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Modelling human decision-making in urban complex systems

Many patterns we find in urban systems are emerging from the behaviour of interacting individuals: For example, urban sprawl results from residents deciding on where to live in the city. In order to better understand such processes and explore the potential effects of policies such as zoning, we can use agent-based models as virtual laboratories. Using examples of modelling human decision-making such as residential location choice in urban systems, I will discuss three key challenges for putting such an approach into practice:
1. Representation of the system: Examples of urban complex systems models range from highly abstract models to empirically driven models for specific case studies. While abstract models allow for better tracing of what is happening during a simulation and can provide generic results, empirically driven models appeal to local stakeholders.
2. Data scarcity: Despite the availability of “big data”, very high-resolution imagery et cetera, data relevant for modelling urban systems is often scarce. This relates, for instance, to data on relevant human decision-making and behaviour but also to data-poor regions.
3. Rooting in social science: Human decision-making in urban systems is often either modelled ad hoc or using strong assumptions regarding the rationality of actors. Implementing social science theories of human decision-making into such models in itself is a challenge, but can be facilitated through standardised documentation and code sharing.