Bayesian statistics

Final lecture

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Further reading

- Andrew Gelman, Jennifer Hill, and Masanao Yajima. Why we (usually) don't have to worry about multiple comparisons. Journal of Research on Educational Effectiveness, 5(2), 189-211, 2012.
- Andrew Gelman, Jessica Hwang, and Aki Vehtari. Understanding predictive information criteria for Bayesian models. Statistics and Computing, 24(6): 997–1016, 2014.
- Aki Vehtari, Andrew Gelman, and Jonah Gabry. Practical Bayesian model evaluation using leave-one-out cross-validation and WAIC. Statistics and Computing, 27(5):1413–1432, 2017.
- John K Kruschke. Bayesian estimation supersedes the t test. Journal of Experimental Psychology: General, 142(2):573, 2013.

Topics we've covered

- Bayesian view of probability.
- Bayesian learning: Bayes' theorem, prior, likelihood, posterior.
- Computation: conjugacy, MC, MCMC (semi-conjugacy, Gibbs).
- MCMC in practice: autocovariance, approximation error, traceplot, effective sample size.
- Fitting, overfitting.
- Some standard models: binomial test for proportions, t-test & ANOVA (equivalent), lm, glm, mixed-effects modelling...
- Software: Stan, `rstanarm`, `mcmcse`...

Where do we go from here

Applying Bayesian statistics as a research tool in your field

- Kruschke: Doing Bayesian data analysis.
- McElreath: Statistical Rethinking: A Bayesian Course with Examples in R and Stan.
- Learn R, rstanarm, Stan.
- (Gelman...: Bayesian data analysis.)

Specializing in Bayesian statistics

- Ross: First course in probability theory.
- Kadane: Principles of uncertainty (subjective Bayesian view).
- Robert: The Bayesian choice (objective Bayesian view).