

Estimating the parameters of a gamma distribution

When to use this

Use this program when your data consists of N observations (y_1, y_2, \dots, y_N) from a gamma distribution and you want to estimate the shape and scale parameters.

The likelihood for this model is a gamma density,

$$f(y|\alpha, \beta) = \prod_{i=1}^N \frac{\beta^\alpha}{\Gamma(\alpha)} y_i^{\alpha-1} e^{-\beta y_i} \quad \alpha, \beta > 0$$

The priors for α and β

The default model file `gamma.stan` is set up with half-normal priors for α and β , coded as `normal(0,50)` with a nonnegativity constraint.

These priors allow for values of both α and β up to 100 to have some probability mass.

The default Stan model file

The name of the model file in the example code is `beta.stan`

```
//Estimate the parameters of a gamma distribution
data {
  int N;                                //sample size is N
  real<lower=0> y[N];                    //y consists of N reals constrained nonnegative
}
parameters {
  real<lower=0> alpha;                  //shape (constrained nonnegative by <lower=0>)
  real<lower=0> beta;                  //scale (constrained nonnegative by <lower=0>)
}
model {
  alpha ~ normal(0,50);                //half-normal prior: centered at zero with sd 50
  beta ~ normal(0,50);                 //half-normal prior: centered at zero with sd 50

  y ~ gamma(alpha,beta); //gamma likelihood given parameters alpha,beta
}
```