Topological Schrödinger Bridge Matching

- A rigo formulation of topological SBP
- Investigating optimal TSBP solutions (Gaussian and general cases)
  - Stochastic optimal control on topological domains
  - (Dynamic) optimal transport
- TSB-based learning models
  - Unifies score-matching (diffusion-based), flow-matching (ODE-based) …
  - For generative and matching purposes
  - …. some discussions on possible directions based on energy interpretations

Overview

Convolution

- Simplicial Fourier transform, Frequency, Fourier basis
- Signal variations
- Convolutional filters
- Generalizes graph convolutions

Gaussian Process

- How to define GPs for different parts?
- Hodge-compositional idea

Hodge decomposition

Convolutional NNs

- Architecture (attention, message passing)
- Robustness
- Higher-order link predictions
- Generalizes GCNs, etc.

Generative learning

- (Dynamic) optimal transport (Schrödinger bridge) on SCs
- Gaussian bridge
- Generative models: diffusion, flow models on SCs