

Generative Agent-Based Social Simulations: Early Prototypes for Epidemiology and Energy Systems

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Generative Agent-Based Models (GABMs) extend traditional Agent-Based Models (ABMs) by incorporating Large Language Models (LLMs) into the decision-making processes of individual agents. While conventional ABMs typically rely on predefined behavioural rules, GABMs enable agents to reason about their environment, interpret contextual information, and make decisions that are shaped by configurable personas, goals, and social interactions.

GABMs are best used as complementary tools alongside established population-scale mathematical and computational models for exploring the social and behavioural dimensions of complex systems in more depth. Their ability to represent heterogeneous individuals with richer cognitive processes makes them particularly suitable for investigating questions where human reasoning, communication, and behavioural diversity play a significant role. This added expressiveness, however, comes at the cost of computational scalability, as each agent may require repeated interactions with an LLM during a simulation.

In my talk, I will present ongoing research into the development of early prototype GABMs for epidemiology and energy systems. I will introduce the underlying modelling framework, discuss implementation considerations, and demonstrate how generative agents can enrich the analysis of social dynamics. I will conclude the presentation with a discussion of the limitations and opportunities for future research.