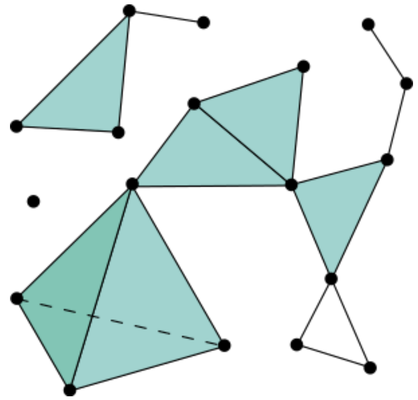
TU Delft

Modeling and Learning Simplicial Signals — an edge case



— Understand edge flows (simplicial signals): smoothness, spectrum
— Process edge flows: Convolutional filters, regularizations
— Learn edge flows: neural networks, Gaussian processes …

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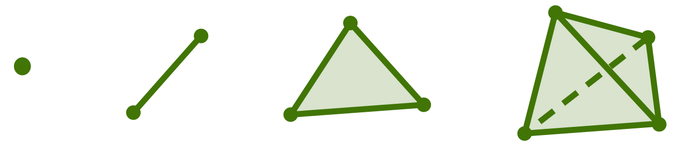
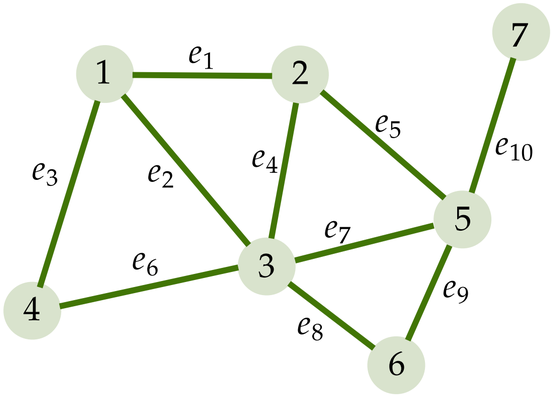
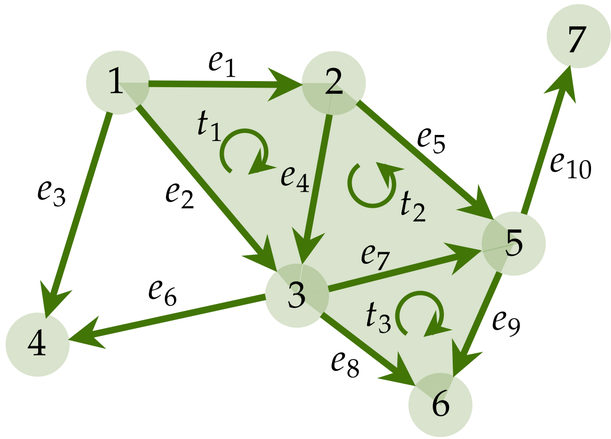
Graphs vs Simplicial 2-Complexes



0-, 1-, 2-, 3-simplices



Graph = Simplicial 1-complex



Simplicial 2-complex

- Oriented simplices (equivalence class of permutations)

Where are SCs used?
- Network analysis
- Topological data analysis
- Topological signal processing
- Topological deep learning
- Numerical methods
- Computer graphics
- …

- To model Higher-order network structure
- To support Higher-order signals