

Rapid-fire bayes intro

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inference

- typically based on *marginal distributions* (integrate over nuisance variables)
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$$P(\theta_1|y) = \iint P(\theta_1, \theta_2, \dots | y) d\theta_2 \dots d\theta_n$$

- can also look at bivariate distributions etc.
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summary statistics

- location: mode vs mean vs median
- interval/region: highest posterior density vs quantiles
- for *symmetric unimodal* distributions, all equivalent
- criteria:
 - scale-independence
 - robustness
 - Bayesian coherence

priors

- nothing is ‘uninformative’
- scale dependence (continuous), aggregation dependence (categorical)
- e.g. log-uniform vs uniform, logit-normal with wide variance
- we usually assume independence, which can make trouble
 - e.g. $U(0,1) \times U(0,1)$
- uniform priors are dicey (“Cromwell’s rule”)

prior rules of thumb

- think about a reasonable range for the parameter (L, U)
- consider a (univariate) Gaussian prior
- ± 2 SD $\approx 95\%$ range
- mean = $(L + U)/2$; SD $\approx (U - L)/4$
- could make tails fatter
 - t , Cauchy
- ... or thinner
 - power-exponential priors
- easier/more universal for log/logit-scales
- e.g. consider a proportional range from $(0.001x \text{ to } 1000x) \rightarrow (-3, 3) \times \ln(10) = (-6.9, 6.9) \rightarrow \text{SD} = 6.9/2 = 3.45$