Test and Isolation Strategies for Data-driven agent-based modeling for Infectious Diseases

Agent-based modeling for realistic reproduction of human mobility and contact behavior to evaluate test and isolation strategies in epidemic infectious disease spread

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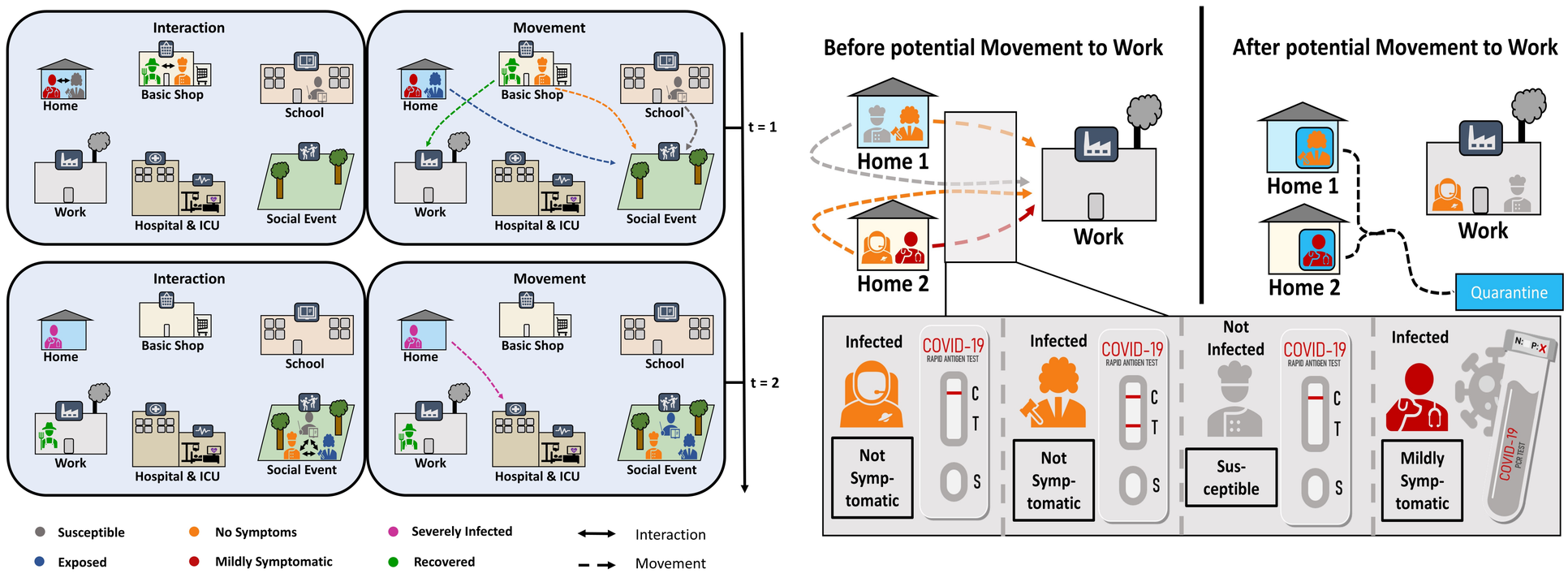
Background

- Agent-based models offer great customizability and can model a pandemic setting in great detail [1]
- (Nonpharmaceutical) Interventions can mitigate the impact of a pandemic [2]
- Finely resolved data is needed for agent-based models

Methods

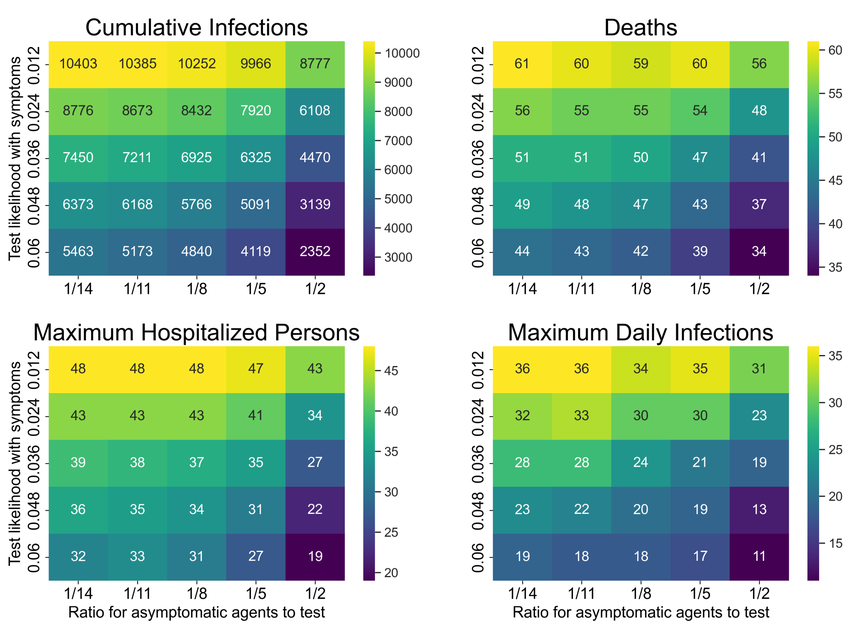
- Mobility-based agent-based model with households, schools, workplaces and other locations
- Realistic daily trip data for the Brunswick region [3]
- Detailed implementation of a testing and isolation scheme
- Shared and distributed memory parallelization

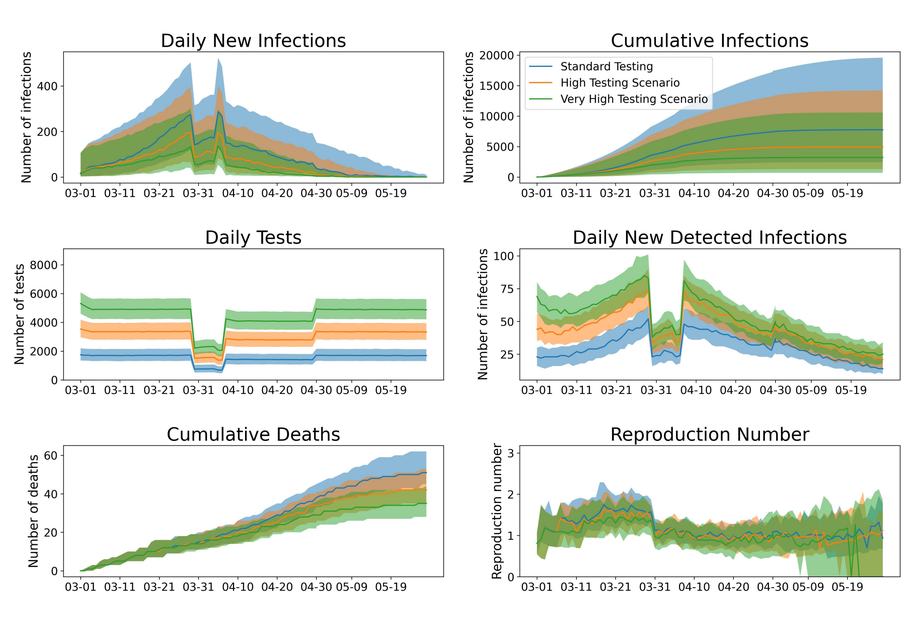
Overview of the Model and Testing and Isolation Implementation



Results

- Calibrated on data from third COVID-19 wave in Germany (March to May 2021) in the Brunswick region
- Left: Effects of varying testing probabilites
- Right: Variation of the probability to test for symptomatic and asymptomatic individuals





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1. Willem, L. *et al.* Optimizing agent-based transmission models for infectious diseases. *BMC Bioinformatics* **16** (June 2015).
2. Walker, P. *et al.* *Report 12: The global impact of COVID-19 and strategies for mitigation and suppression.* Tech. rep. (Imperial College London, Mar. 2020).
3. Schengen, A. *et al.* *Microscopic trip chains for Brunswick (Germany) region.* Version 1.0 (Zenodo, Aug. 2024).