The binomTools package: Performing model diagnostics on binomial regression models

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Binomial regression models are widely used for modelling observations with dichotomous outcome. Since diagnostics are important for validation of model adequacy, the accessibility of suitable diagnostic methods for binomial regression models is crucial. The binomTools package (Hansen and Christensen, 2011) provides a range of diagnostic methods for this class of models extending the basic tool set in base R and enabling a thorough examination of the fitted model.

Appropriate use of the deviance or Pearson’s $\chi^2$ reported by glm for goodness-of-fit assessment requires that observations are suitably grouped, e.g., binary observations should be grouped to binomial form. Our group method for glm objects performs this otherwise cumbersome task. Additional goodness-of-fit tests for binary data available in binomTools include the Hosmer-Lemeshow test.

Residual analysis in binary and binomial models is complicated by the non-unique definition of residuals and the sparseness of appropriate graphical methods. rstudent from stats provide approximate deletion residuals, the so-called likelihood residuals (Williams, 1987); binomTools enhance this by providing the exact counterparts. The half-normal plot with simulated envelopes implemented in our halfnorm function is described by Collett (2003) and one of the most effective and sensitive residual plots for the notoriously difficult binary models. Further, the coefficient of discrimination (Tjur, 2008) and related figures are implemented for summarizing and describing predictive performance.

Our aim with binomTools is to provide a comprehensive collection of methods for residual analysis, model diagnostics and presentation of results from binomial regression models.

References:


