for quantitative inputs, whereas 0–1oss is used for qualitative inputs.

CC 5.1.2: Generating Example Regression Data

Generating Example Regression Data, Question 1

0/1 point (graded)

The code from the previous video is as follows:

```
import numpy as np
import scipy.stats as ss
import matplotlib.pyplot as plt



n = 100
beta_0 = 5
beta_1 = 2
np.random.seed(1)
x = 10 * ss.uniform.rvs(size=n)
y = beta_0 + beta_1 * x + ss.norm.rvs(loc=0, scale = 1, size = n)
```

Run this code on your computer.

What is the approximate mean of `x` and `y`, respectively?

For this problem, you can use `np.mean()` to find the mean.

Mean `x` = 5.1, mean `y` = 14.8.

Mean `x` = 4.9, mean `y` = 14.8.

correct

Mean `x` = 5.1, mean `y` = 15.3.

Mean `x` = 4.9, mean `y` = 15.3.

CC 5.1.3: Simple Linear Regression

Simple Linear Regression, Question 1

1/1 point (graded)

What is the difference between Y (capital letter) and y (lowercase letter)?

Y *is the true value for the output, whereas* y is estimated from the data.

Y *is estimated from the data, whereas* y is the true value for the output.

Y *is a random variable, whereas* y *is a particular value.*

correct

Y *is the model output, whereas* y is the model input.

Simple Linear Regression, Question 2

0/1 point (graded)

The following code implements the residual sum of squares for this regression problem:

```
def compute_rss(y_estimate, y):
```

```
  return sum(np.power(y-y_estimate, 2))


def estimate_y(x, b_0, b_1):
  return b_0 + b_1 * x


rss = compute_rss(estimate_y(x, beta_0, beta_1), y)
```

Using the data from CC 5.1.2 , run the code above. What is the approximate value of `rss`?

6

82
correct

6077

31108

CC 5.1.4: Least Squares Estimation in Code

Least Squares Estimation in Code, Question 1

0/1 point (graded)

Is the best estimate for the slope **exactly** the same as the true value 2 (when rounded to two decimal places)? Rerun the code in the video, but use a finer grid for the search by specifying `slopes = np.arange(-10, 15, 0.001)`.

Which of the following characterizes the new estimate for the slope?

Slightly below 2

Still exactly 2
correct

Slightly above 2

CC 5.1.5: Simple Linear Regression in Code

Simple Linear Regression in Code, Question 1

1/1 point (graded)
If the true intercept were negative but the regression model did not include an intercept term, what would that imply for the estimated slope?

The estimated slope would likely be lower than the true slope.
correct

The estimated slope would likely be greater than the true slope.

The estimated slope would be close to the true slope.

The estimated slope could be lower or higher than the true slope depending on whether the true slope is positive or negative.

Simple Linear Regression in Code, Question 2

0/1 point (graded)
What does an estimated intercept term correspond to?

The estimated outcome when no data is available

The estimated outcome when the input is set to zero
correct

The estimated outcome when the input is set to the truth

The change in the estimated output when the input changes by one unit

Simple Linear Regression in Code, Question 3

0/1 point (graded)
What does an estimated slope term correspond to?

The estimated outcome when no data is available

The estimated outcome when the input is set to zero

The estimated outcome when the input is set to the truth

The change in the estimated output when the input changes by one unit
correct

Simple Linear Regression in Code, Question 4

1/1 point (graded)
You could create several datasets using different seed values and estimate the slope from each. These parameters will follow some distribution.

What is the name used for this distribution?

The sampling distribution of the parameter

The sampling distribution of the parameter estimates
correct

The estimated sampling distribution of the parameter

The estimated sampling distribution of the parameter estimates

Simple Linear Regression in Code, Question 5

1/1 point (graded)

If the $R2$ value is high, this indicates

a good fit: the residual sum of squares is low compared to the total sum of squares.
correct

a good fit: the residual sum of squares is high compared to the total sum of squares.

a bad fit: the residual sum of squares is low compared to the total sum of squares.

a bad fit: the residual sum of squares is high compared to the total sum of squares.

CC 5.1.6: Multiple Linear Regression

Multiple Linear Regression, Question 1

0/1 point (graded)

Consider a multiple regression model with two inputs. The model predictions for the output y are given by

$$\hat{y} = \hat{\beta}_0 + x_1\hat{\beta}_1 + x_2\hat{\beta}_2$$

β_1 and β_2 have been estimated from data. If we assume that $\hat{\beta}_1 = 1$, and $\hat{\beta}_2 = 3$.

What is the interpretation of $\hat{\beta}_1$?

- ○ The change in the predicted outcome if $\hat{\beta}_1$ is increased by 1, holding x_1 constant.
- ○ The change in the prediction of $\hat{\beta}_1$ if x_1 is increased by 1, holding x_2 constant.
- ◉ The change in the predicted outcome if x_1 is increased by 1, holding x_2 constant. ✔
- ○ The change in the predicted outcome if x_1 is increased by 1, independent of x_2.
- ○ The change in the predicted outcome if $\hat{x}_1$ is increased by 1.

Multiple Linear Regression, Question 2

0/1 point (graded)

Consider the model and parameters in Question 1. For a given expected output prediction $\hat{y}$, what would be the expected change in the prediction value if you increased x_1 by 1, and decreased x_2 by 3?

- ○ It cannot be determined: the two might be correlated, so there may not be an interpretation.
- ○ It cannot be determined: both inputs may not change simulataneously.
- ○ It cannot be determined: the change in input 1 depends on the change in input 2.
- ○ It cannot be determined: the answer is either 1 or -9, but we cannot be sure which.
- ◉ -8 ✔
- ○ (1, -9)

CC 5.1.7: scikit-learn for Linear Regression

Comprehension Check due Jun 10, 2021 08:28 +03 Completed

scikit-learn for Linear Regression, Question 1

1/1 point (graded)

In the video, we estimated the values of three parameters. Which of these estimates is closest to its true value?

- The estimated intercept, $\hat{\beta}_0$
- The estimated first slope, $\hat{\beta}_1$
- The estimated second slope, $\hat{\beta}_2$

Submit You have used 1 of 1 attempt

Show answer

Assessing Model Accuracy, Question 1

1/2 points (graded)

When evaluating the performance of a model in a regression setting on test data, which measure is most appropriate?

Train MSE

Test MSE
correct

Train error rate

Test error rate

When evaluating the performance of a model in a classification setting on test data, which measure is most appropriate?

Train MSE

Test MSE

Train error rate

Test error rate
correct

Assessing Model Accuracy, Question 2

0/1 point (graded)
How do we expect an model that was overfit on the training data to perform on testing data?

It will likely perform at least as well on the testing data.

It will likely perform about the same on the testing data.

It will likely perform worse on the testing data.
correct

Assessing Model Accuracy, Question 3

0/1 point (graded)
What is the primary motivation for splitting our model into training and testing data?

By splitting up our data, model fitting is computationally faster.

By splitting up our data, we can fit two models.

By evaluating how our model fits on unseen data, we can see how generalizable it is.
correct