

Introduction to R and GLM/GAMs workshop

Aaron (aaron.greenville@sydney.edu.au) and Mat (mathew.crowther@sydney.edu.au)

This brief two day workshop is designed to remove the mystery behind R, passing on tips for best practice techniques that we have picked up on our journey with R and lastly, to get you started with GLM/M and GAM/Ms. There are many ways to use R and here we wish to show you our workflow, which seems to work for us.

Please **bring your own laptop or share one with a friend**. This workshop is designed to be very hands-on. If you do not have access to a laptop, then please let us know and we will see if we can organize something for you.

Before the workshop you will need:

Download and install:

- a. R <http://cran.ms.unimelb.edu.au/>
- b. RStudio for desktop <https://www.rstudio.com/ide/download/>
- c. GitHub <https://github.com/>
- d. [Exercises](#)

Optional: [Slides from workshop](#)

Acknowledgements: This workshop draws on material from Software Carpentry (If you see one of their course advertised, then do it! <http://nicercode.github.io/2014-02-18-UTS/lessons/>) and Zuur A.F. (2009). *Mixed effects models and extensions in ecology with R*. Springer, New York ; London.

Outline

Basics

1. Exercise 1: Set up R, Rstudio, github
 - installing packages, loading packages, a trick for uni proxy settings
2. Data structures – vectors, lists, matrix, data frame, factors and sub-setting (using \$ to call columns, how to use dataframes, vectors, selecting rows, columns or cells)
3. Getting data into R and setting working directory.
4. basic data checks - head(), using RStudio, plots ()
5. Using and misusing attach()
6. Using help

Version control

1. Why do it?
2. Exercise 2: quick play with RStudio and Github.

Writing functions

1. Exercise 3: A quick and dirty introduction

Organising a project

1. Best practice for organising a project.
2. Exercise 4

GLM and GLMM

1. Basics of a linear model
2. What is a GLM and GLMM
3. Exercise 5: Frog road kill (poisson, quasi-poisson and neg bin)
4. Exercise 6: GLMM with temporal confounding - Hawaii bird abundance
5. Exercise 7: binomial GLM rats

GAM and GAMM

1. What is a GAM and GAMM
2. Exercise 8: GAM- Roadkill
3. Exercise 9: GAMM with spatial confounding - Roadkill

Model selection

1. Introduction to Information Theory
2. Exercise 10: GLM Model selection and model averaging – Roadkill

Pseudo R^2

1. How do you know your top model/s are any good?
2. Exercise 11: GLM Pseudo R^2

Steps in choosing the appropriate analysis

More resources

1. Recommended books: anything from the UseR series, any books by Zuur et al.
2. Search engines: Google and rseek.org
3. Software Carpentry <http://nicercode.github.io/2014-02-18-UTS/lessons/>
4. Quick intro to R http://nicercode.github.io/2014-02-18-UTS/lessons/01-intro_r/
5. Organizing your project <http://nicercode.github.io/2014-02-18-UTS/lessons/30-projects/>
6. R-bloggers <http://www.r-bloggers.com/model-validation-interpreting-residual-plots/>
7. <http://www.ats.ucla.edu/stat/dae/>
8. Git hub demo website: <http://pcottle.github.io/learnGitBranching/?NODEMO>