General Outline

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2024-01-20

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Review of some general Concepts

General objective

- In this section, we will review:

– basic probability concepts and various probability distributions.

– use(s) of Bayes inference in Ecology

– some critics ot the use of **p**

Key Concepts

- Probability basics
- Common probability distributions (binomial, dirichlet, gamma, exponential, log-normal)
- Time to say good-bye to **p**
- Bayes in Ecology

Activities

- Review: Unit 3. Bodine et al and the ASA statement.
- Read: Bayesian inference in ecology. Ecology Letters (2004) 7: 509–520 doi: 10.1111/j.1461-0248.2004.00603.x
- Find a paper in your area of expertise and revise the use of *p*, write down a short analysis (max 1000 words) of the possible ways to solve the problems you might have detected.

Readings

Basic readings

- **Unit 3. Bodine et al** Read Online
- **Ellison. 2004**. Bayesian inference in ecology. Ecology Letters. 7: 509–520 doi: 10.1111/j.1461-0248.2004.00603.x
- **ASA statement** Read Online

Should read

- **Chapter 5. Sokal & Rohlf**
- **Chapter 1. Anderson's perspective on Science and Experimental design** Read Online
- [**Storopoli (2022). Bayesian Statistics: a graduate course.**](https://github.com/storopoli/Bayesian Statistics/tree/main)
- **van de Schoot, R., Depaoli, S., King, R. et al. Bayesian statistics and modelling. Nat Rev Methods Primers 1, 1 (2021).

Probability

General objective

- In this section, we will review:

– basic probability concepts, and various probability distributions.

Key Concepts

- Probability basics
- Common probability distributions (binomial, dirichlet, gamma, exponential, log-normal)

Activities

- Review:

Chapter 2: Introduction: Credibility, Models, and Parameters [@kruschke2014] Chapter 4: What is This Stuff Called Probability? [@kruschke2014]

– Prepare the exercises in both chapters

- Review:

Chapter 3: Principles of Probability [@hobbs2015]

Readings

Basic readings

- **Chapters 2 & 4** [@kruschke2014]
- **Chapter 3** [@hobbs2015]

Should read

- **Unit 3. Bodine et al** Read Online
- **Chapter 5. Sokal & Rohlf**
- **Ellison. 2004**. Bayesian inference in ecology. Ecology Letters. 7: 509–520 doi: 10.1111/j.1461-0248.2004.00603.x

Likelihood

General objective

- In this section, we will review:

– basic likelihood concepts.

Key Concepts

- Likelihood

Activities

- Review:

Chapter 4: Likelihood [@hobbs2015]

Readings

Basic readings

- **Chapter 4** [@hobbs2015]

Should read

- **Ellison. 2004**. Bayesian inference in ecology. Ecology Letters. 7: 509–520 doi: 10.1111/j.1461-0248.2004.00603.x

Bayes

General objective

- In this section, we will review:

– the Bayes' rule

Key Concepts

- Conditional probability
- Bayes' rule

Activities

- Review:

Chapter 5: Likelihood [@hobbs2015] Chapter 5: Bayes' Rule [@kruscke2015]

Readings

Basic readings

- **Chapter 5** [@hobbs2015]
- **Chapter 5** [@kruscke2015]

Should read

- **Ellison. 2004**. Bayesian inference in ecology. Ecology Letters. 7: 509–520 doi: 10.1111/j.1461-0248.2004.00603.x

hLrT - Bayes Factors

General objective

- In this section, we will review:

– the hLrT and Bayes Factors

Key Concepts

- hierarchical tests
- (h)/LrT
- Bayes Factors

Activities

- Review:

Thje wiki pages for: - hierarchical tests - hLrT - Bayes Factors

Readings

Basic readings

- @Kass&Raftery1995

Should read

- **Ellison. 2004**. Bayesian inference in ecology. Ecology Letters. 7: 509–520 doi: 10.1111/j.1461-0248.2004.00603.x

Markov Chain Monte Carlo

General objective

- In this section, we will review:

– the Markov Chain Monte Carlo

Key Concepts

- Sampling
- Markov Chain Monte Carlo

Activities

- Review:

Chapter 7: Markov Chain Monte Carlo [@hobbs2015] Chapter 7: Markov Chain Monte Carlo [@kruscke2015]

Readings

Basic readings

- **Chapter 5** [@hobbs2015]
- **Chapter 5** [@kruscke2015]

Should read

- **Ellison. 2004**. Bayesian inference in ecology. Ecology Letters. 7: 509–520 doi: 10.1111/j.1461-0248.2004.00603.x

Some examples

General objective

- In this section, we will practice with R:

– Krushcke, 2015: 5.3. Complete examples: Estimating bias in a coin – Krushcke, 2015: 7.2.1. A politician stumbles upon the Metropolis algorithm

Key Concepts

- Sampling
- Markov Chain Monte Carlo

Activities

- Review:

Chapters 5-7: Markov Chain Monte Carlo [@kruscke2015]

Readings

Basic readings

- **Chapters 5 - 7** [@kruscke2015]

Should read

- **Ellison. 2004**. Bayesian inference in ecology. Ecology Letters. 7: 509–520 doi: 10.1111/j.1461-0248.2004.00603.x