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On robust classification using projection depth

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Abstract This article uses projection depth (PD) for robust classification of multivariate data. Here we consider two types of classifiers, namely, the maximum depth classifier and the modified depth-based classifier. The latter involves kernel density estimation, where one needs to choose the associated scale of smoothing. We consider both the single scale and the multi-scale versions of kernel density estimation, and investigate the large sample properties of the resulting classifiers under appropriate regularity conditions. Some simulated and real data sets are analyzed to evaluate the finite sample performance of these classification tools.

Keywords Bayes risk · Bandwidth · Cross-validation · Data depth · Elliptic symmetry · Kernel density estimation · Misclassification rate · Multi-scale smoothing