The use of Generalized Linear Mixed Models for the study of dynamical systems



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INTRODUCTION TO GENERALIZED LINEAR MIXED MODELS

Assumption and limitation of glms





age



Generalized linear mixed models include both fixed effects and random effects in order to allow for:

- Repeated measures

Why use GLMMs?

- Temporal correlation
- Spatial correlation
- Heterogeneity
- Nested data



The R function to fit a generalized linear mixed model is glmer() which uses the form fitted.model <- glmer(formula, family="model family", data=data.frame) **Repeated measures**



Spatial correlation

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- The intercept is different for each individual/site
- Accounts for baseline differences in the response variable between individuals/sites





- The effect of a variable (b) is different for each individual/site
- Accounts for baseline differences in the relationship responseexplanatory variable between individuals/sites





NOW THAT WE CAN MODEL REPEATED OBSERVATIONS OVER TIME...

Introducing time-dependent trends

a) Linear trends (days, months, years)

Time = 1, 2, 3, 4, ..., N

Where N is the total number of observations for each individual or site (including NAs)







Introducing time-dependent trends



Evaluating abrupt and progressive changes over time

Immediate impact a)

- Impact = 0 before the event happened 1 after the event happened



Evaluating abrupt and progressive changes over time

a) Immediate impact

b) Progressive impact







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