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8. Exercise: Multiple observations, more general model

Exercises due Apr 8, 2020 05:29 IST Completed

Exercise: Multiple observations, more general model

1/1 point (graded)

Suppose that $X_1 = \Theta + W_1$ and $X_2 = 2\Theta + W_2$, where Θ, W_1, W_2 are independent standard normal random variables. If the values that we observe happen to be $X_1 = -1$ and $X_2 = 1$, then the MAP estimate of Θ is

✓ Answer: 0.16667

Solution:

The numerator term of the posterior is equal to a constant times

$$e^{-\theta^2/2} e^{-(x_1 - \theta)^2/2} e^{-(x_2 - 2\theta)^2/2}.$$

To find the MAP estimate, we set x_1 and x_2 to the given values, and set the derivative of the exponent (with respect to θ) to zero. We obtain

$$\theta + (\theta + 1) + 2(2\theta - 1) = 0,$$

which yields $6\theta - 1 = 0$ or $\theta = 1/6$.

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You have used 2 of 3 attempts



i Answers are displayed within the problem

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? having a problem using the formula
why isn't the answer 5 ??

7

? Did anyone manage to use the formula from the previous lecture to solve this question?

4 new_ 10

✓ Lecture 15 support

Hi, I seem to be massively struggling with this lecture. Not finding the book or videos to be that helpful. ...

3

💬 intuition behind this answer

I'm not quite getting the intuition behind this answer. I expected the answer to have the opposite sign th...

5

💬 Interesting fact

1 new_ 11

? variance of X1 and X2

$\text{var}(x_1) = \text{var}(\theta + w_1) = E(\theta + w_1)^2 - (E(\theta + w_1))^2 = E(\theta + w_1)^2 - 0 = E(\theta + w_1)^2$ expan...

2

? [Staff or Student]

I apparently am not able to interpret the formula from the end of the last section correctly. Should we h...

3

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