Robust Functional Data Analysis

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Abstract

Outliers are encountered in functional datasets as often as they are in univariate or multivariate datasets. But outlier identification is more complicated in functional spaces due to their infinite dimensionality, which precludes the existence of a (useful) version of the Mahalanobis distance. Therefore, affine equivariant robust estimators based on metrically trimmed means and covariances cannot be defined. But we will present practical and easily computable versions of trimmed means and covariances that are location, scale and rotation equivariant. They are based on a measure of outlyingness that does not rely on the Mahalanobis distance but on nearest neighbors. We will present examples that show the usefulness of this outlyingness measure for spotting isolated outliers and atypical clusters of functions.