edX

Linear Regression
Video

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UCSDSE212017-V002700

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- Hi, last time we talked about

finding a line that passes through two points on the plane.

And we raised the question at the end about

what about having more than two points.

Can we find a line that passes

close to these points?

POLL
If your data set contains 10 colinear points, meaning they are all points on the same line, should you use a linear regression to find that line?

RESULTS

○ **No**   **58%**

◉ **Yes** **42%**

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Results gathered from 127 respondents.

FEEDBACK
No, we do not need to use linear regression. Simply taking two points, we can calculate the slope of the line.

1

0/1 point (graded)
When a system has more dimensions than points, it is called an "overdetermined system".

◉ True ✖

◯ False ✔

Answer
Incorrect: Video: Systems of Linear Equations

Explanation
It is an "underdetermined system".

Submit   You have used 1 of 1 attempt

ℹ   Answers are displayed within the problem

2

1/1 point (graded)
The purpose of linear regression is to find a line that most closely matches a set of data with multiple data points.

◉ True ✔

◯ False

Answer
Correct: Video: Linear Regression

| Submit | You have used 1 of 1 attempt |

ℹ Answers are displayed within the problem

3

4.0/4.0 points (graded)

Given points $p_1 = (2, 3)$ and $p_2 = (3, 0)$, and the equation $A\vec{w} = \vec{b}$ answer the following:

a) Find the coefficient matrix, A.

- ○ $A = \begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix}$

- ◉ $A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$ ✔

- ○ $A = \begin{bmatrix} 1 & 3 \\ 1 & 2 \end{bmatrix}$

- ○ $A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$

Answer
Correct: Video: Systems of Linear Equations

Explanation
The definition in the video.

b) Find the dependent variable vector, $\vec{b}$.

- ○ $\vec{b} = \begin{bmatrix} 9 \\ -3 \end{bmatrix}$

○ $\vec{b} = \begin{bmatrix} 3 \\ 0 \end{bmatrix}$ ✔

○ $\vec{b} = \begin{bmatrix} 9 \\ -1 \end{bmatrix}$

○ $\vec{b} = \begin{bmatrix} 6 \\ 2 \end{bmatrix}$

Answer
Correct: Video: Systems of Linear Equations

Explanation
The definition in the video.

c) Solve for the parameter vector, $\vec{w}$.

○ $\vec{w} = \begin{bmatrix} 9 \\ -3 \end{bmatrix}$ ✔

○ $\vec{w} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$

○ $\vec{w} = \begin{bmatrix} 3 \\ 0 \end{bmatrix}$

○ $\vec{w} = \begin{bmatrix} -3 \\ 1 \end{bmatrix}$

Answer
Correct: Video: Systems of Linear Equations

Explanation
With $A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$ and $\vec{b} = \begin{bmatrix} 3 \\ 0 \end{bmatrix}$, we get $\vec{w} = \begin{bmatrix} 9 \\ -3 \end{bmatrix}$ by solving the linear equation $A\vec{w} = \vec{b}$.

d) Give the equation for the line connecting p_1 and p_2.

○ $y = 3x + 9$

○ $y = x - 3$

○ $y = -3x + 3$

◉ $y = -3x + 9$ ✔

Answer
Correct: Video: Systems of Linear Equations

Submit   You have used 4 of 4 attempts

ⓘ Answers are displayed within the problem

4

0 points possible (ungraded)
The parameter vector, $\vec{w} \in \mathbb{R}^2$, represents the slope and Y-intercept of a line in the 2-D plane.

◉ True ✔

○ False

Answer
Correct: Video: Systems of Linear Equations

Explanation
The definition in the video.

Submit   You have used 1 of 1 attempt

ⓘ Answers are displayed within the problem

5

0 points possible (ungraded)

Why do we want to minimize the square difference from a point to the line instead of the actual difference when using the least squares method?

- ☑ It's more accurate to minimize the larger value

- ☑ We could minimize the actual difference as well

- ☑ We want to ensure the value is positive because it is a distance ✔

- ☐ We want to ensure that far away points are weighted more heavily than nearby points ✔

❌

Answer
Incorrect:
Video: Linear Regression

Explanation
- False.
- False.
- True. If we use a value that can be negative, for example, the actual difference, it can arbitary small by makeing the line far away from the points.
- True. The square difference penalizes far away points heavily than the absolute difference does.

| Submit | You have used 4 of 4 attempts |

ⓘ   Answers are displayed within the problem

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