QUASI-LIKELIHOOD OR EXTENDED QUASI-LIKELIHOOD? AN INFORMATION-GEOMETRIC APPROACH

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Abstract. When the variance is a known function of the mean, as in quasi-likelihood applications, the sample variance also contains information about the mean and extensions of quasi-likelihood functions have been suggested that incorporate this additional information. In order to be sure these extensions are an improvement, further assumptions are made typically on the higher moments of the data so that there is a trade-off between the greater robustness of the quasi-likelihood estimates and the potentially improved estimates based on the extended quasi-likelihood functions. Improvement is often measured by relative efficiency but more insight can be gained by considering optimality of estimating functions, information loss, and sufficiency. All these measures can be described using the dual geometries of the quasi- and extended quasi-likelihood estimators. For a substantial range of models, the extended estimates offer little improvement when the coefficient of variation is small.

Key words and phrases: Information, sufficiency, efficiency, extended quasi-likelihood, generalized linear model, dual geometries, angle, curvature.