Thesis Progress Meeting

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Current Projects

1. General Bibliography - Subject and Question precision.
2. Technical Tools : development of tools, getting started with others.
3. Algorithmic Systematic Review
4. Existing Model Quantitative Benchmarking
5. Theoretical Model Coupling
6. Control of meta-parameters through synthetic data
7. Governance
8. Scaling Sensitivity

Achieved Work (by projects)

- Technical Tools
  - OpenMole Workflow with NetLogo tasks, running on remote. [1w]
  - NetLogoDoc, tool to automatically generate elaborated documentation from NL code. [0.5w]
- General Bibliography. [0.3w]
- Algorithmic Systematic Review
  - Google Scholar API to check catalog validity and retrieve citing refs. [0.5w]
  - Short Paper for ECTQG. [0.3w]
- Synthetic Data Control : simple macro-model, calibrated through mrophological indicators on european density data. [0.5w]
- Governance : theoretical game-theory model, old implementation recoding. [0.5w]
- Scaling Sensitivity : theoretical derivation of phase diagram. [0.3w]

NetLogoDoc

→ Need for a systematic documentation of model, including internal implementation (generally not systematically vlidated). Filter transforming

NL code into intermediary java code, processed by `Doxygen`. Helps for architecture as analogy with classes has to be found (`.nls` correspond mainly to static classes in our convention).

TODO : release beta version for testing.

Algo SR

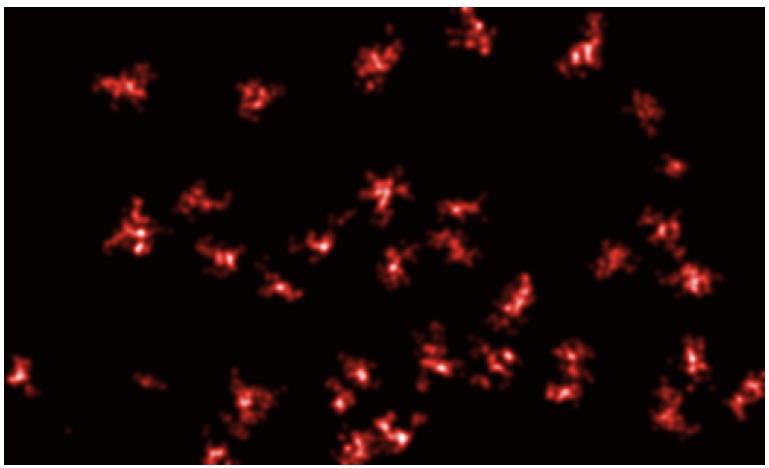
Scholar API allows to retrieve citing references (only this sense).

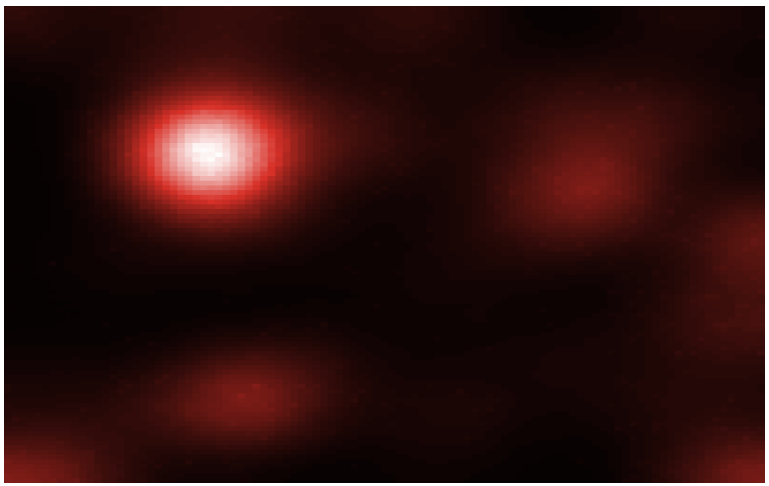
$\rightarrow$ External validation of classification results for corpuses obtained through langage processing through study of clustering coefficients for 1st order backward citation network.

TODO : compute clustering coefs, finish paper ECTQG.

Synthetic Data Control

Gibrat model, valid in first approximation [Favaro and Pumain, 2011], used to generate macro-distribution of densities - strongly coupled with an heterogeneous diffusion model to obtain spatially distributed "cities".





Synthetic Data Control

Currently being calibrated on real data (Greater Paris and London).

Identification of plausible parameter values, associated to different thematic regimes [Duranton, 1999]

$\rightarrow$ Generation of stochastic datasets of synthetic macro-distribution for densities, on which one can control e.g. the transition from "tyranny of distance" to "tyranny of land". Use of these controls to study behavior of morphogenesis models that take macro density profiles as exogeneous variables.

Governance

Original model in [Le Nechet, 2012] : LUTI model with the originality to have an evolving transportation network infrastructure, depending on a gouvernance structure.

Extension : test the effects of possible evolution of gouvernance structure (e.g. merge of communes). Can a polycentric metropolis emerge from the bottom-up ?

$\rightarrow$ Game-theory framework to express negociations between adjacent cities when building new infrastructures ; local rules for constructing and/or merging.

TODO : finish a functional implementation (to slow for now).
Abstract for ECTQG

Scaling

Based on [Arcaute et al., 2013], current work by C. Cottineau : phase diagrams of scaling parameter for different urban variables in the 2D space of morphological and functional threshold used to define boundaries of cities.

Q : Form of the phase diagram should contain structure of the urban system ? In particular relationship between form and function ?

Current Work : Formal derivation of the expression of the phase diagram for Gaussian Mixtures, to check if results are not structural.

TODO : Should be interesting to look at variation of phase diagram across varying geographical ragions (position and size), may confirm different mechanisms of systems of cities.

References I


Arcaute, E., Hatna, E., Ferguson, P., Youn, H., Johansson, A., and Batty, M. (2013).
Constructing cities, deconstructing scaling laws.
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Duranton, G. (1999).
Distance, land, and proximity: economic analysis and the evolution of cities.
Environment and Planning a, 31(12):2169–2188.


Favaro, J.-M. and Pumain, D. (2011).
Gibrat revisited: An urban growth model incorporating spatial interaction and innovation cycles.
Geographical Analysis, 43(3):261–286.

References II

Le Nechet, F. (2012).
Aménagement urbain et jeux d'échelles : construction à aménagement urbain et jeux d'échelles : construction à aménagement urbain et jeux d'échelles : construction à plusieurs niveaux d'un réseau de transport métropolitain.