Topological Schrödinger Bridge Matching

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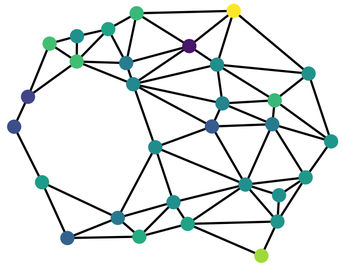
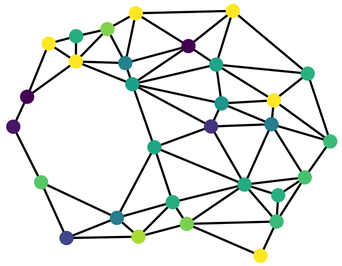
Topological signal distribution matching

- In a topological domain, e.g., a graph, signals on the node set.
- Given (empirical) signal distributions, $X_0 \sim \rho_0$ at $t = 0$ and $X_1 \sim \rho_1$ at $t = 1$



(unknown) stochastic process

$X := (X_t)_{0 \le t \le 1} \sim \mathbb{P}$



- Assume some *prior (reference)* process $Y \sim \mathbb{Q}_{\mathcal{T}}$ —— topology-aware

Topological Schrödinger Bridge Problem

$$\min D_{KL}(\mathbb{P} \| \mathbb{Q}_{\mathcal{T}}) \; s.t. \; \mathbb{P}_0 = \rho_0, \mathbb{P}_1 = \rho_1$$