

brglm: Bias reduction in generalized linear models

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The **brglm** R package provides an alternative fitting method for the `glm` function for reducing the bias of the maximum likelihood estimator in generalized linear models (GLMs). The fitting method is based on the generic iteration developed in Kosmidis and Firth (2010a) for solving the bias-reducing adjusted score equations (Firth, 1993). It relies on the implementation of the first-order term in the asymptotic expansion of the bias of the maximum likelihood estimator for GLMs which has been derived in Cordeiro and McCullagh (1991). The bias-corrected estimates derived in the latter study are by-products of the general fitting method.

The benefits of reducing the bias in estimation are discussed, especially in models for discrete responses. Specifically, in such models there is a positive probability that the maximum likelihood estimate has infinite components, which can potentially cause problems in the use of standard inferential procedures. In contrast, for many well-used GLMs, the reduced-bias estimates have been found to always have finite components, motivating their study and use in practice (see, for example, Firth 1992; Mehrabi and Matthews 1995; Heinze and Schemper 2002; Bull et al. 2002; Zorn 2005; Kosmidis 2009; Kosmidis and Firth 2010b).

The **brglm** package also provides methods for the construction of confidence intervals through the profiles of appropriately constructed inference functions (Kosmidis, 2008; Kosmidis and Firth, 2009).

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