Edouard Pauwels

The empirical Christoffel function in Statistics and Machine Learning

We consider the Christoffel function associated to a probability measure, or more precisely, its empirical counterpart associated with an independent sample. This object has a rich history of research with strong connection to orthogonal polynomials theory. I will briefly review some of these aspects and describe important properties of the Christoffel function which could be used for statistical purposes. This opens a number of research questions which I will discuss. I will present a recent consistency result which relates the empirical Christoffel function and its population counterpart in the limit of large samples. I will illustrate further these properties on several applications in statistics and machine learning:

(a) density and support estimation from finite samples,
(b) outlier and novelty detection and
(c) affine matching.