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Multilevel Overdispersion in Hierarchical Generalized Linear Models

Overdispersion refers to the phenomenon of observing greater variation in the data than is predicted by the model. This problem is most commonly studied in discrete data models, and in fact originated from Binomial and Poisson models. The problems caused by overdispersion are serious, and include inflated test statistics, smaller confidence intervals, in effect liberal statistical tests caused by incorrect standard errors. The causes of overdispersion are numerous, and include omitted predictors from the model, incorrect transformation of the response, incorrect response distribution assumed, and correlation among response units.

The topics of this talk will focus on the last two of these causes of overdispersion. Methods will be outlined for correcting a generalized linear model for a single level of overdispersion by attempting to correct distributional assumptions and account for correlation among units. Hierarchical generalized linear models will be introduced, and methods will be outlined to account for overdispersion at multiple levels of this hierarchical structure.