Motivation

Urban development has accelerated across the globe in recent decades. Much new urbanization has not been concentrated in cities, but has occurred as dispersed, low density development outside of major centers but within their area of economic influence. Province of Seville (Spain) has experienced notable urban expansion in recent years and is subject of the case study.

- In Seville (and Spain) urban expansion has been especially acute since the restoration of democracy.
- The speed of development slowed down during the 2008 crisis.

Map of Seville

- The territory is represented by a regular grid of cells
- We classify cells into two major categories:
  1 – urban land,
  0 – non-urban land (vegetation, wetlands, agricultural land and water)

Statistical analysis and preliminary results

- Multiple regression of population density in the cell based on the type of land use in this cell, the type of the land use in the neighboring cells and economic indicators
- Cross validation in each municipality to verify significance of detected relationship between land use and economic development
- Spatial autocorrelation analysis. Spatial data has the tendency to be dependent. Characteristics at proximal locations are more similar than expected for randomly associated pairs of observations, which leads to unstable parameter estimates.

Regression residuals exhibit significant spatial autocorrelation overall and in most municipalities, e.g. in Dos Hermanas municipality with 107 thousand inhabitants.

Future Work

- Removing spatial autocorrelation, if necessary this can be accomplished through rigorous analysis at the municipal level
- Projecting land-use patterns based on economic indicators (solving the inverse problem)

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