

Correspondence analysis and redundancy analysis

Class work:

In this class we are going to explore correspondence analysis and redundancy analysis. There are **four** possible problems of which **you should solve two**.

1. Reciprocal averaging algorithm

Write a reciprocal averaging algorithm following Hill (1973).

Hint: make sure you always rescale site scores to $\in [0,1]$ (or $\in [0,100]$). This is done as follows:

$$x_{i,transf} = \frac{x_i - \min(x)}{\max(x) - \min(x)}$$

Compare your species and site scores to the species and site scores obtained using *cca* (*vegan*)

2. Apply CA to the arctic pollen data

Arctic pollen data used by Frechette et al. (2008) is available in the *palaeoSig* package and called *arctic.pollen* (*data(arctic.pollen)*)

Run CA using function *cca* (*vegan*-package). Use square root transformed pollen data.

Make a screeplot and determine explained variances.

Plot CA axes 1 and 2 (try different types of scalings, see help function for details)

Describe the CA joint plot.

Is there an arch?

Add an ordination surface for July temperature (function *ordisurf*, *data(arctic.env)*)

If there is an arch, plot CA axes 3 and 2 and add an ordination surface for July temperature.

3 Write an own redundancy analysis function

You can use function *lm*, *res* for regression and *rda* (*vegan*) or *cov* and *eigen* for ordination.

Compare your results to results obtained by *rda(y~env)*

4 Apply redundancy analysis to a pollen record from southern Norway

Load pollen and reconstructed temperature and annual precipitation from a site in southern Norway (data in data folder in Wk7.. folder on GitHub).

Constrain the pollen square root transformed pollen record with July temperature and mean annual precipitation individually and jointly.

Look at variances explained by RDA and PCA axes.

Make a tri-plot of the RDA using both July temperature and mean annual precipitation as constraints.

Describe the tri-plot. Add ordination surfaces of July temperature and mean annual precipitation