Past, Present and Future results on r-convex hull and r-shapes

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Abstract

The r-convex hull provides an easy tool for set estimation from the theoretical point of view. It allows to estimate the support of a distribution, its boundary, the volume of its support as well as the measure of its boundary in the full dimensional case. Unfortunately, when the dimension is higher than 2, the computation of the different estimators based on the r-convex hull is very difficult. On an other hand, the r-shape is a relatively easy tool to compute but may have some pathologic behaviour. Understanding the relation between the r-hull and the r-shape allows us to obtain theoretical results on the r-shape. In this talk, I will explain some of these relations with applications and I will briefly present two aspects of the lower dimensional case: the first one deals with manifold estimation and the second deals with submanifold estimation.