Title: RESIDUALS AND DIAGNOSTICS FOR GENERALIZED LINEAR MODELS

Abstract: Ordinal outcomes are common in scientific research and everyday practice, and we often rely on regression models to make inference. A long-standing problem with such regression analyses is the lack of effective diagnostic tools for validating model assumptions. The difficulty arises from the fact that an ordinal variable has discrete values that are labeled with numerical values of no linearity. The values merely represent ordered categories.

In this paper, we propose a surrogate approach to defining residuals for an ordinal outcome Y. The idea is to define a continuous variable S as a “surrogate” of Y and then obtain residuals based on S. For the general class of cumulative link regression models, we study the residual’s theoretical and graphical properties. We show that the residual has null properties similar to those of the common residuals for continuous outcomes.