

Applying Generalized Linear Models to Discrete Response Data Using the SAS System

Maura E. Stokes

Abstract

This tutorial discusses fitting regression models to discrete data within the framework of generalized linear models. Response data includes binomial, multinomial, and count. Logistic and probit models are applied to binomial data, polytomous and cumulative logit models are applied to multinomial data, and Poisson regression is applied to count data. Parameter estimation, model building, model checking, and statistical inference are discussed for applications of these various models. Overdispersion for binomial and Poisson data is discussed, and various measures for correction are introduced, including using the log-linked negative binomial regression for overdispersion count data.

Participants will learn to choose the appropriate SAS procedures to fit a particular discrete response model, as well as learn the basic syntax, default output and some useful options of these procedures. They will receive a copy of the overhead transparencies at the tutorial.

Outline

1. Overview of Generalized Linear Models

Systematic and random components

Link functions

Deviance and Pearson χ^2 “dispersion” statistics

2. Binomial Models

Logit, probit, and complementary log-log links

Overdispersion

- Williams’ model

Examples

3. Poisson Models

Log link

Overdispersion

- log-linked negative binomial model

Example

4. Multinomial Models

Ordinal responses

- cumulative logit model

Nominal responses

- polytomous logit model

- conditional logit model

Examples