

Semi-Supervised Learning on Hypergraphs using Graph Convolutional Networks

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Graph Convolutional Networks are a special type of Neural Network designed to combine the flexibility of Machine Learning with standard tools from graph theory. In applications that supply adjacency information in addition to data point features, GCNs may incorporate this information by means of the graph Laplacian operator, which is used to define a generalization of convolution on graph-based data. Spectral convolutional filters are learned by training with partially labelled data in a semi-supervised classification context.

We introduce the extension of GCNs to hypergraphs, a generalization of traditional graphs where edges no longer represent connections between two, but an arbitrary number of nodes. We discuss the method's benefits and challenges in the context of this application. We further introduce special spectral filters that are required to reduce the complexity of the layer operations caused by the non-sparse hypergraph Laplacian matrix. We finally present the method's strong practical performance by application to common hypergraph datasets.

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