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Overview

- Motivation
- Spatial dependence, spatial heterogeneity, and time
- Exploratory Spatial Data Analysis
- Spatial-Interaction (SI) modeling concepts
- Exploratory methods for transaction data
- Invitation for demonstrations

Motivation

- Interested in space-time dependence
  - stock (variable on a map)
  - flows (interactions on a map)

- Visual, exploratory, and modeling approaches

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Spatial dependence, spatial heterogeneity, and time

• Spatial dependence: \( y_i = f(y_j), i=1,...,n \text{ and } i \neq j \)
  - frame dependence (MAUP)
  - spatial process

• Spatial heterogeneity: \( y_i = x_i \beta_i + c_i \)
  - specification issue

• W matrix
  \( y^* = Wy \)
  \( y = \rho Wy + e \)
  \( y = \rho Wy + X\beta + e \)

Exploratory Spatial Data Analysis (ESDA→GeoDA)

• GeoDA features
  - local and global Moran’s I and Multivariate Moran’s I
  - parallel coordinate plots
  - scatterplot matrices
  - conditional plots
  - map movies
  - basic GIS functionality
  - !! directly reads ArcView shape files !!

• GeoDA Demonstration
Spatial-Interaction (SI) modeling concepts

- Complexity of ODT interactions
- Information use in traditional modeling approaches
- Regions: spatial regularities
- Epochs: temporal regularities
- Ideally link regionalization, flow visualization, model fitting, and evaluation.

Spatial-Interaction (SI) modeling concepts (cont.)

parameter/information sets

\[
\begin{array}{ccc}
OD & O & X_{(ik)} \\
D & & \\
X_{(jk)} & & \\
\end{array}
\]

multiplicative models

\[
\hat{n}_{ij} = \tau_i^O \tau_j^D 1
\]

\[
n_{ij} = \hat{n}_{ij} = \tau_i^O \tau_j^D \tau_{ij}^{OD}
\]

constrained model:

\[
n_{ij} = \tau_i^O \tau_j^D \tau_{ij}^{OD}
\]

where subset of \( \tau_{ij}^{OD} \) are not equal to 1

Flow Mapper Software

Welcome to Flow Mapper

This version produced with the assistance of The Center for Spatially Integrated Social Science (CSISS), a National Science Foundation funded project at the Geography Department of the University of California, Santa Barbara, California

To start you will need to load place categories and an interaction table. You may also load an outline map as the base of one or more polygons, and a file of place names. See the Quick Start Guide in the Help documentation installed with the application to start.

Parameters: [minmax] [maxval] [type]

Program conceived by Walter Tobler, design & programming by David Jones

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