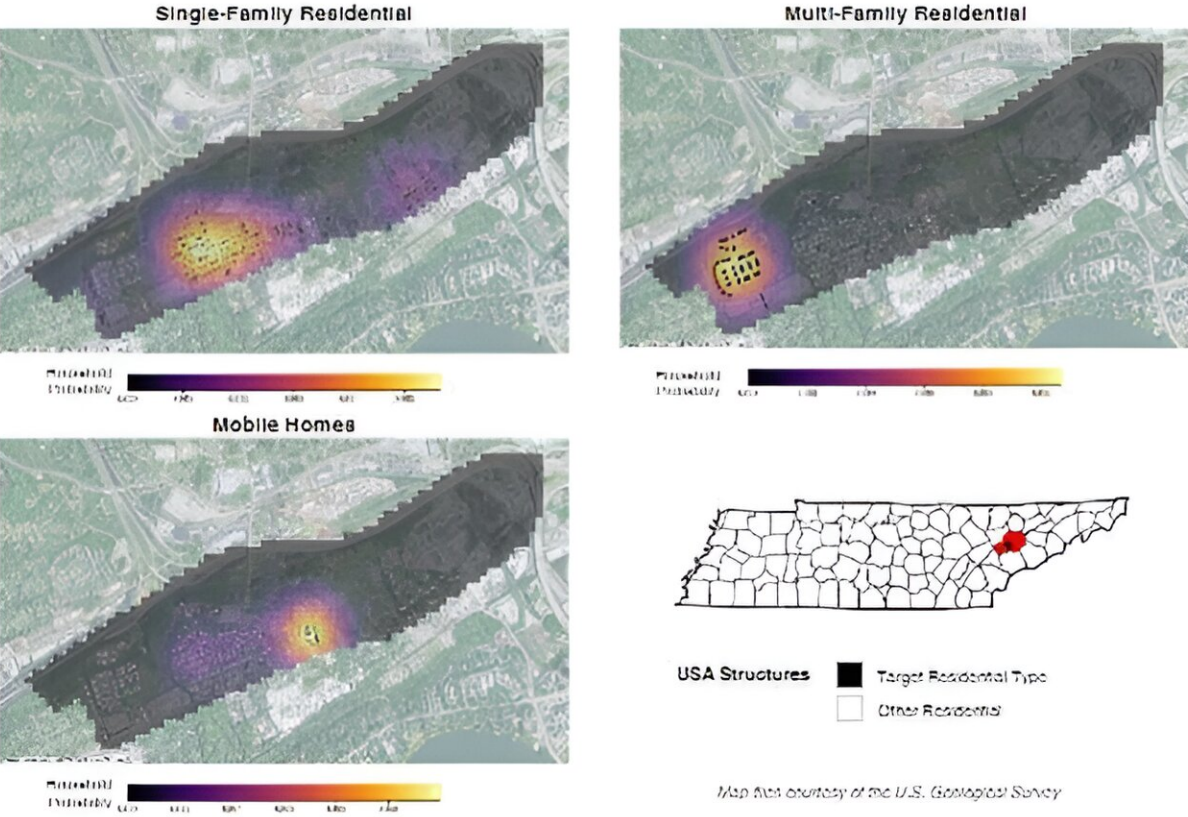


How travel among synthetic populations reveals gaps in essential services

July 24 2024, by Liz Neunsinger



Comparison of synthetic household occurrence probabilities to U.S. Structures types for a single block group. Credit: ORNL, U.S. Dept. of Energy

Think about your neighborhood. Where are the stores or doctor's

offices? How easy is it to access fresh food? Human mobility researchers at the Department of Energy's Oak Ridge National Laboratory are providing information on access to essential services in communities by creating synthetic populations that mirror real neighborhoods and observing how transportation routes around the area support or detract from the residents' quality of life.

Joe Tuccillo, a human geography research scientist, leads the UrbanPop project that uses [census data](#) to create synthetic populations. Using a [Python software suite called Likeness](#) on ORNL's high-performance computers, Tuccillo's team generates a [population](#) with individual "agents" designed to represent people that interact with other agents, facilities and services in a simulated neighborhood.

"This is critical for starting to think about how people access resources like nutrition and health," Tuccillo said.

This research, published as a short paper in the [Proceedings of the United States Research Software Engineer Association](#) 2023 conference, enhances the [UrbanPop methodology](#) for modeling trips to essential services.

What the agents do depends on the questions the researchers ask. When inquiring about transportation routes, for example, researchers observe the various means and routes agents take to get from their home to a destination and see what services exist along the routes. This can uncover how the location of amenities helps or hinders agents' ability to receive services and reveal how people in similar real cities may experience food deserts, lack of adequate health facilities or long commutes.

"We hope to make our Likeness software publicly available this year for others in the research community to create synthetic populations for their own tasks," Tuccillo said. Likeness can be applied to models in a

variety of research areas, including human mobility modeling, access to vaccines for low socioeconomic individuals during a pandemic or school bus [route](#) equity in a county.

More information: Tuccilo, J. Downscaling Synthetic Populations to Realistic Residential Locations. *Proceedings of the United States Research Software Engineer Association 2023 conference* (2023).

zenodo.org/records/10420984

Provided by Oak Ridge National Laboratory

Citation: How travel among synthetic populations reveals gaps in essential services (2024, July 24) retrieved 24 July 2024 from

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