

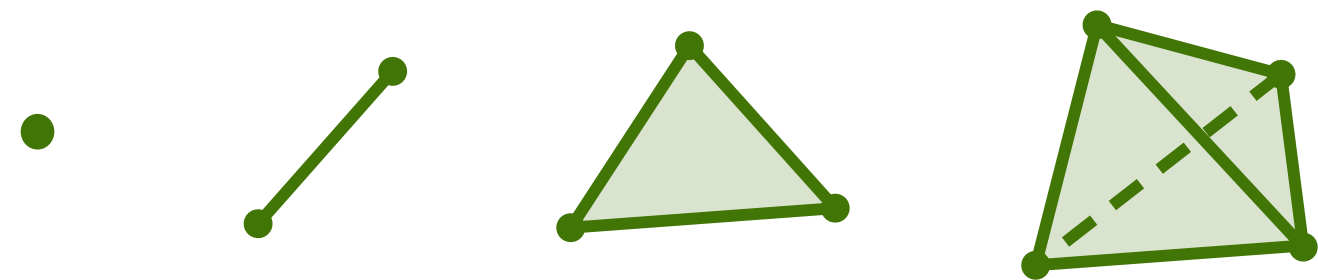
Hodge-Compositional Edge Gaussian Processes

- Edge flow; difference vs. node data; graph vs. simplicial complex
- Smoothness of edge flows: div and curl; Hodge decomposition
- GP modeling of edge functions: div-free, curl-free kernels ...

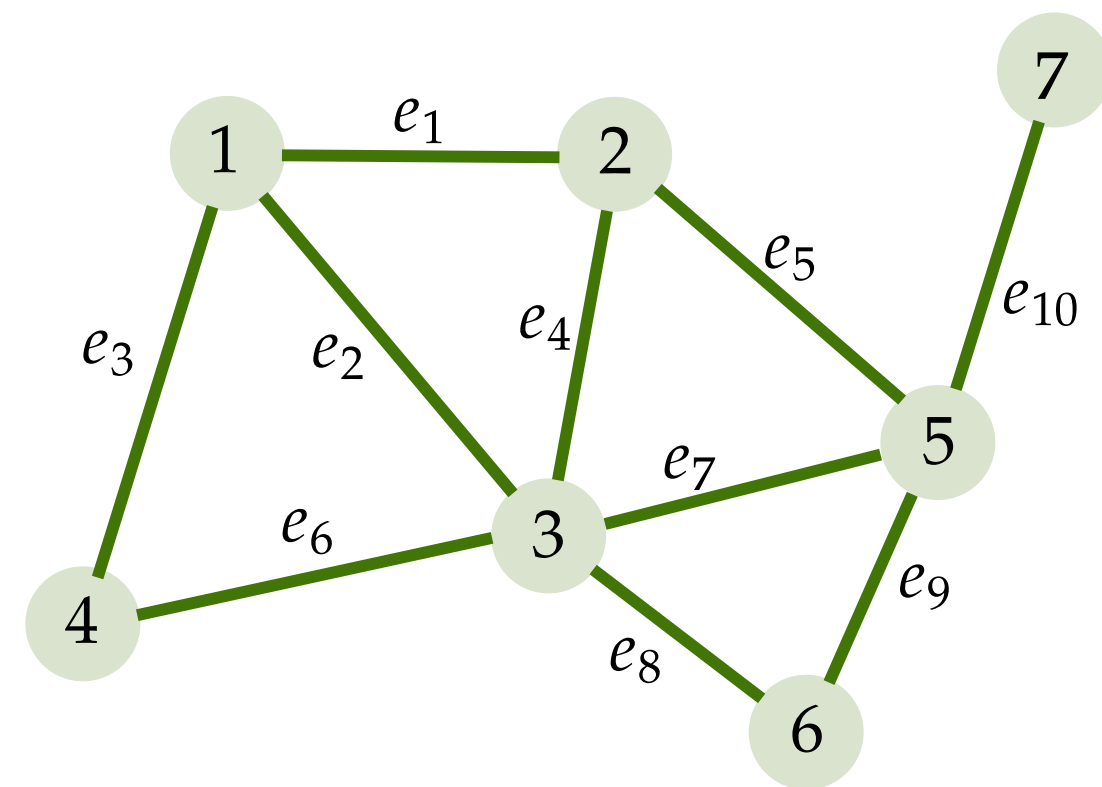
AISTATS 2024

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Graphs vs Simplicial 2-Complexes



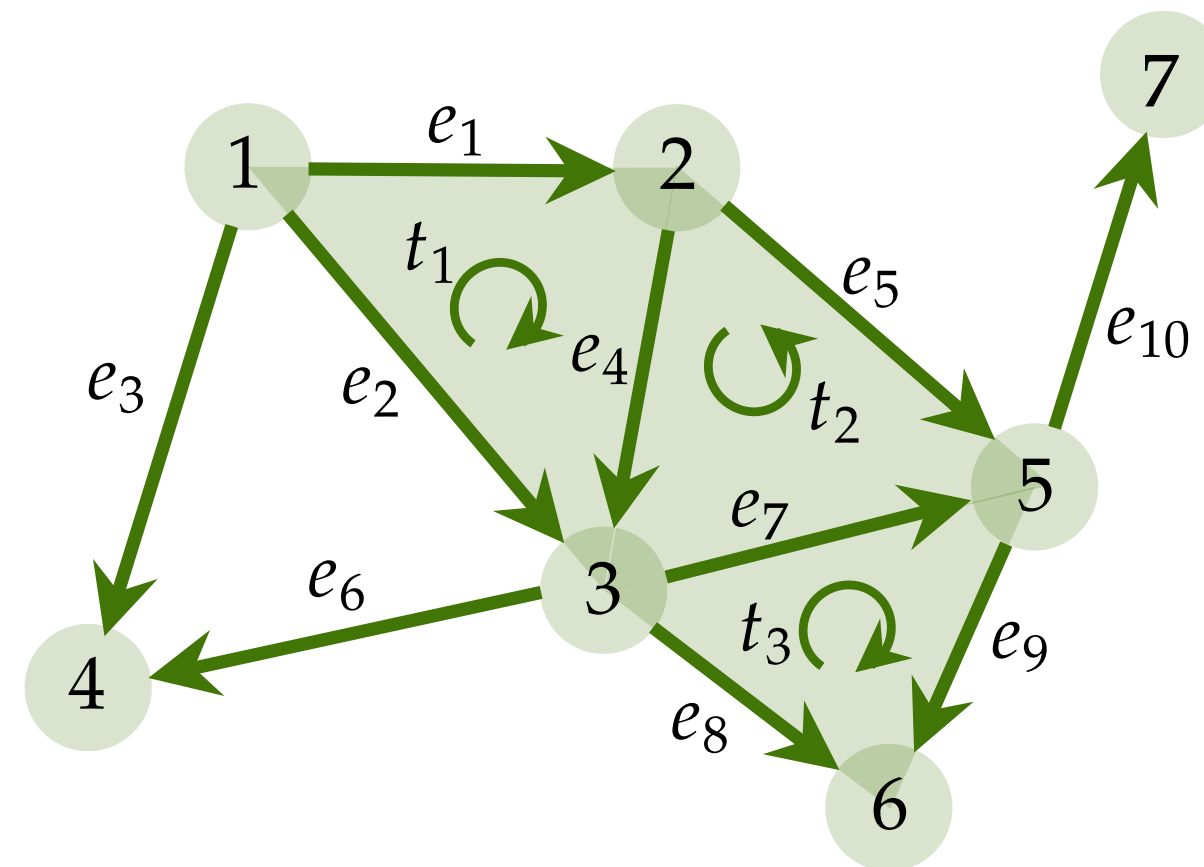
0-, 1-, 2-, 3-simplices



Graph

Simplicial 1-complex

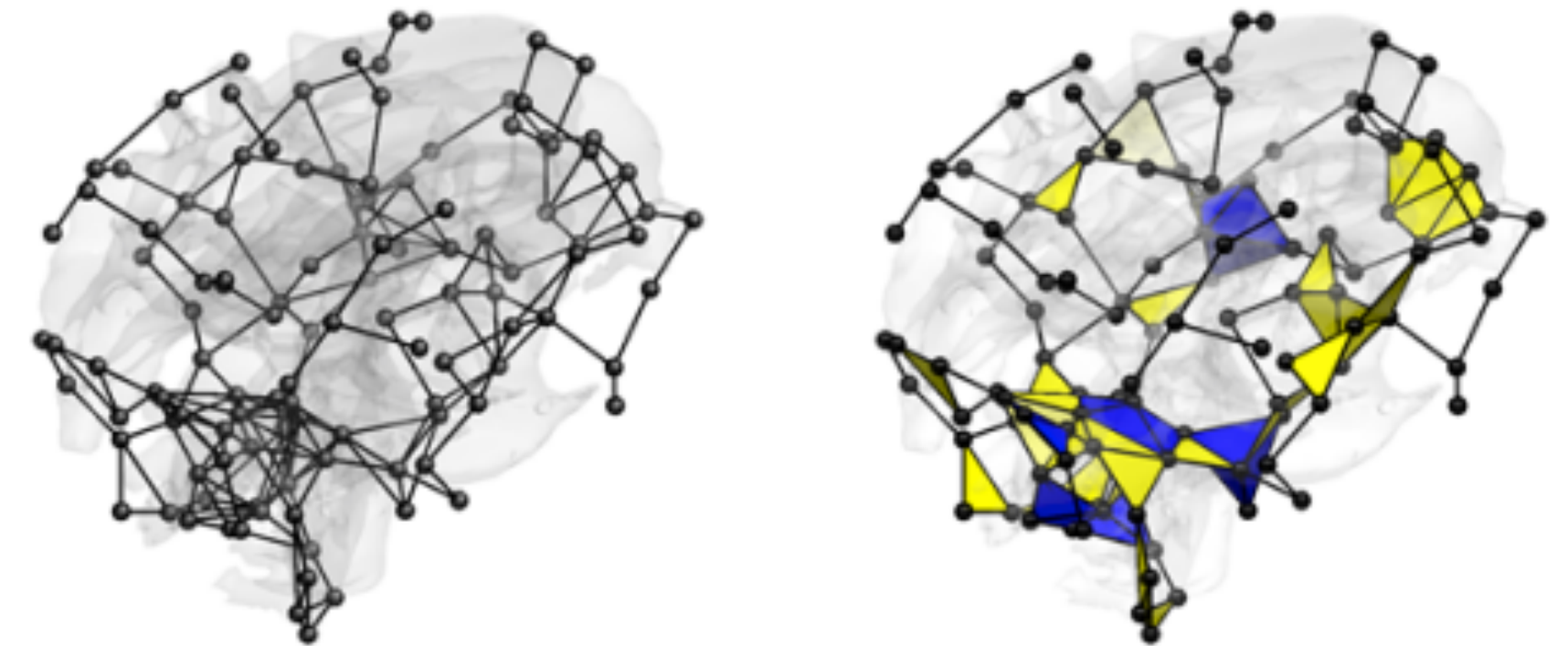
$$G = (V, E)$$



Simplicial 2-complex

$$SC_2 = (V, E, T)$$

- Oriented simplices (equivalence class of permutations)



Neuroscience (Anand et al. 2023):

1. Firing of neurons
2. Activation of multiple brain regions

- Network analysis
- Topological data analysis
- Topological signal processing
- Topological deep learning