0.1 Graph Symmetrization

The segment similarity graph is constructed as a weighted k-nearest neighbor graph based on cosine similarity. Since the k-nearest neighbor relation is not necessarily symmetric, the raw adjacency matrix A_{raw} is symmetrized according to

$$A_{ij} = \max(A_{\text{raw},ij}, A_{\text{raw},ji}) \,.$$

This symmetrization ensures that the resulting adjacency matrix is symmetric, allowing it to be interpreted as a Hermitian Hamiltonian with real eigenvalues in subsequent quantum walk simulations.