Three-Dimensional Spatial Association Measures

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Introduction

The use of two dimensions is common when calculating measures of spatial association, however, the inclusion of a third dimension (altitude or depth) can provide more complete information when evaluating spatial relationships. This work exposes the possible effects on the measures of spatial association with the inclusion of a third dimension in the calculation of Euclidean distances.

Methods

Data Origin

Discussion and Conclusions

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<th>(d_{2d}^2)</th>
<th>(l)</th>
<th>(Z_i)</th>
<th>(w_{Xj})</th>
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Conclusions

• Introducing the third dimension in the distance measures has effects on the spatial weight matrix in the calculation of spatial association measures such as Moran's Local I.
• In some specific cases of variables, a third dimension plays the role of a covariate and should not be considered as an element for calculating distances.

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References

• Lovelace, R. and others. (2015). Introduction to Visualizing Spatial Data in R. Recovered from: [https://cran.r-project.org/]

\(d_{3d}^2 = x^2 + y^2 + z^2\)

\(d_{2d}^2 = x^2 + y^2\)

\[l = \frac{\sum w_{ij}(y_i - y)(y_j - y)}{\sum (y_i - y)^2}\]

\[Y_i = \frac{\sum w_{ij}(y_i - y)(y_j - y)}{\sum (y_i - y)^2}\]