

The classification of multivariate functional data is an important task in scientific research. Unlike point-wise data, functional data are usually classified by their shapes rather than by their scales. We define an outlyingness matrix by extending directional outlyingness, an effective measure of the shape variation of curves that combines the direction of outlyingness with conventional depth. We propose two classifiers based on directional outlyingness and the outlyingness matrix, respectively. Our classifiers provide better performance compared with existing depth-based classifiers when applied on both univariate and multivariate functional data from simulation studies. We also test our methods on two data problems: speech recognition and gesture classification, and obtain results that are consistent with the findings from the simulated data.