Methods for the exploration of simulation models

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Research projects

Sensitivity analysis:

- Robustness of calibration algorithms to stochasticity
- Sensitivity of models to the spatial configuration

LUTI models:

- Testing Luti models against stylized facts
- Luti toy-model : the Lutecia model
- Analysis of scenarios

Robustness to stochasticity

How must a stochastic fitness be handled in GAs ? (number of repetitions, statistical robustness of the estimation, form of the Pareto front)

$\rightarrow$ OpenMOLE has developed its own original method based on dimension embedding

Objectives :

- More thorough benchmark of the evaluation strategy
- Study of unconventional noise landscapes, found in "real" models
- Test on different case studies

Sensitivity of spatial models

Sensitivity of models with a spatial component mostly ignore the effect of the spatial configuration

$\rightarrow$ How to control with synthetic configurations ?

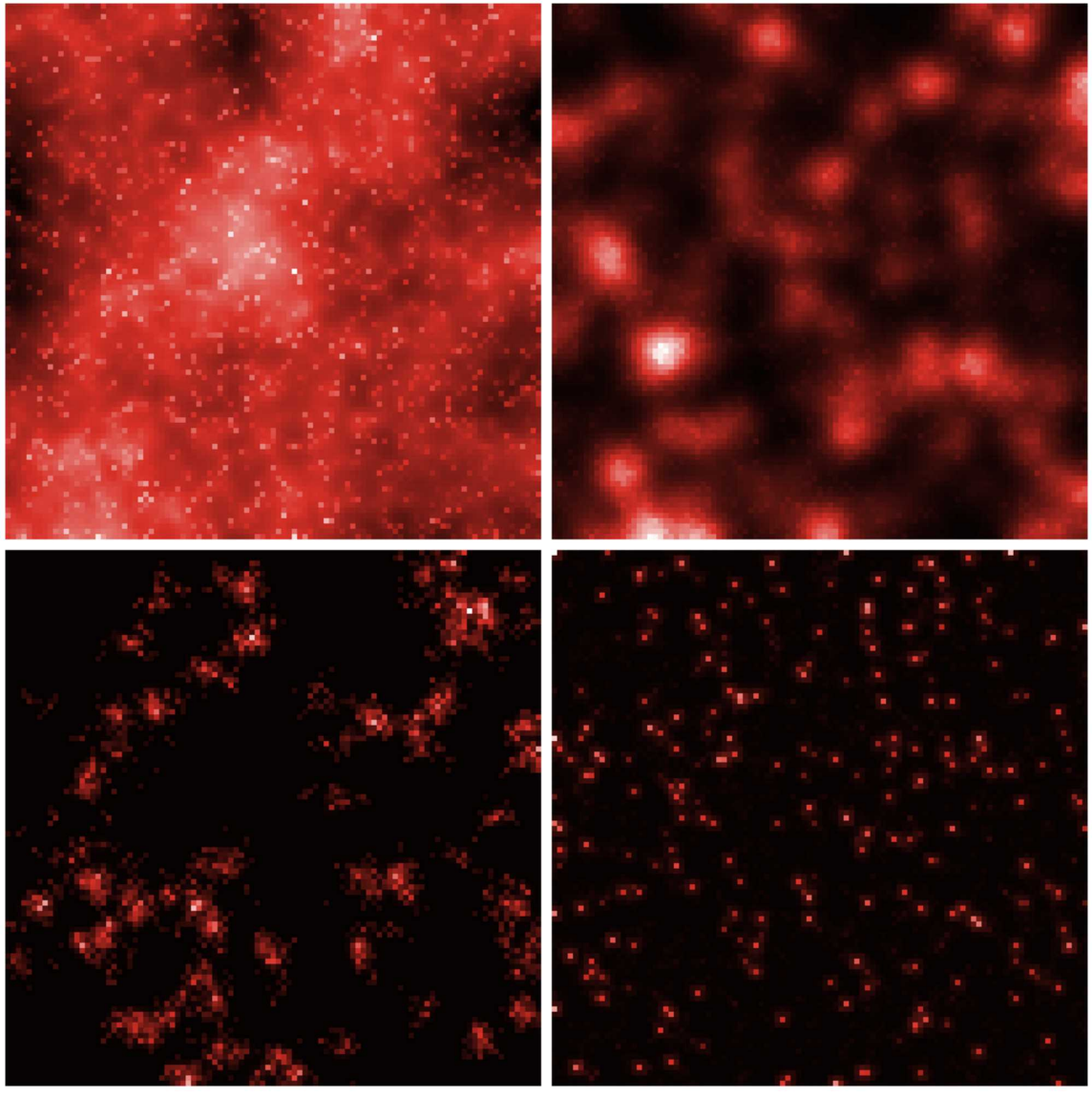
$\rightarrow$ How to test the sensitivity to missing data or spatial uncertainty ?

Objectives:

- Synthetic spatial configuration generators embedded into OpenMOLE (grid and networks)
- Perturbations of real geographical data
- Associated methods and measures

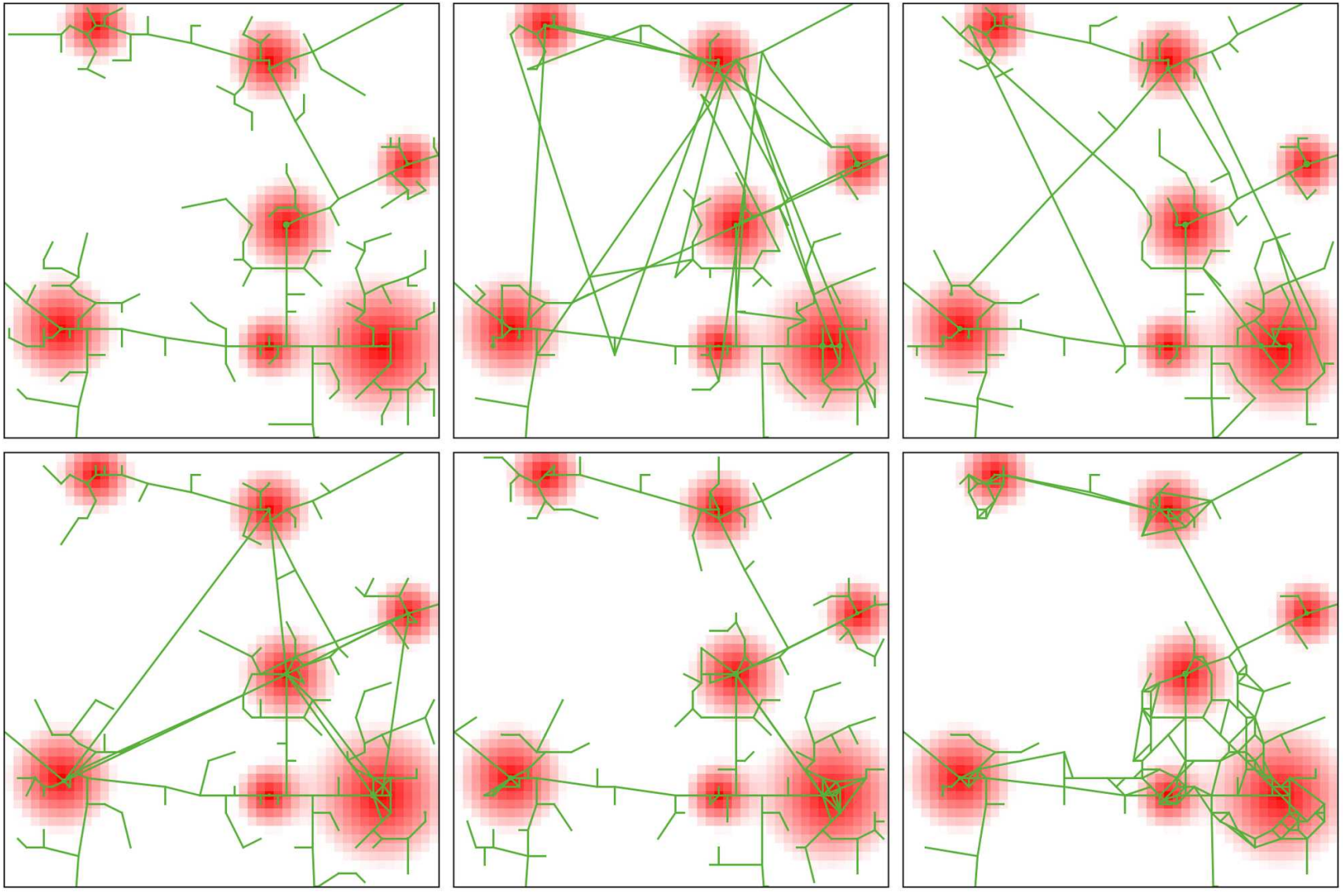
Sensitivity of spatial models

Generation of spatial population grids [Cottineau et al., 2017] [Raimbault, 2018a



Sensitivity of spatial models

Generation of road network by multimodeling [Raimbault, 2018b]



Stylized facts in Luti models

How to validate a Luti model ?

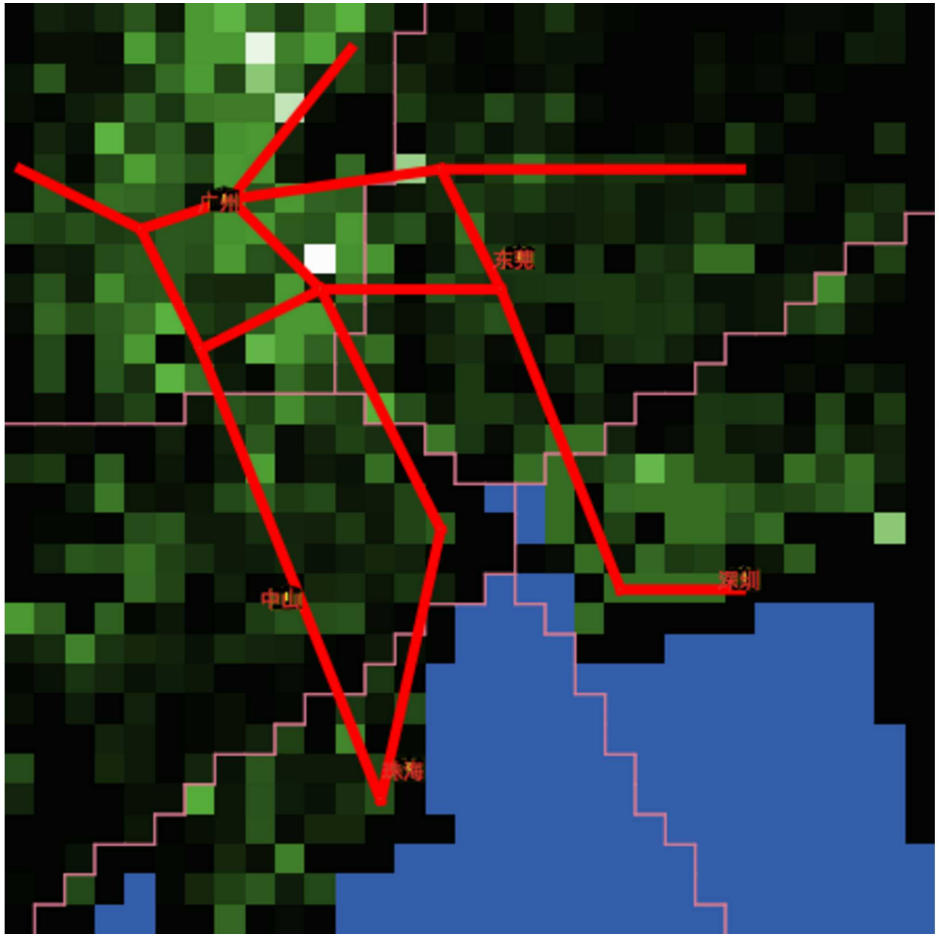
$\rightarrow$ Development of a generic method to test the validity of a model against stylized facts (Guillaume)

$\rightarrow$ List of stylized facts for Luti models from the literature (cf A. Bonnafous: *Is the model better than nothing ?* : very difficult constraint !)

Luti toy model

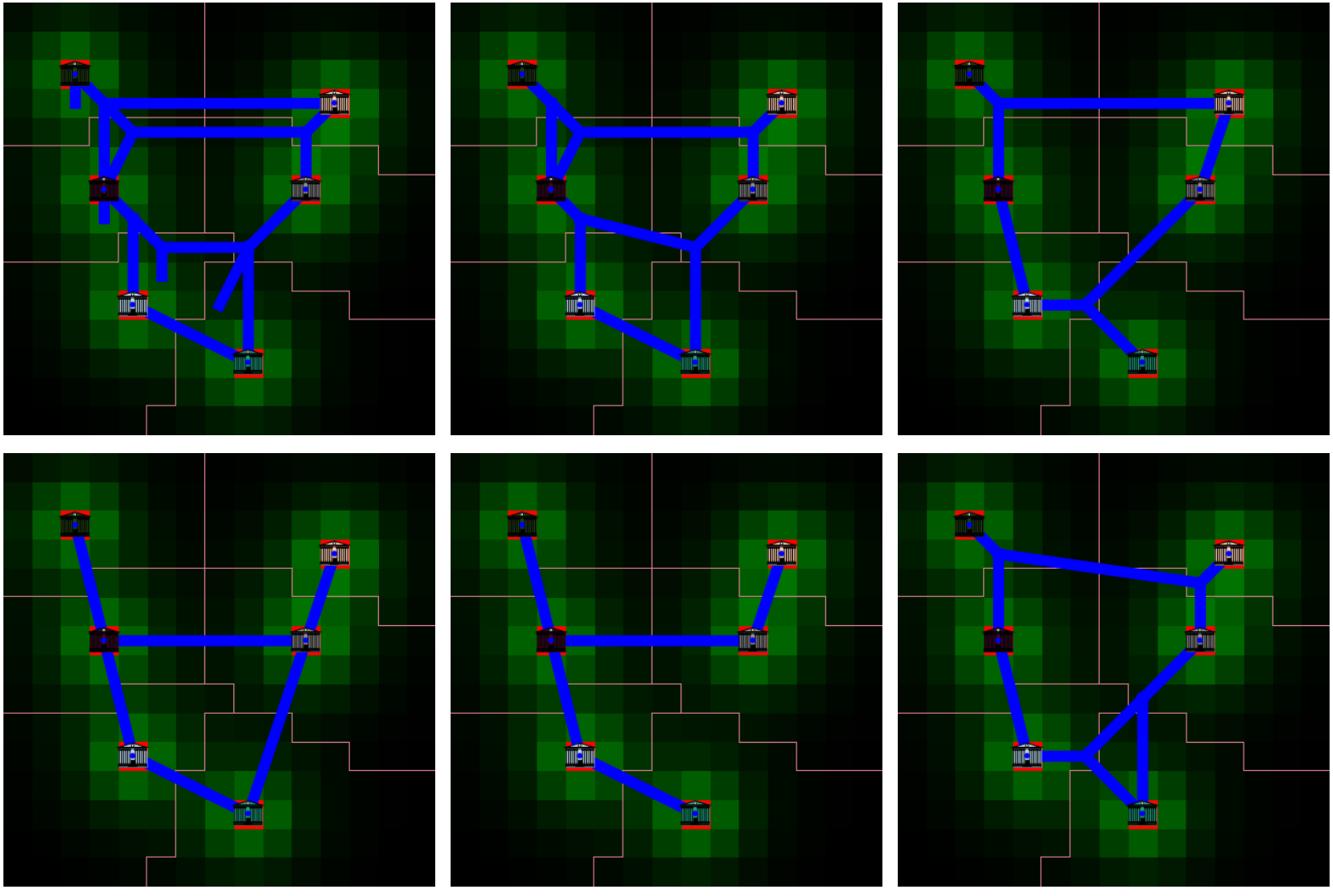
The Lutecia model [Le Néchet and Raimbault, 2015]: coupling a Luti with endogenous transportation growth to model the co-evolution of networks and territories

→ Redevelopment in scala as a toy model for the test of methods



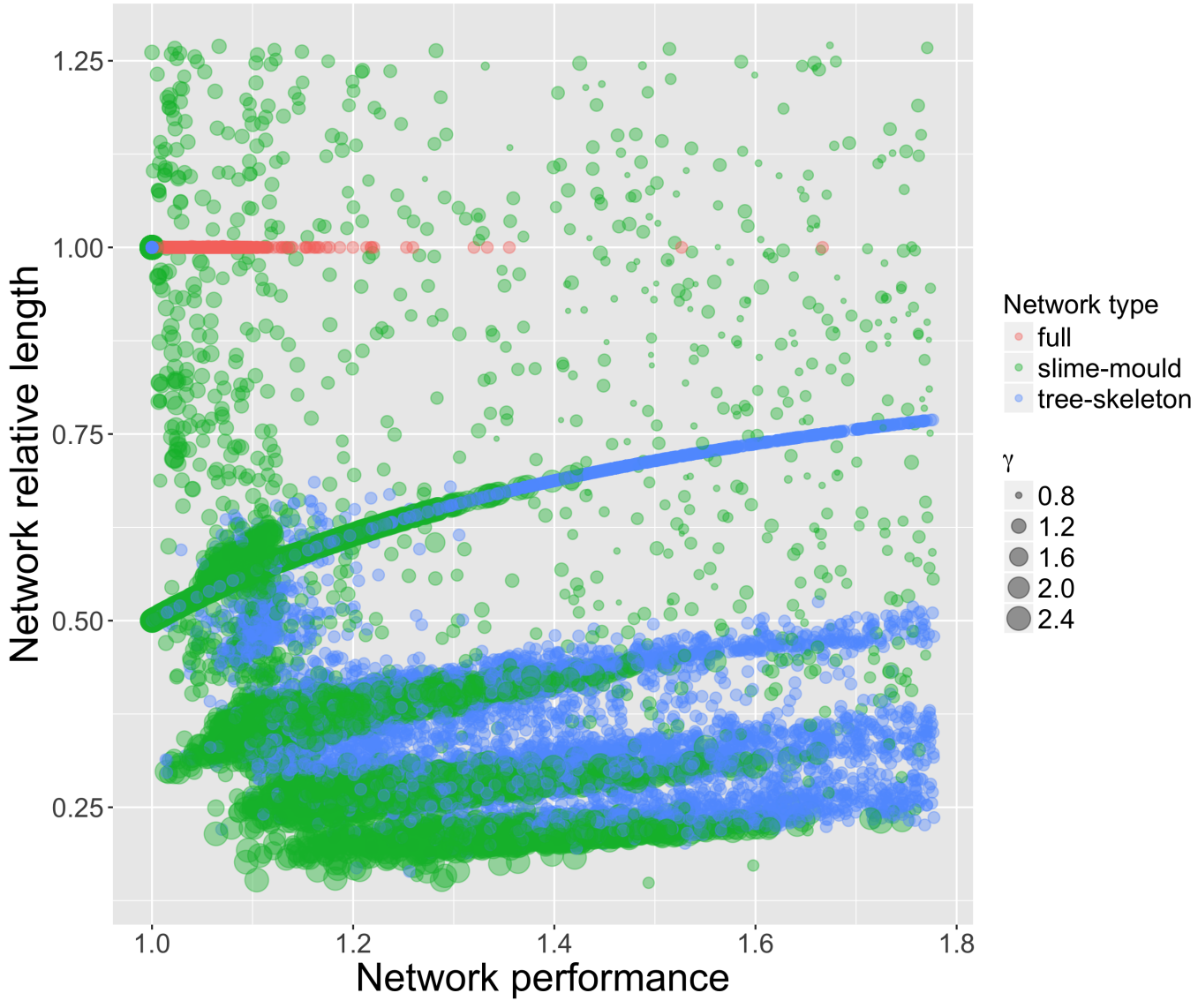
Analysis of scenarios

Comparison of scenarios for transportation networks



Analysis of scenarios

Performance of generated synthetic networks



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