MINIMUM DISPARITY ESTIMATION FOR CONTINUOUS MODELS: EFFICIENCY, DISTRIBUTIONS AND ROBUSTNESS

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Abstract. A general class of minimum distance estimators for continuous models called minimum disparity estimators are introduced. The conventional technique is to minimize a distance between a kernel density estimator and the model density. A new approach is introduced here in which the model and the data are smoothed with the same kernel. This makes the methods consistent and asymptotically normal independently of the value of the smoothing parameter; convergence properties of the kernel density estimate are no longer necessary. All the minimum distance estimators considered are shown to be first order efficient provided the kernel is chosen appropriately. Different minimum disparity estimators are compared based on their characterizing residual adjustment function (RAF); this function shows that the robustness features of the estimators can be explained by the shrinkage of certain residuals towards zero. The value of the second derivative of the RAF at zero, A_2, provides the trade-off between efficiency and robustness. The above properties are demonstrated both by theorems and by simulations.

Key words and phrases: Disparity, Hellinger distance, Pearson residuals, MLE^*, robustness, efficiency, transparent kernels.