The scattering transform in cosmology, or, a CNN without Training

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Abstract

Patterns and non-Gaussian textures are ubiquitous in astronomical data but challenging to quantify. I will present a new powerful statistic, called the "scattering transform". It borrows ideas from convolutional neural nets (CNNs) while retaining the advantages of traditional statistics. As an example, I will demonstrate its application to weak lensing cosmology, where it outperforms classic statistics and is on a par with CNNs. I will also show interesting interpretations of the scattering statistics. I argue that the scattering transform provides a powerful new approach in astrophysics and beyond.

Keywords: scattering transform, cosmology, weak lensing, interpretability

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