Statistical Inference in R and JAGS

Noble Hendrix & Jim Thorson
noblehendrix@gmail.com / james.thorson@noaa.gov

Review - Lecture

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Review

- Steps to a GLM

1. Random part of the response (statistical distribution):

$$C_i \sim \text{Poisson}(\lambda_i)$$

2. Link of random and systematic part (log link function):

$$\log(\lambda_i) = \eta_i$$

3. Systematic part of the response (linear predictor η_i):

$$\eta_i = \alpha + \beta^* X_i$$

Peregrine falcon example

Model 1

$$Y_t \sim Pois(\lambda_t)$$

$$\log(\lambda_t) = \alpha + \beta_1 t + \beta_2 t^2 + \beta_3 t^3$$

Model 2

$$Y_t \sim Pois(\lambda_t)$$

$$\log(\lambda_t) = \alpha + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + e_t$$

$$e_t \sim N(0, \sigma_t^2)$$

Model 3

$$Y_{i,t} \sim Pois(\lambda_{i,t})$$

$$\log(\lambda_t) = \alpha_i + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + e_t$$

$$e_t \sim N(0, \sigma_t^2)$$

$$\alpha_i \sim N(\mu_\alpha, \sigma_\alpha{}^2)$$

Additional Resources

- Baysesian modeling: Kéry and Schaub. 2012. Bayesian Population Analysis using WinBUGS
- Maximum Likelihood: Zuur et al. 2007. Mixed Effects Modeling in R