The Mantel Test

30

$$SS_X = \sum_{i=1}^{N}\sum_{j=1}^{N}(x_{ij} - \bar{x})^2$$

$$SS_{\mathrm{Y}} = \sum_{i=1}^{N} \sum_{j=1}^{N} (y_{ij} - \bar{y})^2$$

$$\bar{x} = \frac{\sum_{i=1}^{N} \sum_{j=1}^{N} x_{ij}}{N(N-1)}$$

$$\bar{y} = \frac{\sum_{i=1}^{N} \sum_{j=1}^{N} y_{ij}}{N(N-1)}$$

$$SS_{XY} = Z - N\bar{x}\bar{y}$$

$$\rho = \frac{SS_{XY}}{\sqrt{SS_X}\sqrt{SS_Y}}$$

The Mantel Test

$$SS_X = \sum_{i=1}^{N}\sum_{j=1}^{N}(x_{ij} - \bar{x})^2 \qquad SS_Y = \sum_{i=1}^{N}\sum_{j=1}^{N}(y_{ij} - \bar{y})^2$$

$$\bar{x} = \frac{\sum_{i=1}^{N}\sum_{j=1}^{N} x_{ij}}{N(N-1)} \qquad \bar{y} = \frac{\sum_{i=1}^{N}\sum_{j=1}^{N} y_{ij}}{N(N-1)}$$

$$SS_{XY} = Z - N\bar{x}\bar{y}$$

$$\rho = \frac{SS_{XY}}{\sqrt{SS_X}\sqrt{SS_Y}}$$

The Mantel Test

```
require(vegan)
mantel( as.dist(D1), as.dist(D2), permutations=9999 )
##
## Mantel statistic based on Pearson's product-moment correlation
##
## Call:
## mantel(xdis = as.dist(D1), ydis = as.dist(D2), permutations = 9999)
##
## Mantel statistic r: 0.9373
##       Significance: 1e-04
##
## Upper quantiles of permutations (null model):
##    90%    95%  97.5%    99%
## 0.0707 0.0940 0.1154 0.1373
## Permutation: free
## Number of permutations: 9999
```