

# Dimension Reduction Exercise

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## Task 3: Explore t-SNE and Barnes-Hut t-SNE

Apply t-SNE or Barnes-Hut t-SNE to the quantitative variables in the iris data (you can take the R help as a starting point).

Play with different perplexities.

## Task 4: Co-ranking matrix

This is a pen-and-paper task. In the original data space, four  $p$ -dimensional objects have the distance matrix

$$D = \begin{pmatrix} 0 & 10 & 2 & 3 \\ 10 & 0 & 4 & 2 \\ 2 & 4 & 0 & 5 \\ 3 & 2 & 5 & 0 \end{pmatrix};$$

these have been mapped into 2-dimensional space and have the following distance matrix in that space:

$$\widetilde{D} = \begin{pmatrix} 0 & 10.00 & 5.14 & 5.80 \\ 10.00 & 0 & 6.12 & 5.26 \\ 5.14 & 6.12 & 0 & 5.01 \\ 5.80 & 5.26 & 5.01 & 0 \end{pmatrix}.$$

Determine the  $3 \times 3$  coranking matrix  $\mathbf{Q}$  between the original data and their mapping.