

Beta prior

Suppose you have a Bernoulli model for a success/failure outcome and have decided to use a beta distribution as the prior. Writing the beta distribution as $\text{beta}(a, b)$, if you also want the prior to be a flat prior, then ...

A flat prior is literally flat - that is constant. The only beta distribution that is constant is $\text{beta}(1, 1)$

1 0.5 points

... you should set a to

Type your answer...

2 0.5 points

... and b to

Type your answer...

3 1 point

Suppose that pd , the probability of direction, for θ is 97%. That means that--given the model, the prior, and the evidence---there is 0.97 probability that θ is:

- Negative
- Zero
- Positive
- Cannot be determined from the information given

There is 97 probability that θ is on the same side of zero as the median of its posterior. Since we don't know the median, we don't have enough information.

4 2 points

Suppose that after running `stan_glm()`, the summary shows the following partial result:

Estimates:

	mean	sd	1%	2.5%	5%	10%	50%	90%	95%	97.5%	99%
x1	2.11	0.09	1.90	1.93	1.97	1.99	2.11	2.21	2.25	2.28	2.31

(the percentages indicate the percentiles of the posterior).

We want an interval that covers 90% of the posterior. We can do that by picking the 5th and 95th percentiles (this gives the equal tails credible interval).

Based on this, a 90% credible interval for the regression coefficient corresponding to $x1$ would be (,).

Priors

You are about to analyze new data from a experiment, with particular interest in estimating a parameter β .

Published data leads you to believe that β has a mean of about 0.8 and a standard deviation of about 1.2.

You need to decide on a prior distribution.

Notice that it is both centered at zero and a wide spread

5 1 point

Which prior best corresponds to an informative prior

- uniform distribution from -100 to 100
- normal distribution with mean 0.0 and standard deviation 3.0
- normal distribution with mean 0.8 and standard deviation 1.2
- beta(4,5) distribution

This distribution is based on the published data

6 1 point

Which prior best corresponds to an weakly informative prior

- uniform distribution from -100 to 100
- normal distribution with mean 0.0 and standard deviation 3.0
- normal distribution with mean 0.8 and standard deviation 1.2
- beta(4,5) distribution

7 1 point

Which prior best corresponds to a flat prior

- uniform distribution from -100 to 100
- normal distribution with mean 0.0 and standard deviation 3.0
- normal distribution with mean 0.8 and standard deviation 1.2
- beta(4,5) distribution

Syntax

Suppose you have a dataset with 5 variables, u, v, w, x, and y.
In the following, consider formulas that might be used in `stan_glm()`, `stan_glmer()`, or `blm()`

8 1 point

Which formula corresponds to data in which observations are separately classified into groups in two different ways?

$y = -1 + u * x$

$y = u + (1 | v) + (1 | w)$ The so-called crossed model. There are groups-level intercepts for both the groups defined by v and the groups defined by w

$y = u + (1 | v) + (1 | v:w)$

$y = -1 + u$

9 1 point

Which formula corresponds to data in which observations are classified into groups, which are themselves classified into a higher level of groups?

$y = -1 + u * x$

$y = u + (1 | v) + (1 | w)$

$y = u + (1 | v) + (1 | v:w)$ This is the nested model. The groups defined by v (e.g. teachers) are nested in groups defined by w (e.g. schools)

10 1 point

Which formula allows for interaction but no intercept?

$y = -1 + u * x$ $-1 \Rightarrow$ no intercept
 $u * x \Rightarrow$ interaction

$y = u + (1 | v) + (1 | w)$

$y = u + (1 | v) + (1 | v:w)$

$y = -1 + u$