Advanced STATS and R GLM's

The University of Oklahoma

The Exponential Family

- We have been looking at the linear model of the form:

$$E(Y_i) = \mu_i = x_i'\beta$$

Or $E(Y) = X\beta$ where X is the design matrix and x_i' is the ith row of the design matrix X

Where

$$Y_i \overset{\text{iid}}{\sim} N(\mu_i, \sigma^2)$$

This would be our typical multiple regression model.

Modification

- We can modify the form of this model to make it a little more general.
- Distribution no longer simply Normal but Exponential family
- $g(\mu_i) = x_i'\beta$
- g is called the link function

Exponential Family

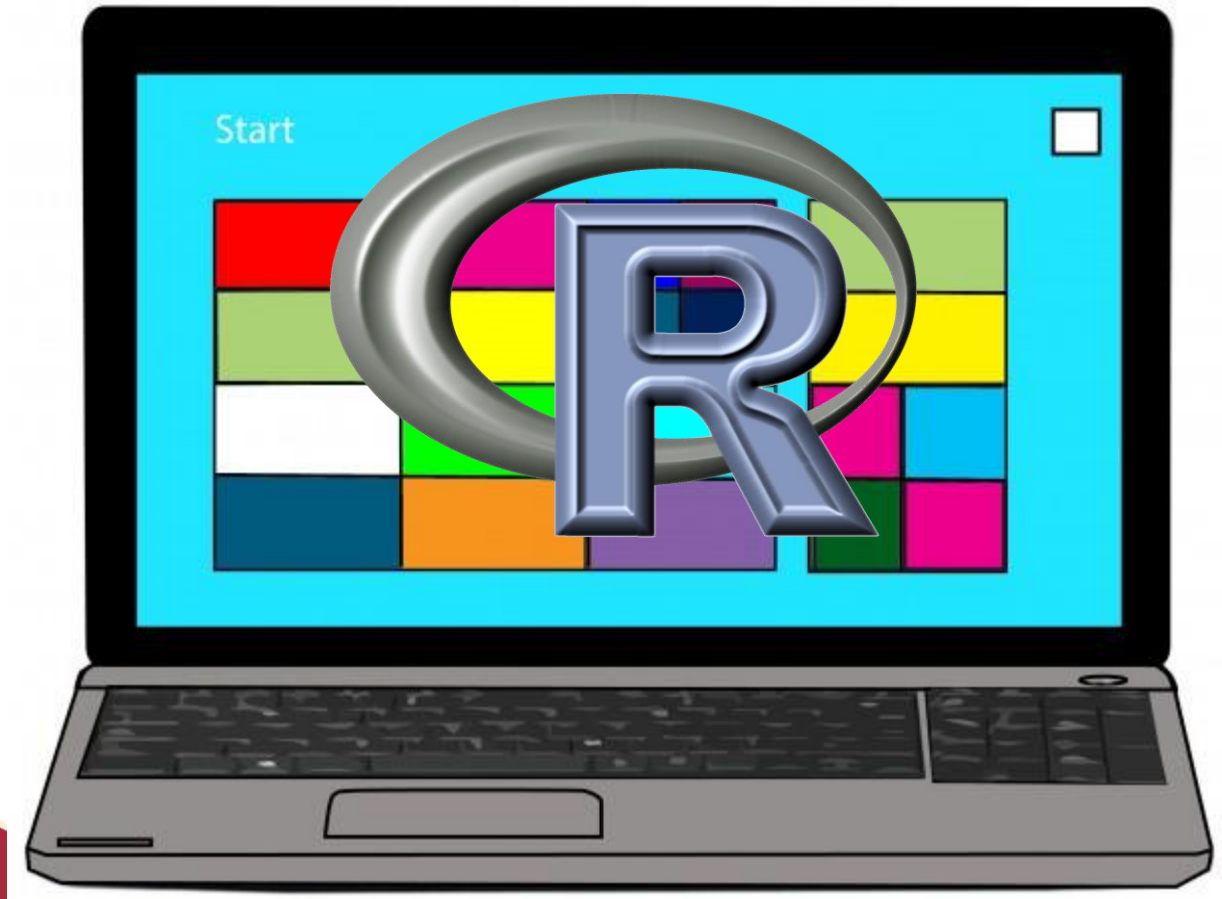
- Suppose that the distribution of Y depends on only one parameter θ
- Then we could define Y to be distributed within the exponential family of distributions if:

$$f(y|\theta) = s(y)t(\theta)e^{a(y)b(\theta)}$$

- Or equivalently

$$f(y|\theta) = \exp\Big(\big(a(y)b(\theta) + c(\theta) + d(y)\big)\Big)$$

Bring your laptop or use Network.



Get the Data and Book

- Link below:
- statsandr.oucreate.com

Courses

- **Bayesian Stats MATH 4803/5803**
- Advanced Applied STATS MATH 4793/5793 (Next Year)
- **Applied Statistical Methods MATH 4753**

Next time bring your laptop (if you want to).