Sensitivity analysis of the MATSim transport model

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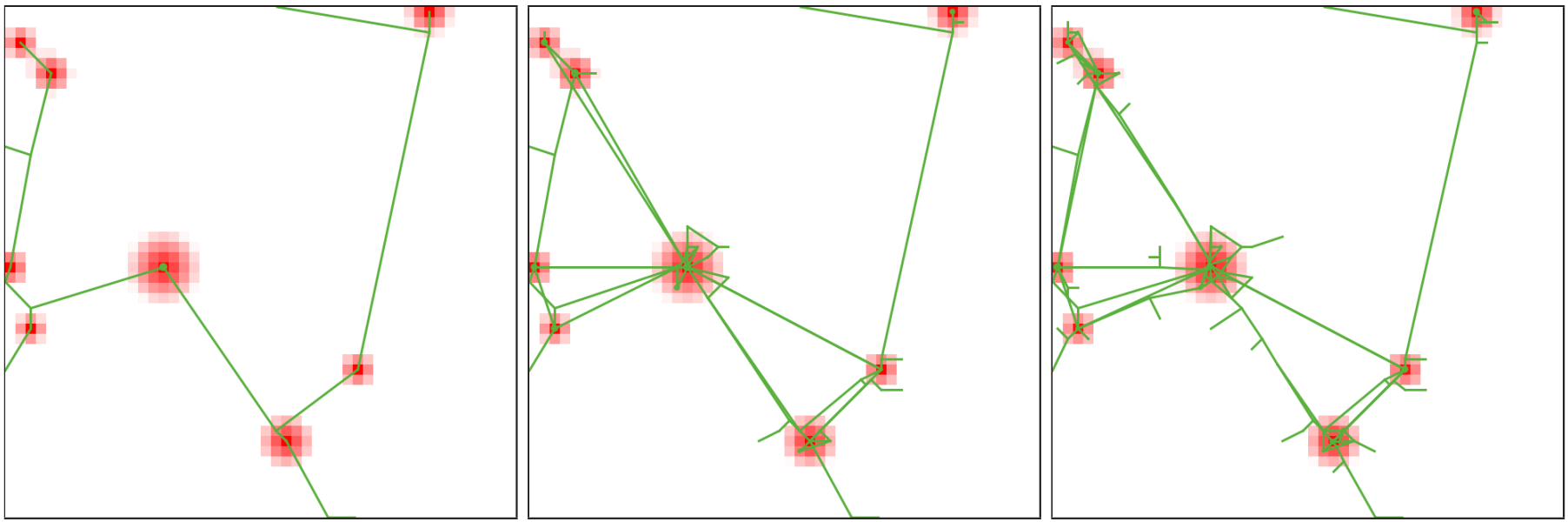
[Cats and Birch, 2021]
[Szell et al., 2021]
[Cats et al., 2020]

Road network generation algorithm

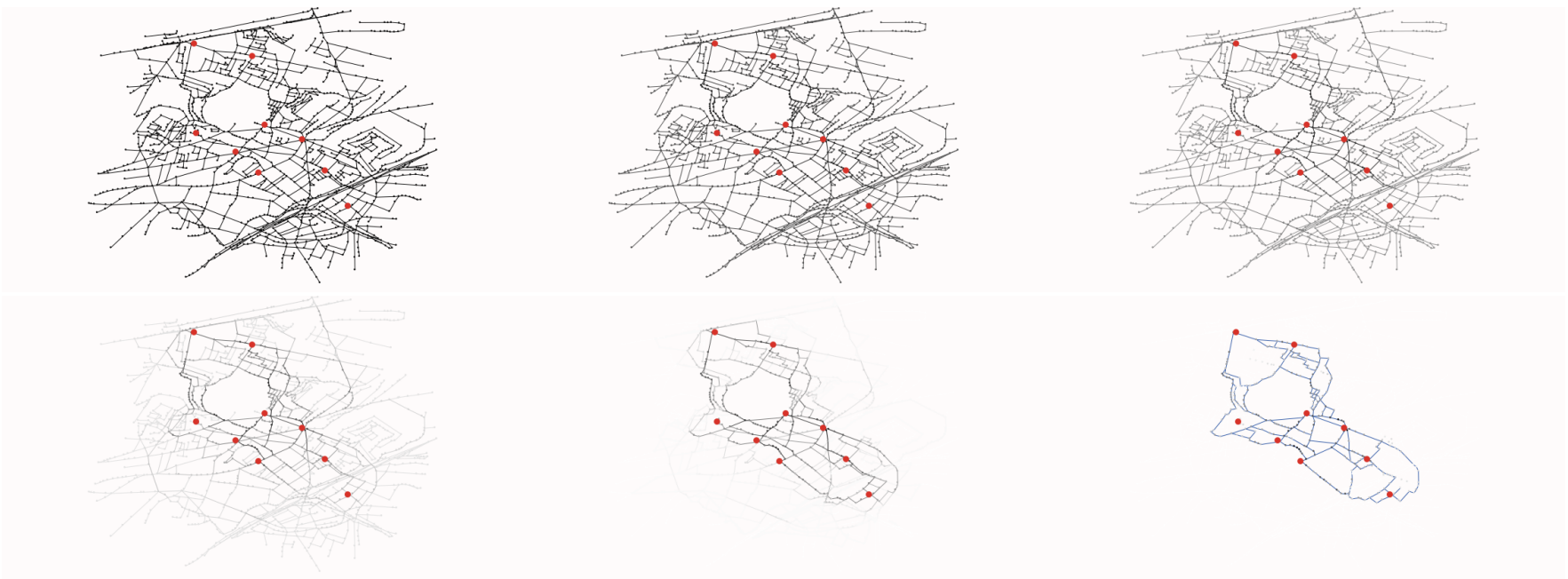
At each time step, with a fixed population density:

1. Add new nodes preferentially to population and connect them
2. Variable heuristic for new links, among: nothing, random, gravity-based deterministic breakdown, gravity-based random breakdown (from [**?**]), cost-benefits (from [**?**]), biological network generation (based on [**?**])



Biological network generation

Model studied by [**?**] : exploration and reinforcement by a slime mould searching for ressources

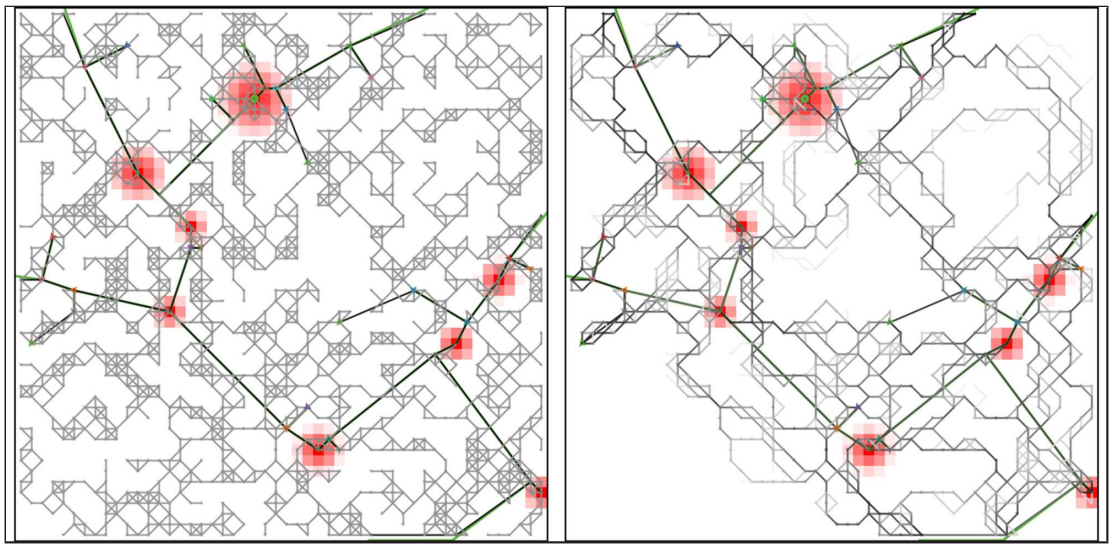


Application to the design of optimal bus routes

Biological Network generation

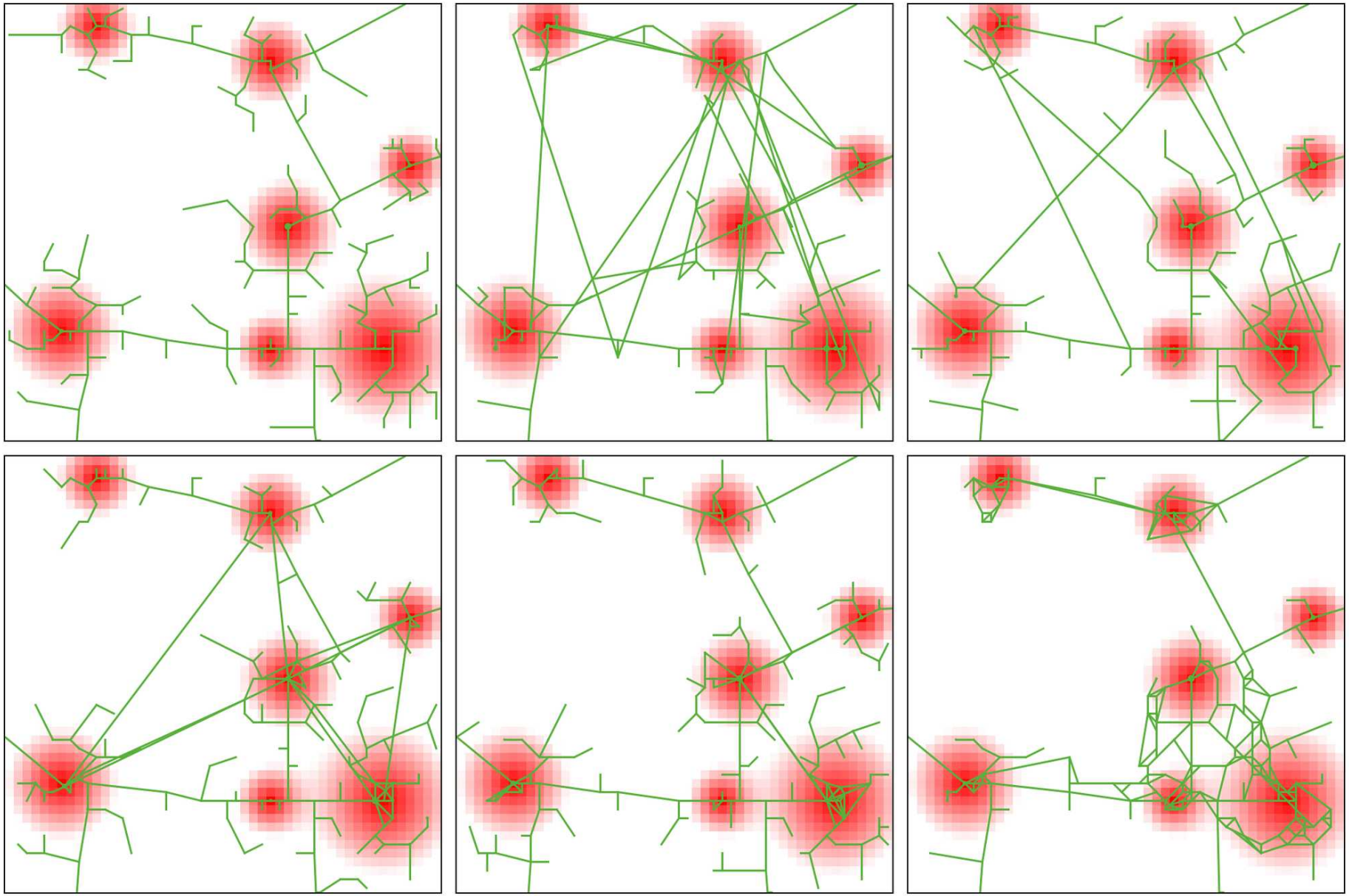
Adding new links with biological heuristic:

1. Create network of potential new links, with existing network and randomly sampled diagonal lattice
2. Iterate for k increasing ($k \in \{1, 2, 4\}$ in practice) :
   - Using population distribution, iterate $k \cdot n_b$ times the slime mould model to compute new link capacities
   - Delete links with capacity under θ_d
   - Keep the largest connected component
3. Planarize and simplify final network



Intermediate stage for biological network generation

Example of generated networks



In order: connection; random; deterministic breakdown; random breakdown; cost driven

Conclusion

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Open repositories

`https://github.com/JusteRaimbault/NetworkGrowth`

References I

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