

QF624-2025-W6

Number of participants: 30

When working in the log-domain, we write $\log P(\theta \mid x) \propto \log P(x \mid$



- 1. $\theta) + \log P(\theta)$. Which of the following is **\emph{not}** a main advantage of using the log-form?**

2 correct answers
out of 20 respondents

Converts products into sums, simplifying differentiation in optimization.



2 votes

Improves numerical stability by avoiding underflow for very small probabilities.



12 votes



Ensures the posterior is a convex function of θ .



2 votes

Allows one to drop the intractable normalizing constant $\log P(x)$ when optimizing.



4 votes



2.

When writing the MAP objective as $\min_{\theta} [-\log P(\mathcal{D} \mid \theta) - \log P(\theta)]$, we drop the term $\log P(\mathcal{D})$ because:

8 correct answers
out of 18 respondents

It depends on θ .



2 votes

It is identically zero.



4 votes



It does not depend on θ .



8 votes

It equals the log-prior.



4 votes

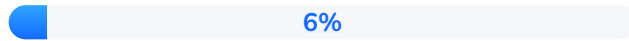


3.

Under what assumption does MAP estimation become equivalent to maximum likelihood estimation (MLE)?

14 correct answers
out of 18 respondents

The likelihood $P(\mathcal{D} \mid \theta)$ is uniform in θ .



1 vote



The prior $P(\theta)$ is uniform (constant) in θ .



14 votes

The evidence $P(\mathcal{D})$ is maximized.



2 votes

The dataset size $|\mathcal{D}| \rightarrow \infty$.



1 vote



4. Which symmetry property holds for the sigmoid?

1 correct answer
out of 16 respondents

$$\frac{f(-z)}{f(z)} = 1 +$$

0%

0 votes



$$\frac{f(-z)}{f(z)} = 1 -$$

6%

1 vote

$$\frac{f(-z)}{1 - f(z)} = \frac{f(z)}{1 - f(z)}$$

75%

12 votes

$$f(-z) = -f(z)$$

19%

3 votes



You raise the decision threshold of a probabilistic classifier (i.e. require a higher p to call “positive”). Which of these metric-changes is always true (all else held fixed)?

9 correct answers
out of 13 respondents

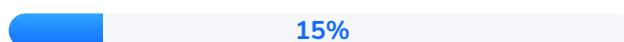


Precision increases,
Recall decreases.



9 votes

Recall increases,
Precision
decreases.



2 votes

Specificity
decreases, Error
rate decreases.



1 vote

Accuracy
necessarily
increases.



1 vote



In the context of cost-sensitive logistic regression for an imbalanced dataset, if misclassifying a minority class instance (False Negative) is deemed 5 times more costly than misclassifying a majority class instance (False Positive), how would this typically be implemented?

7 correct answers
out of 10 respondents

By oversampling the minority class by a factor of 5 before training.



1 vote

By setting the decision threshold to 5.0 after training the standard logistic regression model.



1 vote



By multiplying the loss contribution of each minority class instance by 5 during the model training process.



7 votes

By applying L1 regularization with a lambda value of 5 to penalize complexity related to majority class features.



1 vote