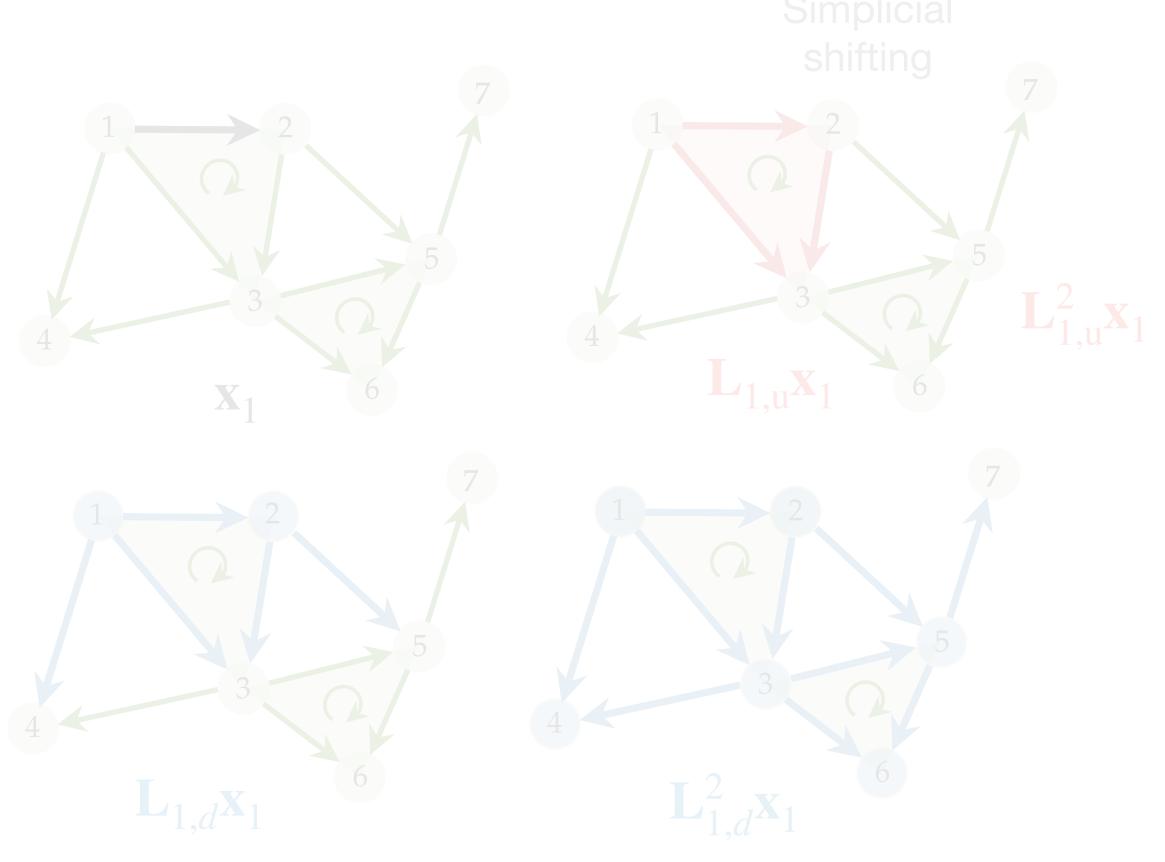
## 1. Simplicial Convolutions and Filters

## Spatial/Topological

## **Edge Convolution**

Shift-and-Sum



Simplicial locality

## **Simplicial Convolutional Filter**

$$\mathbf{H} := \mathbf{H}(\mathbf{L}_{\mathrm{d}}, \mathbf{L}_{\mathrm{u}}; \boldsymbol{\alpha}, \boldsymbol{\beta}) = \sum_{k=0}^{K_{\mathrm{d}}} \alpha_{k} \mathbf{L}_{\mathrm{d}}^{k} + \sum_{k=0}^{K_{\mathrm{u}}} \beta_{k} \mathbf{L}_{\mathrm{u}}^{k}$$