**[Graph Classification with Geometric Scattering](https://openreview.net/forum?id=SygK6sA5tX)**

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* **Abstract:** One of the most notable contributions of deep learning is the application of convolutional neural networks (ConvNets) to structured signal classification, and in particular image classification. Beyond their impressive performances in supervised learning, the structure of such networks inspired the development of deep filter banks referred to as scattering transforms. These transforms apply a cascade of wavelet transforms and complex modulus operators to extract features that are invariant to group operations and stable to deformations. Furthermore, ConvNets inspired recent advances in geometric deep learning, which aim to generalize these networks to graph data by applying notions from graph signal processing to learn deep graph filter cascades. We further advance these lines of research by proposing a geometric scattering transform using graph wavelets defined in terms of random walks on the graph. We demonstrate the utility of features extracted with this designed deep filter bank in graph classification of biochemistry and social network data (incl. state of the art results in the latter case), and in data exploration, where they enable inference of EC exchange preferences in enzyme evolution.
* **Keywords:** geometric deep learning, graph neural network, graph classification, scattering
* **TL;DR:** We present a new feed forward graph ConvNet based on generalizing the wavelet scattering transform of Mallat, and demonstrate its utility in graph classification and data exploration tasks.