

## Spatial Correlation

Prepared by Yosef Bodovski

**Definition:** Spatial Correlation is a measure of the tendency for places that are near to each other to have more similar (positive correlation) or dissimilar (negative correlation) values of their statistics.

### Software:

The software package that can be used for spatial correlation calculations is SADA (Spatial Analysis and Decision Assistance) developed in the University of Tennessee. SADA characterizes spatial correlation through the use of the semi-variogram model, which provides a measure of variance as a function of distance between data points. This measure is defined as half of the average squared difference between two values separated by vector  $\mathbf{h}$ :

$$\gamma(\mathbf{h}) = \frac{1}{2N(\mathbf{h})} \sum_{i=1}^{N(\mathbf{h})} (x_i - y_i)^2$$

where  $N(\mathbf{h})$  is the number of pairs separated by vector  $\mathbf{h}$ ,  $x_i$  is the starting point (tail) and  $y_i$  is the ending point (head).

### Application:

Spatial Correlation is used in various research studies. In physical geography it can be used to analyze elevation or climate data. In social sciences it is used to find clusters of areas similar by their social or economic characteristics. One of the successful examples of spatial correlation analysis is State Income Growth research made by Federal Reserve Bank.

### References/Sources:

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- Kelejian, Harry H. and Dennis P. Robinson. 1995. Spatial Correlation: A Suggested Alternative to the Autoregressive Model. *New directions in spatial econometrics*. Springer: New York.
- Marsh, T., R. Mittelhammer and R. Huffaker. 1997. Spatial correlation in applied econometric models: A generalized model with an application to potato production. *American Journal of Agricultural Economics*, 79(5):1704-1704.
- SADA (Spatial Analysis and Decision Assistance) home page: <http://www.tiem.utk.edu/~sada/>