2020 SISG MODULE 8: Bayesian Statistics for Genetics
Introduction and Overview

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Background Text: P.D. Hoff (2009), *A First Course in Bayesian Statistical Methods*, Springer.

Supplementary Text: J.C. Wakefield (2013), *Bayesian and Frequentist Regression Methods*, Springer.

Demonstrations of methods via R implementations will be carried out in class. Students are encouraged to follow along.

Code and other materials (course notes, papers) are available at the course website:

Course Details

- Course will be taught remotely over July 20–July 22.
- Break out rooms for exercises/R sessions.

Course Outline

DAY 1: Mon 20 July

- Mon 8.00–8.50 Lecture 1 (Rice): Why Bayes? Introduction. Review of probability
- Mon 8.50–9.20 R-Demo/Exercises/Solutions
- Mon 9.20–9.40 Break
- Mon 9.40–10.30 Lecture 2 (Wakefield): Binomial Sampling 1
- Mon 10.30–11.00 R-Demos and Practice Sessions
- Mon 11.00–11.30 Lunch Break
- Mon 11.30–12.20 Lecture 3 (Wakefield): Binomial Sampling 2
- Mon 12.20–12.50 R-Demos and Practice Sessions
- Mon 12.50–13.10 Break
- Mon 13.10–14.00 Lecture 4 (Rice) Continuous sampling. Linear regression. MCMC.
- Mon 14.00–14.30 Demo/Exercises/Solutions

Course Outline

DAY 2: Tue 21 July

- Tue 8.00–8.50 Lecture 5 (Wakefield): Multinomial Sampling
- Tue 8.50–9.20 R-Demos and Practice Sessions
- Tue 9.20–9.40: Break
- Tue 9.40–10.30 Lecture 6 (Rice): Model selection and averaging
- Tue 10.30–11.00 Demo/Exercises/Solutions
- Tue 11.00–11.30 Lunch Break
- Tue 11.30–12.20 Lecture 7 (Wakefield): Generalized linear modeling and mixed modeling
- Tue 12.20–12.50 R-Demos and Practice Sessions
- Tue 12.50–13.10 Break
- Tue 13.10–14.00 Lecture 8 (Rice): Meta analysis.
- Tue 14.00–14.30 Demo/Exercises/Solutions

Course Outline

DAY 3: Wed 22 July

- Wed 8.00–8.50 Lecture 9 (Wakefield): Bayesian and frequentist testing: Single tests and multiple tests
- Wed 8.50–9.20 R-Demos and Practice Sessions
- Wed 9.20–9.40: Break
- Wed 9.40–10.30 Lecture 10 (Rice): Software (WinBUGS/JAGS/INLA/Stan)
- Wed 10.30–11.00 Demo/Exercises/Solutions