A Minimum Distance Weighted Likelihood Method of Estimation

Arun Kumar Kuchibhotla[1] and **Ayanendranath Basu**[2*]

[1] *Department of Statistics, Wharton School, University of Pennsylvania, Philadelphia 19104-6340, USA; arunku@wharton.upenn.edu.*
[2] *Interdisciplinary Statistical Research Unit, Indian Statistical Institute, 203 B. T. Road, Kolkata 700108, India; ayanbasu@isical.ac.in*
[*] *Presenting author*

Keywords. *Minimum Disparity Estimation; Weighted Likelihood Estimation; Residual Adjustment Function; Higher Order Influence Analysis.*

Over the last several decades, minimum distance (or minimum divergence, minimum disparity, minimum discrepancy) estimation methods have been studied in different statistical settings as an alternative to the method of maximum likelihood. The initial motivation was probably to exhibit that there exists other estimators apart from the maximum likelihood estimator (MLE) which has full asymptotic efficiency at the model. As the scope of and interest in the area of robust inference grew, many of these estimators were found to be particularly useful in that respect and performed better than the MLE under contamination. See **?**. Later, a weighted likelihood variant of the method was developed in the same spirit, which was substantially simpler to implement. See **?**. In the statistics literature the method of minimum disparity estimation and the corresponding weighted likelihood estimation methods have distinct identities. Despite their similarities, they have some basic differences. In this paper we propose a method of estimation which is simultaneously a minimum disparity method and a weighted likelihood method, and may be viewed as a method that combines the positive aspects of both. We refer to the estimator as the minimum distance weighted likelihood (MDWL) estimator, investigate its properties, and illustrate the same through real data examples and simulations. We briefly explore the applicability of the method in robust tests of hypothesis.

References

Lindsay, B. G. (1994). Efficiency versus robustness: The case for minimum Hellinger distance and related methods. *Annals of Statistics*, **22**, 1081–1114.

Markatou, M., Basu, A. & Lindsay, B. G. (1998). Weighted likelihood equations with bootstrap root search. *Journal of The American Statistical Association*, **93**,

740–750.