Ecological Analytics

Harvard Forest June 2015 9-10am EDT

Instructor: Matthew Lau (http://people.fas.harvard.edu/~matthewklau)

Students will learn how to use programming for ecological analyses using the R programming language and gain experience:

- Managing analytical aspects of a project
- Inputting, manipulating and exporting data
- Statistical functions
- Plotting data patterns
- Coding and software best practices
- Getting more help, experience and practice

Although statistics will be introduced very briefly, this will not be a statistics class.

Pre-requisites: experience with using basic computer software. *Required Materials*: laptop or access to some computing device.

Calendar

June 1 (Monday), 7:45-8PM: brief intro to ecological analyses. + Why program? + Brief introduction to project management + Connect to syllabus and course materials

June 2 (Tuesday), 9-10AM: Analytics and programming basics. **Before Class** + Connect to Harvard Forest Guest wireless + *Install R on your computer: http://lib.stat.cmu.edu/R/CRAN/* + Download the example project: https://github.com/HarvardForest/myProject/archive/master.zip

In Class + Introduction to analytics, the usefulness of programming and R + Present the overarching framework of analytics for a project (document organization, task scheduling, data management, analytics management, keeping an analytics notebook) + Basic functions/operations and tasks (e.g., do simple calculations on scalars and vectors) + Objects + Functions + Scripting and annotation

Challenge

June 4 (Thursday): Data management

In Class + Inputting and managing data overview + Data structure and spreadsheets + Data reading functions (read.table) + Manipulating vectors (sorting, ordering) + Manipulating matrices

Challenge

June 9 (Tuesday): Data analysis

In Class + Calculating basic statistics (mean and variance) + Scatterplots, Barplots and Histograms + Mean differences + Getting data from the HF archive

June 16 (Tuesday): Programming + Advanced object classes (dataframes and lists) + Loops and applys + Data provenance + Versioning + Software ethics and hackathons?

Readings and Resources

- R Cheat Sheet ++ http://cran.r-project.org/doc/contrib/Short-refcard.pdf
- Version Control ++ https://help.github.com/articles/good-resources-for-learning-git-and-github
- Code for America ++ https://www.codeforamerica.org