



A New Maximum Likelihood Based Approach for Count Data with Over-Dispersion

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Outcome variables that are counts are often encountered in longitudinal trials. For example, we consider a study of the serial counts of seizures in patients. The analytic goal was to identify correlates associated with seizure counts, assuming a Poisson distribution for the outcome variable. However, preliminary analysis suggested over-dispersion, so that the estimated variance of seizure counts exceeded the mean, and was therefore inflated relative to that assumed for the Poisson distribution. In this presentation I describe our new approach for analysis of Poisson data with over-dispersion. I describe the construction of the likelihoods, development of the estimating equations and asymptotic distribution of the estimators, and implementation of the approach for analysis of the seizure data. I also discuss simulation results that demonstrate the benefits of our approach relative to semi-parametric methods that are available for analysis of longitudinal count data. I also discuss software that is under development in R and Stata so that others can implement our methods in analyses of their own count data.

Keywords: longitudinal data; first-order autoregressive structure; discrete data; first-order antedependence.