An Affine-Invariant Data Depth Based on Random Hyperellipses

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Abstract

One of the fundamental concepts in the study of statistical depth is that the depth function should be invariant to the choice of coordinate system. Although this notion of affine-invariance is desirable, most of the current depth functions which satisfy this property are difficult to compute in high dimensions. In this paper, a statistical depth function based on random hyperellipses is proposed which is both affine-invariant and simple to compute in any practical dimension. We will discuss the theoretical properties of the depth measure and outline some of its potential applications. Several examples are presented in order to illustrate these concepts. This is work with Bruce Brown, Tom Hettmansperger, and Fengjuan Xuan.