



CPS Poster

Three-Dimensional Spatial Association Measures

Author: Prof. Carlos Alfonso Mantilla Duarte

Coauthors: Prof. José M. Angulo

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Presentation Image



Three-Dimensional Spatial Association Measures

Carlos Mantilla Duarte^{a,b} - José M. Angulo^b

a. Universidad Industrial de Santander, Bucaramanga, Colombia
 b. Universidad de Granada, Granada, Spain

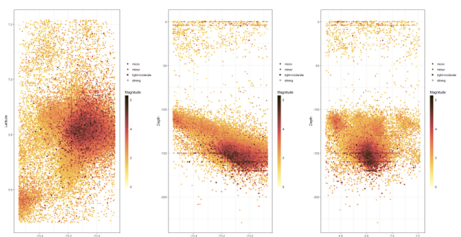
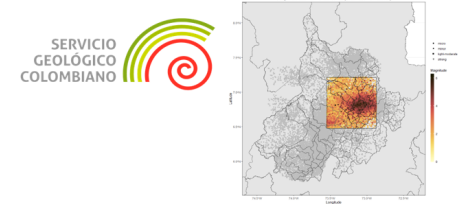


Introduction

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



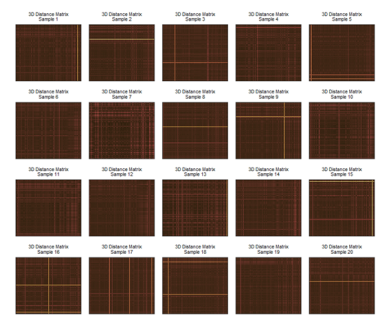
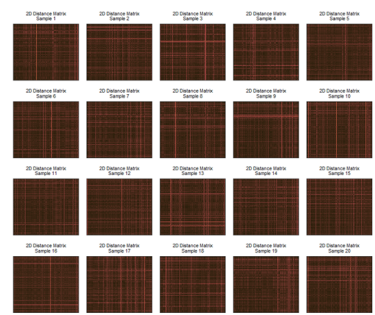
$$d_{2d}^2 = x^2 + y^2$$

$$d_{3d}^2 = x^2 + y^2 + z^2$$

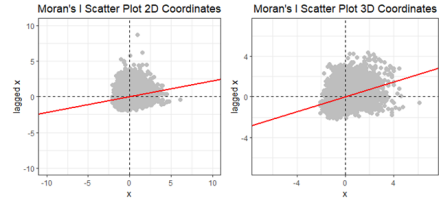
$$I = \frac{\sum \sum w_{ij} (y_i - \bar{y})(y_j - \bar{y})}{\sum (y_i - \bar{y})^2}$$

$$I_i = \frac{(y_i - \bar{y}) \sum w_{ij} (y_j - \bar{y})}{\sum (y_i - \bar{y})^2}$$

Results



Discussion and Conclusions



Moran's I Local (2D)

ID	li	Ei	Vi	Zi	p-value	Xi	wXi
1	1.402350	-0.000400	1.998148	0.992354	0.321025	0.958886	0.571326
2	-1.656243	-0.000400	1.998148	-1.171400	0.241438	0.958886	-1.074154
3	1.087660	-0.000400	2.997221	0.628252	0.529839	-0.711594	0.649682
4	5.820550	-0.000400	1.998148	4.117941	0.000038	2.173781	1.198176
5	0.164069	-0.000400	1.998148	0.116351	0.907374	-1.04147	-0.995797
6	2.030702	-0.000600	2.997221	1.173316	0.240669	0.958886	2.530231

Moran's I Local (3D)

ID	li	Ei	Vi	Zi	p-value	Xi	wXi
1	1.111056	-0.000400	1.998148	0.786282	0.431702	0.958886	0.708225
2	-1.073654	-0.000400	1.998148	-0.759256	0.447699	0.958886	-0.692610
3	-0.716435	-0.000400	1.998148	-0.506547	0.612472	-0.711594	0.614836
4	2.518747	-0.000400	1.998148	1.782132	0.074728	2.173781	0.708225
5	-0.073217	-0.000400	1.998148	-0.051513	0.958917	-1.04147	0.428058
6	1.547998	-0.000400	1.998148	1.095390	0.273346	0.958886	0.986392

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.

Acknowledgement:

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References

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Presentation File

ISI - International Statistical Institute
 Permanent Office, P.O. Box 24078, 2450 AB The Hague, The Netherlands
info@isi2023.org

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Brief Description

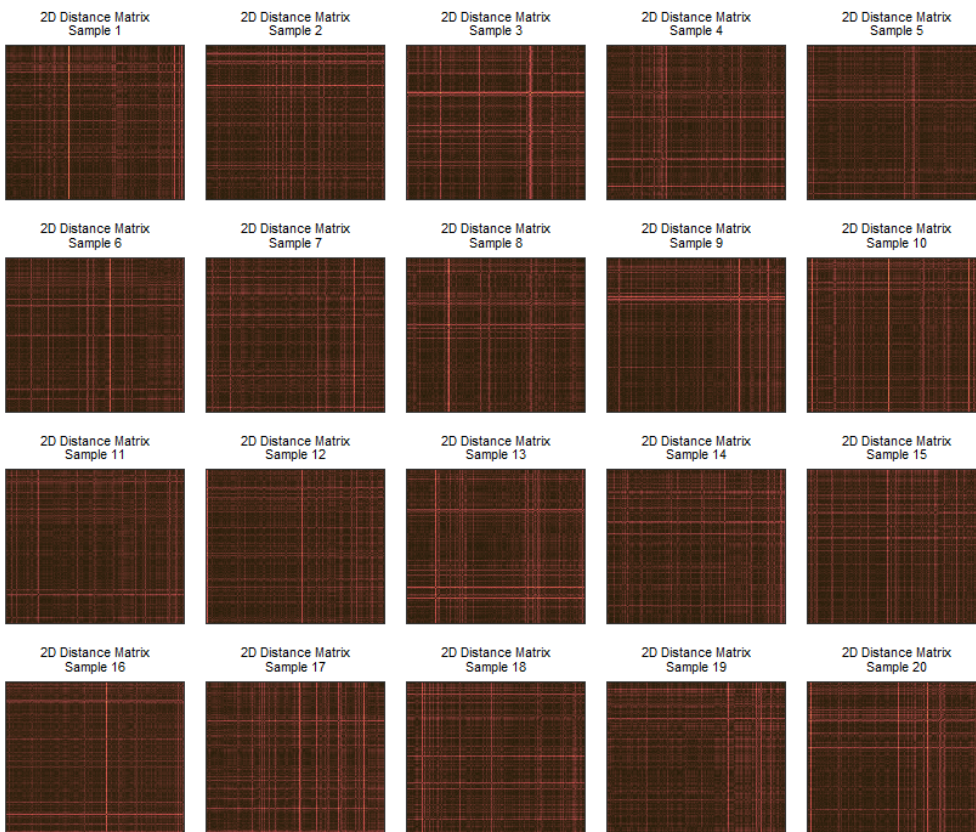
This session shows: the source of the data, the effects of including a third dimension in the distance measures and the effects on some special association measures such as Morán's I

Abstract

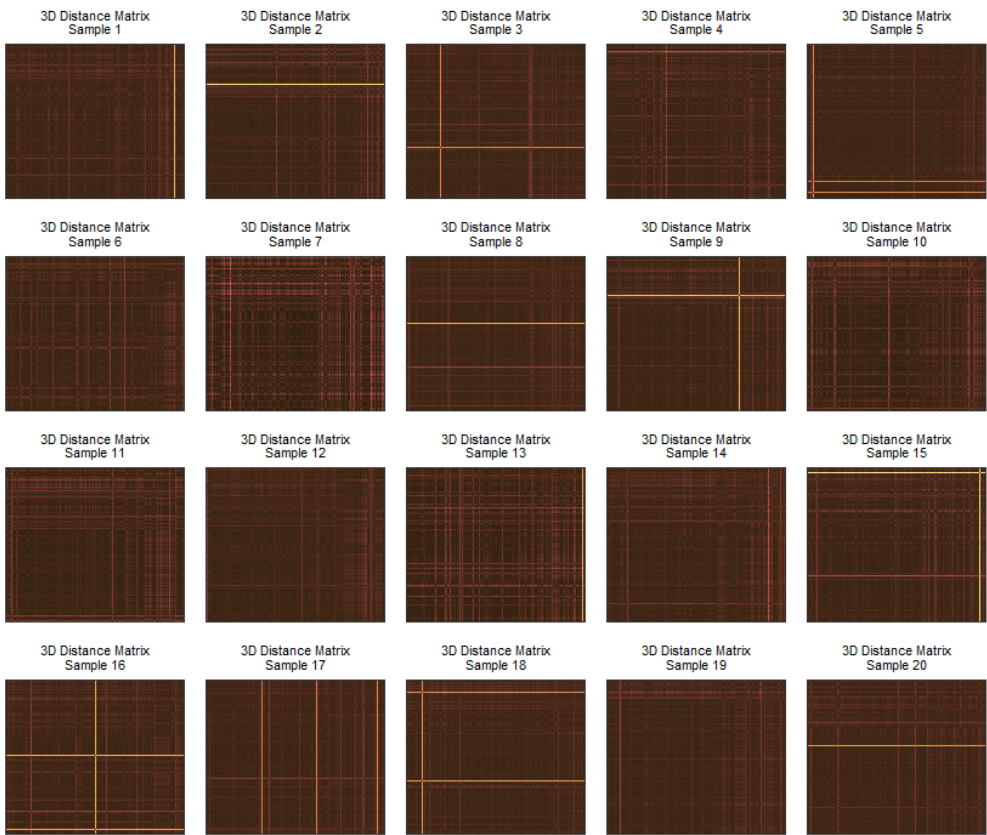
The use of two dimensions is common when calculating measures of spatial association, however, the inclusion of a third dimension (altitude or depth) can provide more complete information when evaluating spatial relationships. This work exposes the possible effects on the measures of spatial association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

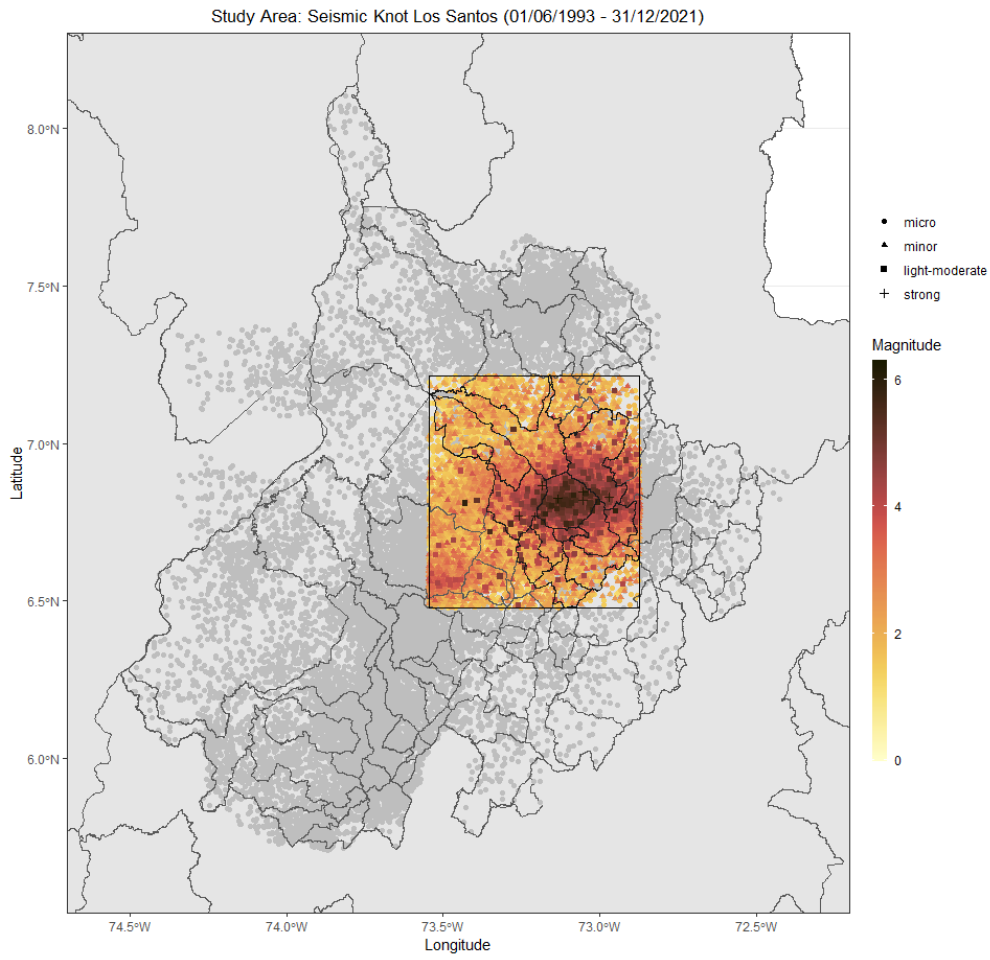
Figures/Tables

Distance2d_MatrixPlot



Distance3d_MatrixPlot





16Los_Santos_byCoords

