

DATA.STAT.770 Dimensionality Reduction and Visualization
Exercise set 14 Solutions

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Problem H2: Kamada-Kawai algorithm versus Sammon's Mapping

Sammon's Mapping equals :

$$\sigma r = \sum_{i < j} (p_{ij} - d_{ij}(x))^2 / p_{ij}$$

And Kamada Kawai Method cost function is given by:

$$\text{Cost} = \sum_{i=1}^{n-1} \sum_{j=i+1}^n (1/2) k_{ij} (||y_i - y_j|| - l_{ij})^2 \quad \text{where } l_{ij} = L \cdot d_{ij} \quad \text{and} \quad k_{ij} = K / d_{ij}^2$$

Similarities

- Both methods emphasize the importance of small distances.
- They compare the difference of distances in original space and projected space.

Differences

- Sammon mapping focusses on the small distances in the projection space while K-K method on the small distances in the original space. Thus, Sammon mapping achieves good precision and K-K method achieves good recall.
- K-K method uses squared distance. In some sense, shorter distances in K-K method are more important than those in Sammon mapping.
- K-K method has a parameter K , which can be adjusted to reflect how important the small distances are.