Computer intensive statistics in ecology (OCEAN 5052)

Information

Time: Tusday 9:10- 12:10

Lecturers: Chih-Hao HSIEH & Yi-Jay CHANG

Credits: 3 (including practice)

Reference

No textbook. Handouts and primary journal articles will be provided.

Outline

This is an advanced course intended for senior undergraduate and graduate students with knowledge of basic statistics including random variables, analysis of variance, regression analysis, and rank-based non-parametric statistics. We will discuss several computer-intensive statistical methods. We will discuss the theory, assumption, and application of these methods in ecological problems. The course is designed for hand-on work. Students need to get familiar with at least one computer language to do the statistics. Most of work can be done with R or MatLab, but any other programming language will do equally well. Sometimes, we will use well-developed software when the computation is too complicated and beyond the basic level. There will be dedicated time every week for students to present their works and to discuss the application of these methods on real world problems.

Objectives

The objectives are to provide students computational skills for sophisticated statistical methods that are often required for biological questions.

Schedule (tentative)

Week	Content	Lecturer
1	Introduction to R programming and plotting	Yi-Jay CHANG
2	Random variables, distribution, random number generator, statistical identity	Chih-Hao HSIEH
3	Bootstrap and Jackknife	Chih-Hao HSIEH
4	Bootstrapped confidence limits	Chih-Hao HSIEH
5	Permutation	Chih-Hao HSIEH
6	Minimization	Chih-Hao HSIEH
7		

Week	Content	Lecturer
8	Midterm break	NA
9	Classification 1	Yi-Jay CHANG
10	Classification 2	Yi-Jay CHANG
11	Dimension reduction methods 1	Yi-Jay CHANG
12	Dimension reduction methods 2	Yi-Jay CHANG
13	Maximal likelihood	Yi-Jay CHANG
14	Model selection	Yi-Jay CHANG
15	Bayesian analysis I	Yi-Jay CHANG
16	Bayesian analysis II	Yi-Jay CHANG
17	Neural Network	Chih-Hao HSIEH
18	Final discussion (no class)	

Evaluation

Homework 70% + Homework presentation 30%