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Fast Simulation of Epidemics on Coevolving Networks

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github.com/gerritgr/icon

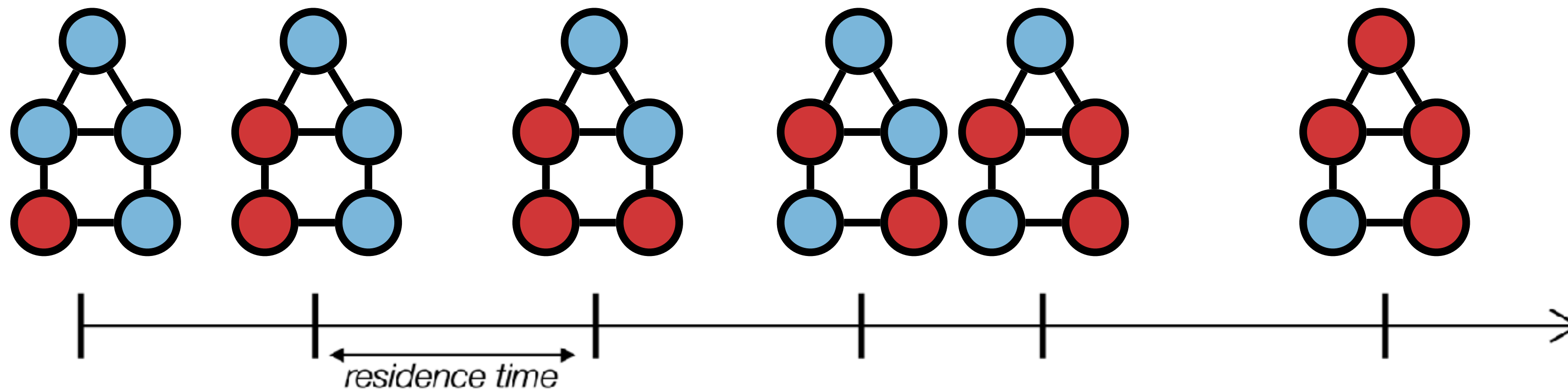
11.12.2024





Simulations are Useful

Stochastic simulations are the **cornerstone** of the analysis of dynamical processes on complex networks.

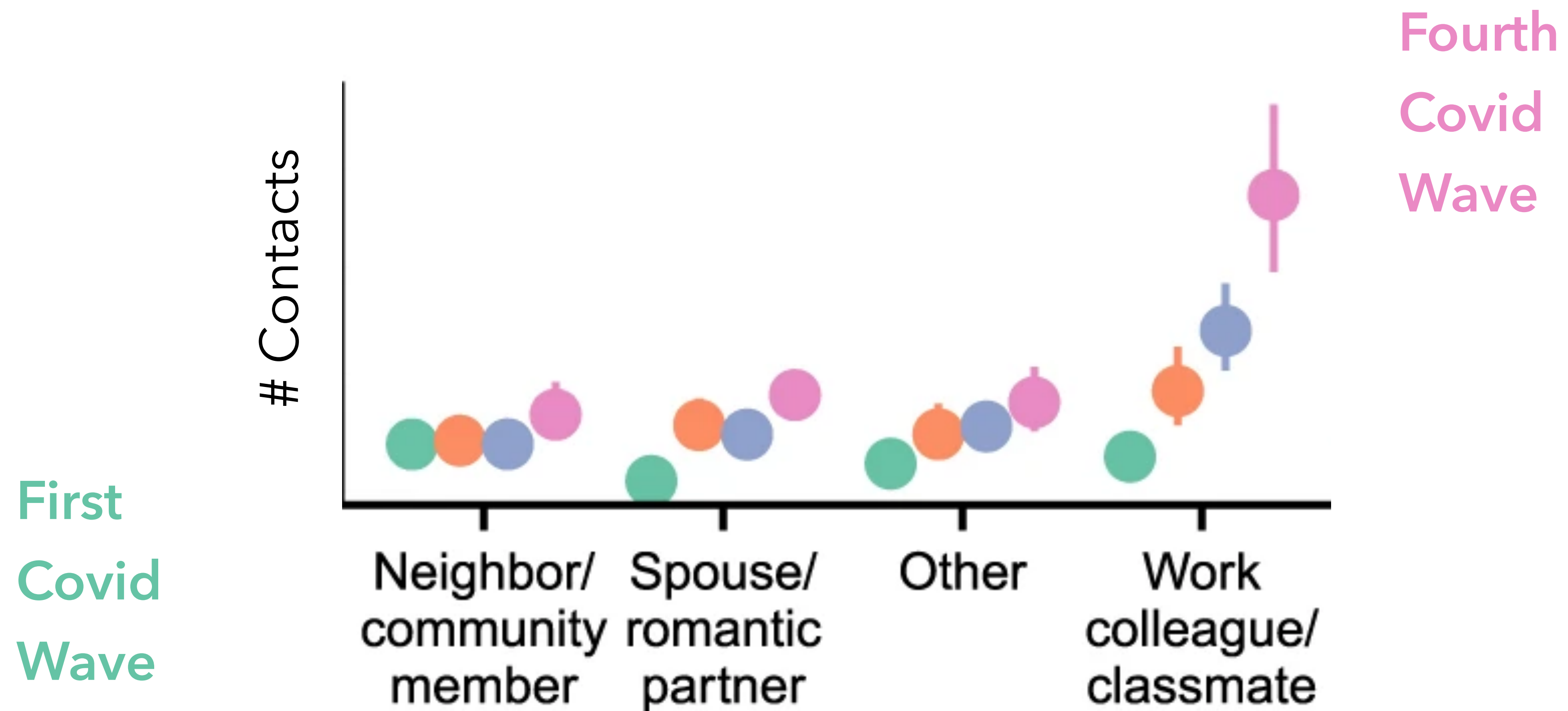


Optimized Gillespie algorithms for the simulation of Markovian epidemic processes on large and heterogeneous networks
(Cota & Ferreira)

Efficient sampling of spreading processes on complex networks using a composition and rejection algorithm
(St-Onge et al.)

Rejection-Based Simulation of Stochastic Spreading Processes on Complex Networks
(Grossmann & Wolf)

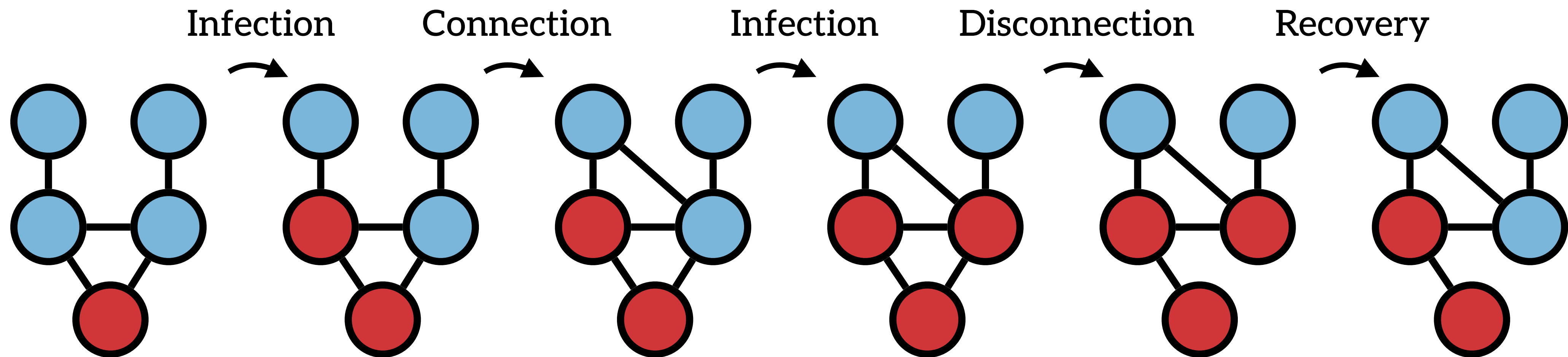
Real-World Epidemics Coevolve



Quantifying population contact patterns in the United States during the COVID-19 pandemic (Feehan et al.)

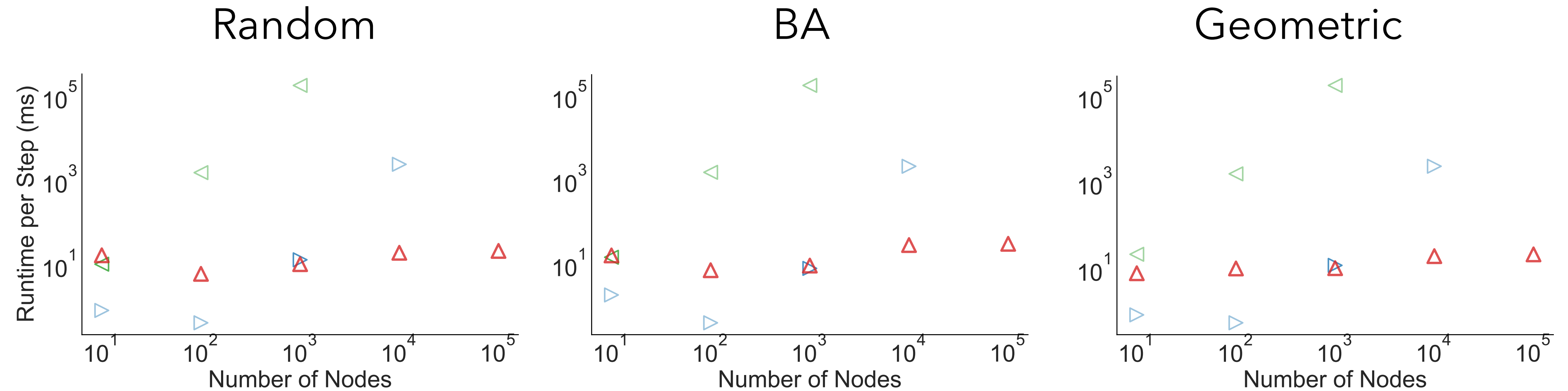


Real-World Epidemics Coevolve





Fast Simulation on Coevolving Networks



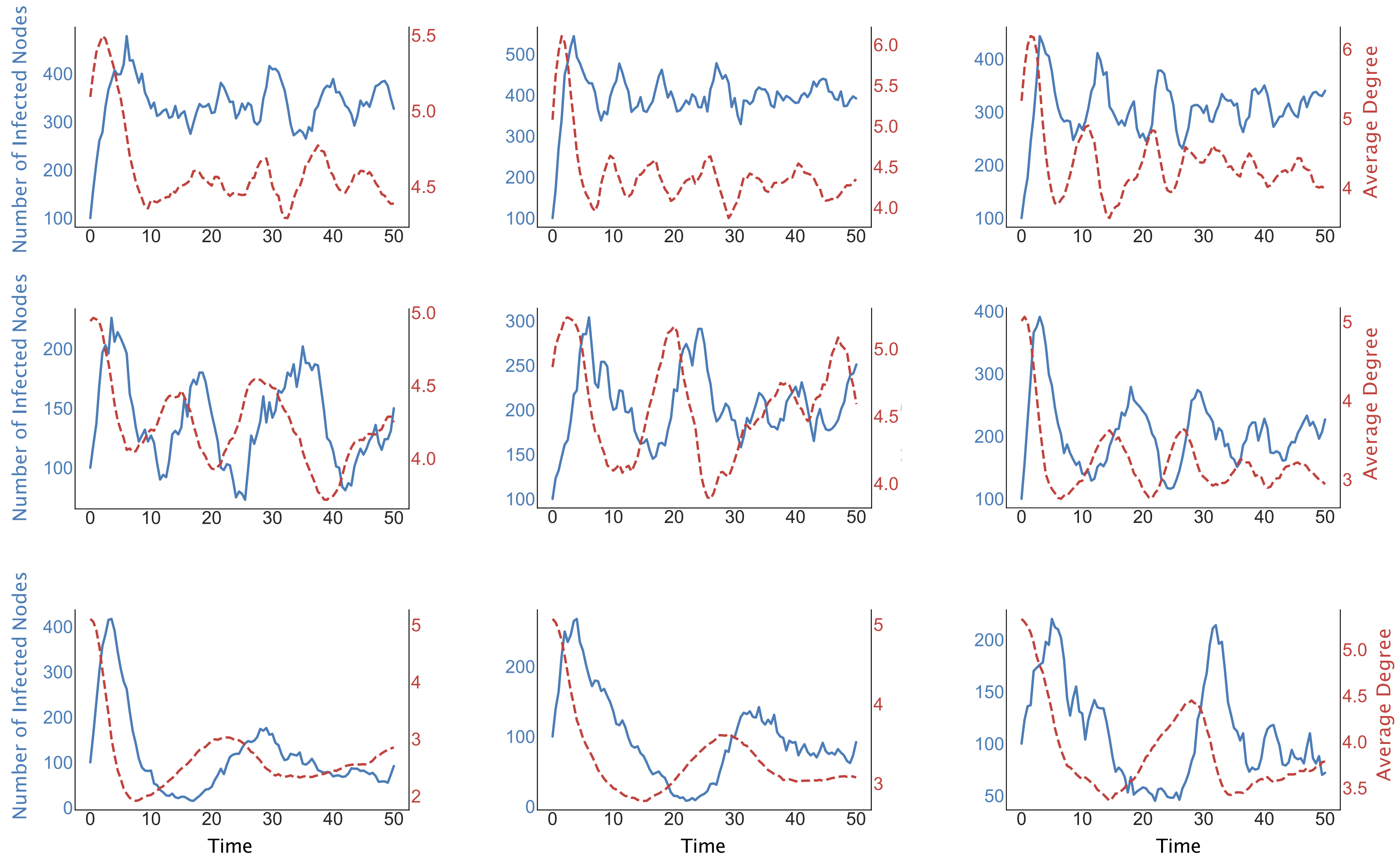
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Time: Almost **constant runtime** in the number of nodes

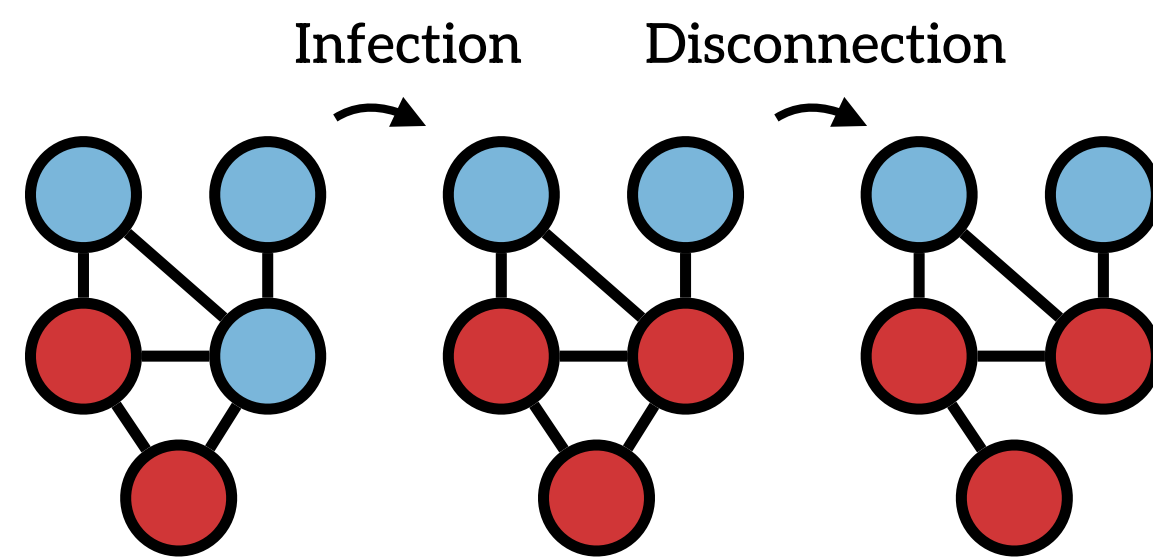
Space: Store network as edge list



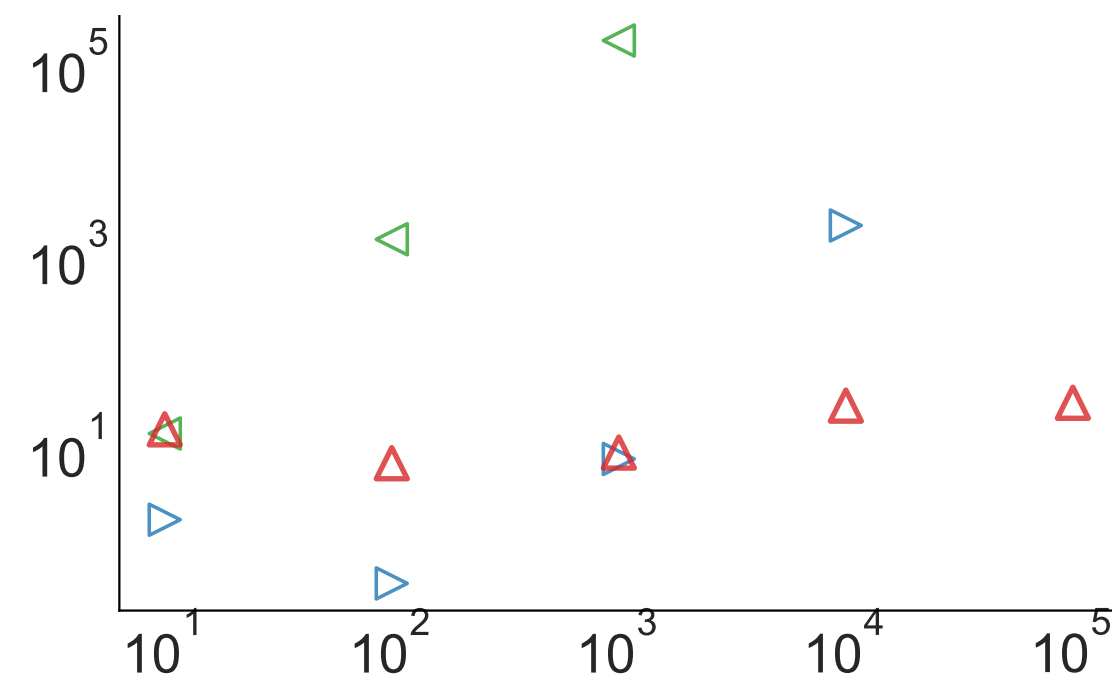
Study Coevolving Dynamics



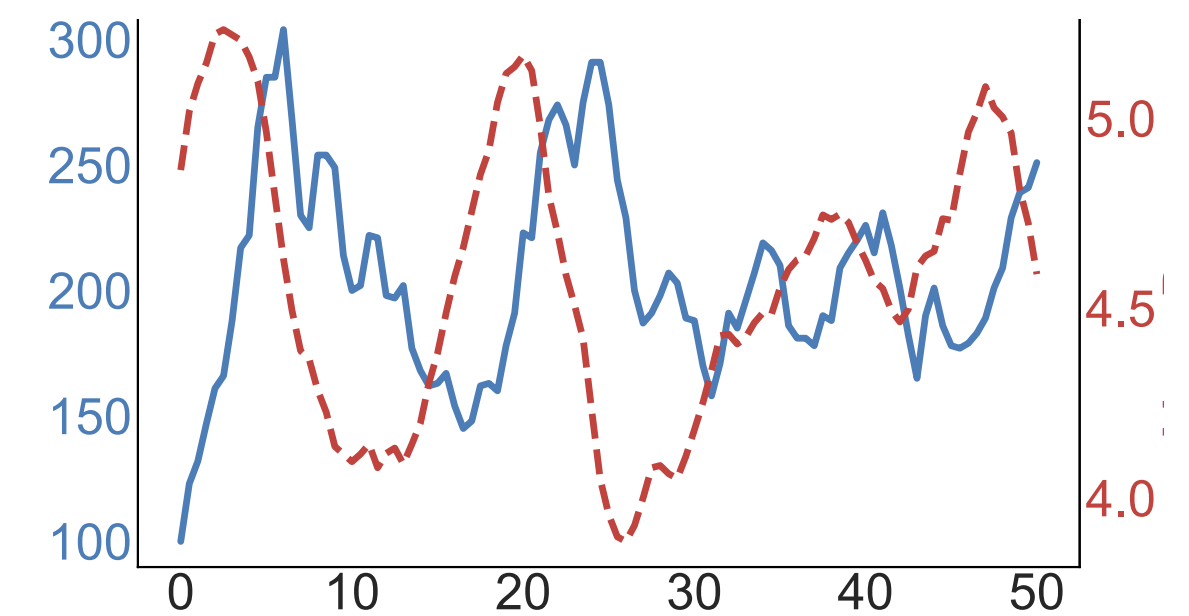
Summary



Co-evolving model



Super fast simulation



Emerging dynamics

Actively looking for collaborators!

Find code and slides at: github.com/gerritgr/icon