Title:
Testing for Uniqueness of Estimators

Abstract:
Uniqueness of the population descriptor is a standard assumption in asymptotic theory. However, so-called m-estimation problems, in which an estimator is determined by minimizing a cost function, often feature local minima of the sample cost function. These minima may stem from multiple global minima of the underlying population cost function. We present a hypothesis test to systematically determine for a given sample whether the underlying population cost function may have multiple global minima. We discuss three applications:
1) the mean on a non-euclidean data space,
2) non-linear regression and
3) Gaussian mixture clustering.

Keywords:
Asymptotic statistics, Non-Euclidean statistics, non-unique descriptors