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*Hotelling Trace Criterion as a Figure of Merit for the Optimization of Chromatogram Alignment.*

We present a methodology for the optimization of chromatogram alignment using a class separability measure called the Hotelling trace criterion (HTC). In gas chromatography, normal fluctuations occur in peak height due to differences in chemical composition; however, variations in peak location due to measurement error also occur. Without correction along the time axis, analysis of chemical differences could be skewed or obscured. The correlation optimized warping (COW) alignment algorithm was applied to biodiesel data derived from gas chromatography. It requires two input parameters: segment size and maximum warp. The biofuel data, representing classes of soy, canola, tallow, waste grease and a hybrid, were aligned using COW and then transformed into principal components (PC), which were then used to evaluate the HTC. The alignment parameters that maximized the HTC were chosen for our analysis. The results demonstrated that the parameters derived from maximizing the HTC more effectively aligned the data than those derived from other previously published metrics, as evidenced by improved clustering of the classes in the PC-plots. (Received September 15, 2014)