Supporting Text

Description of Steps in Spectral Reordering of Correlation Matrices

Note that these steps are described in detail and are justified in "A spectral algorithm for envolope reduction of sparse matrices" (1).

Let the input to the spectral reordering be called **B**, of size *NxN*.

- Compute **C = B+1** to ensure every element in **C** is positive.
- Compute **Q** of size *NxN* such that

$$q_{ij} = \begin{cases} -c_{ij} & i \neq j \\ -\sum_{j=1, j\neq i}^{N} q_{ij} & i = j \end{cases}$$

- Compute a matrix **t** of size *NxN* such that

$$t_{ij} = \begin{cases} 0 \\ \dfrac{1}{\sqrt{\sum_{i=1}^{N} C_{ij}}} \end{cases}$$

- Compute **D** such that **D = t Q t**.
- Compute the eigenvector **v** associated with the second smallest eigenvalue of **D**.
- Scale **v** by computing **v2** = **t v**.
- Sort **v2** in ascending order inducing a permutation vector **p**.
- Reorder the nodes in the original matrix **B** according to **p**.

1. Barnard, S.T., Pothen, A., & Simon, H.D. (1995) *Numer. Linear Algebra Appl.* **2,** 317-334.