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Spatial Depth-Based Classification for Functional Data

Carlo Sguera, Pedro Galeano, Rosa Lillo

We enlarge the available number of functional depths by defining two new depth measures for curves. Both depths are based on a spatial approach: the functional spatial depth (FSD), that shows an interesting connection with functional spatial quantiles, and the kernelized functional spatial depth (KFSD), which is useful for studying functional samples that require an analysis at local level. Afterwards, we consider supervised functional classification problems. We focus on cases in which the differences between groups are not extremely clear-cut or the data may contain outlying curves. We perform classification with some available robust methods based on the use of functional depths by considering FSD and KFSD as well as different existing functional depths. The functional k-nearest neighbor classifier is used as a benchmark procedure. The results indicate that the spatial depth-based classification approach lead to good results, especially with KFSD. Finally, we also analyze two real classification problems obtaining results that are consistent with those observed with simulated curves.

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