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Abstract

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On scattering moments of marked point processes

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Scattering moments [1] is a discrete family of nonlinear and noncommuting operators computing at different scales the modulus of a wavelet transform of a one- or higher-dimensional signal (e.g. image). They are invariant with respect to translations and Lipschitz-continuous with respect to smooth diffeomorphisms of the signal. These properties make them useful in signal processing, in particular in relation to statistical learning.

First, we show how the scattering moments can be used to address the following problem of statistical learning of geometric marks of point processes, studied in [2]: An unknown marking (score) function, depending on the geometry of point pattern, produces characteristics (marks) of the points. One aims at learning this function from the examples of marked point patterns in order to predict the marks of new point patterns.

Next, we present some limit results for the scattering moments of marked point processes as the scale of the wavelets becomes small or big. The latter involves the central limit theorem for geometric statistics of point processes [3] and can be used to estimate the variance asymptotic of the underlying processes.

References

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