

Target estimation and implications to robustness

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Abstract: This paper considers target functionals \tilde{T} , which are bias-reduced functionals that can be obtained from a functional T in a parametric setting. It is shown that the L_1 -error of the corresponding target estimator decreases and the asymptotic normality is obtained using von Mises expansions with the Hadamard derivative. It is also shown that targeting can improve robustness since the gross-error sensitivity decreases under certain conditions. Applications to M-estimates of location, the sample median, and simultaneous M-estimates of location and scale are given.

Key words: Bias, influence function, L_1 -error, parametric family, statistical functionals, target estimates, von Mises expansions.

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1 Introduction

Target estimation was introduced by Cabrera and Fernholz (1996) as a procedure to reduce the bias and the variance of an estimator. In that paper, the von Mises expansion of a statistical functional was used to obtain conditions for this reduction in bias and variance. Moreover, it was also shown that the bias of the target estimator can be expressed in terms of the influence function of the original statistic. It is natural to ask what the relationship is between the von Mises expansion of the original functional and that of the target functional. This issue is addressed in the present paper where the asymptotic distribution of the target functional will follow from the corresponding von Mises expansion. The influence function of the target functional is also obtained and a condition is given for reducing the