Overview

FW8051 Statistics for Ecologists

Department of Fisheries, Wildlife and Conservation Biology

Learning Objectives and steps we will take to meet them.

Demonstrate an ability to implement a variety of statistical models and methods in frequentist and Bayesian frameworks

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Demonstrate an understanding of a range of advanced statistical modeling techniques and an ability to choose an appropriate method depending on characteristics of the data.

Will consider models for:

- Normal (i.e., Gaussian) data with constant variance (linear regression)
- Non-linear predictor-response relationships
- Data with non-constant variance (generalized least squares)
- Count and binary data (generalized linear models)
- Correlated data (mixed models, generalized estimating equations, cluster-level bootstrap).

Will fit models using frequentist and Bayesian frameworks (using JAGs).

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Bring a computer every day to class!

Demonstrate "model literacy" – be able to describe a variety of statistical models and their assumptions using equations and text and match parameters in these equations to estimates in computer output.

```
Call:
lm(formula = age ~ proportion.black, data = LionNoses)

Residuals:
    Min      1Q  Median      3Q     Max
-2.5449 -1.1117 -0.5285  0.9635  4.3421

Coefficients:
                 Estimate Std. Error t value Pr(>|t|)
(Intercept)        0.8790     0.5688   1.545    0.133
proportion.black  10.6471     1.5095   7.053 7.68e-08 ***
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

Residual standard error: 1.669 on 30 degrees of freedom
Multiple R-squared:  0.6238,    Adjusted R-squared:  0.6113
F-statistic: 49.75 on 1 and 30 DF,  p-value: 7.677e-08
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We will work on this nearly every day in class!

Conduct research using a workflow that maximizes 'reproducibility' of your work.

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- Projects in Rstudio
- rmarkdown, knitr
- Project/file management

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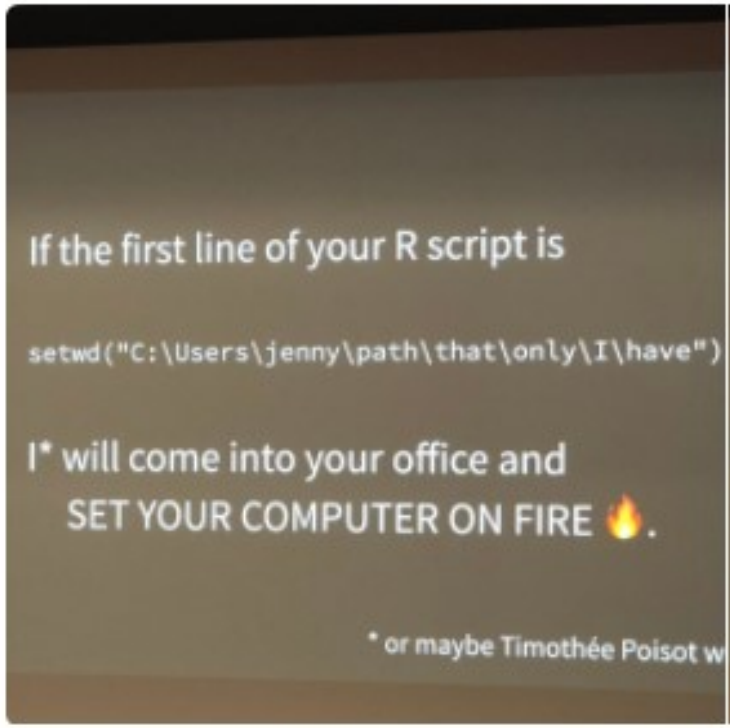
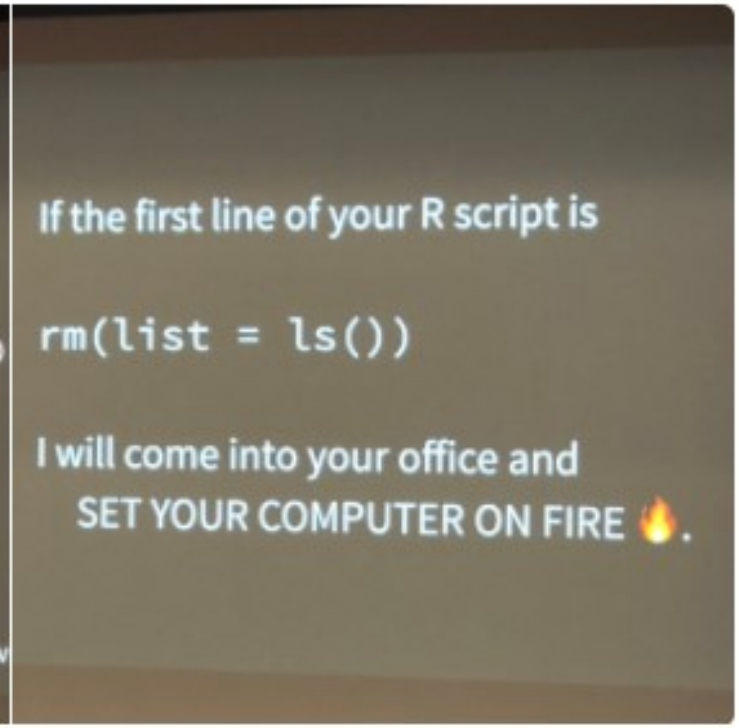
Homework and in-class assignments will give you experience with tools in R/Rstudio for reproducible research

Hadley Wickham ✓
@hadleywickham

Following

The only two things that make @JennyBryan 😤😠🤯. Instead use projects + here::here() #rstats





4:50 PM - 10 Dec 2017

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Gain an appreciation for challenges associated with selecting among competing models and performing multi-model inference.

- Multiple Models Topic will cover various model building strategies

Self and Peer Evaluations

I will use a combination of self- and peer-evaluations to aid in grading homework assignments.

- helps me spend my time efficiently
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I use a low-stress, forgiving rubric when assigning homework grades (for a 94% or an A-, you must):

- complete at least 1/2 of the assignment
- demonstrate at least partial understanding in your answers
- annotate your code
- de-intentify yourself (i.e., remove your name)

But, my grading system requires that you turn in assignments on time, so please plan ahead if you will be away or have a busy stretch.

Peer Assessment

Comments from previous year's course evaluations

- I like the self and peer assessments. It helps to be forced to review answers and process, otherwise I would just move to the next 10 things I have to work on.
- Homework grading format is awesome: by evaluating ourselves and our peer before instructor sees our work, we are able to better understand mistakes that we made and /or others made and subsequently offer suggestions in a "learning by teaching" fashion.
- I found the peer assessments to be highly valuable. The code we were exposed to throughout the course plus looking at more variations within the peer assessments has brought my level of understanding up significantly.

Grading

- Homework assignments (35%)
- Class participation (self and peer assessments) (10%)
- Quizzes (~7) (15%)
- Data analysis contribution to exercise book (10%)
- Final exam (30%)

S/N students will be required to complete all homework assignments and self and peer reviews, but will not have to take the final exam, quizzes, or contribute a data analysis to the exercise book.