

Bayesian Statistics for Genetics Lecture 0: Logistics

July, 2023

Welcome!

This course *introduces* Bayesian statistics for genetics. We aim to cover;

- Bayesian reasoning, and how it helps learning from genetic data
- Many widely-used models and priors
- Bayesian calculations, and some of the algorithms and software that implements them

We assume basic knowledge of R, but not more than this. To keep the focus on statistics, the genetic examples are intended to be accessible.

Introduction: Resources

Most importantly, the class site is

https://faculty.washington.edu/kenrice/sisgbayes/

Contains (or will contain);

- Links to all slides with hyperlinks and session recordings (for reference)
- All datasets needed for exercises, links to software needed
- Exercises for you to try
- Our solutions to exercises (later!)
- Links to other software, other courses, books, and places to get help

Beware the internet's widespread misinformation on Bayes! (probably well-intentioned, but...)

Schedule

- 1. Logistics, and non-technical introduction to reasoning with Bayes
- 2. Binomial models #1
- 3. Binomial models #2, logistic regression, sampling from posteriors
- 4. Multinomial models, INLA
- 5. Linear regression, nuisance parameters, prior influence, MCMC
- 6. Model selection/model averaging, more complex MCMC
- 7. Mendelian Randomization
- 8. Meta-analysis
- 9. Testing/multiple testing
- 10. Further software examples, open question time

Introduction: About Ting



- Assistant Professor, UW
 Biostat
- A useR and an instructoR
- Causal inference (clinical trials and observational studies)

Introduction: About Ken



- Professor, UW Biostatistics
- Genetic/Genomic research in Cardiovascular Epidemiology, also polygenic risk scores
- Meta-analysis combining sources of information
- Third-generation Bayesian!

Introduction: Course structure

10 sessions over 2.5 days

- Day 1; Introduction and first examples
- Day 2; Regression models
- Day 3; More advanced topics

Web page: http://faculty.washington.edu/kenrice/sisgbayes/

Introduction: Session structure

What to expect in a typical 90 minute session;

- 50 mins teaching (please ask questions!)
- 25 mins hands-on; please discuss as you go and work together
- 15 mins summary, discussion/extensions (questions again!)