CayleyNets and transferability in spectral graph convolutional neural networks

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The rise of graph-structured data such as social networks, regulatory networks, citation graphs, and functional brain networks, in combination with resounding success of deep learning in various applications, has brought the interest in generalizing deep learning models to non-Euclidean domains. In this talk I will introduce the field of graph convolutional neural networks. Defining convolution on graphs is challenging, since there is no canonical way to define translations in a sliding window approach. We focus in this talk on spectral methods, where convolution is defined via the convolution theorem, namely, as pointwise multiplication in some frequency domain. I introduce CayleyNets, a spectral method with desirable computational and analytic properties.

This talk also aims at debunking a common prejudice against spectral methods. In some learning tasks on graphs, the learned filters should generalize on graphs that we haven't seen in the training set. Namely, a filter should have similar repercussions on two graphs that represent similar phenomena. This property is called transferability. As oppose to the common misconception, I show that spectral methods are transferable.