Generalized Bayesian-Type Estimators. Robust and Sensitivity Analysis

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Abstract: Let $X_1, X_2, \ldots, X_n$, be i.i.d. random variables with a density function $f(x, \theta)$ where $\theta \in \Theta \subset R^k$ is an unknown parameter that we are interested in estimating. Following up robustification procedure presented by Huber [10] we shall study one possible approach for using (non-sample) prior information for robust type estimators and prove some asymptotic properties of introduced estimators. We shall show that the Bayes-type estimators and maximum posterior probability estimators are asymptotically equivalent to the order $O_p(n^{-1})$ or $o_p(n^{-1})$, depending on some regularity conditions. Because of this asymptotic relation, one expects that with an appropriate choice of ρ (i. e such as we would use in generating an M-estimator) we can obtain a Bayesian type estimator with good robustness properties.

In addition, if $f(x, \theta) = \exp\{-\rho(X_i, \theta)\}$ then these results lead to relations of maximum likelihood and Bayes' estimators.

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