For a Cautious Use of Big Data and Computation

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Session Geocomputation : The Next 20 years

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Computational power : exponential capabilities

[Gleyze, 2005] : urban network analyses, concludes that “limited by computation”
$\rightarrow$ 10 years later : [Lagesse, 2015] !

First Simpop models [Sanders et al., 1997] “calibrated” by hand
$\rightarrow$ today Simpoplocal [Schmitt et al., 2014] and
Marius [Cottineau et al., 2015] calibrated on grid, billions of simulations !

Space syntax : from [] to

New and Big Data

Mobility studied through various type of data : new data from transportation systems [], from Social Networks , other types
Opening of "classic" dataset will allow ever more meta-analyses

But to what purpose ?

[Barthelemy et al., 2013]

SCIENTIFIC REPORTS

OPEN

SUBJECT AREAS:
PHYSICS
STATISTICAL PHYSICS,
THERMODYNAMICS AND

Self-organization versus top-down planning in the evolution of a city

Marc Barthelemy[1,2], Patricia Bordin[3,4], Henri Berestycki[2] & Maurizio Gribaudi[5]

But to what purpose ?

Theories and Computation

Case study : Context and Rationale

Dataset construction

Locally stationary spatial correlations

$Y_i\,[\vec{x}, t]$ spatio-temporal stochastic process, assumptions :

1. Local spatial autocorrelation is present and bounded by l_ρ (in other words the processes are continuous in space) : at any $\vec{x}$ and t, $\left|\rho_{\|\Delta\vec{x}\|<l_\rho}\left[Y_i(\vec{x}+\Delta\vec{x}, t), Y_i(\vec{x}, t)\right]\right| > 0$.
2. Processes are locally parametrized : $Y_i = Y_i\,[\alpha_i]$, where $\alpha_i(\vec{x})$ varies with l_α, with $l_\alpha \gg l_\rho$.
3. Spatial correlations between processes have a sense at an intermediate scale l such that $l_\alpha \gg l \gg l\rho$.
4. Processes covariance stationarity times scale as $\sqrt{l}$.
5. Local ergodicity is present at scale l and dynamics are locally chaotic.

Stationarity and Ergodicity

Results : Examples of indicators

Results : Examples of correlations

Results : Stationarity scales

Results : Stationarity scales

Case study : implications

Discussion

Is a theory-free quantitative geography possible ?

$\rightarrow$

Is a pure computational quantitative geography possible ?

$\rightarrow$

Conclusion

Reserve

Reserve Slides

Network Simplification Algorithm

Indicators

References I

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