



OAK RIDGE NATIONAL LABORATORY

UrbanPop

Characterizing the social fabric of localities across the United States

UrbanPop leverages data fusion and transportation modeling capabilities to produce realistic, virtual representations of households, people, and activity spaces during the nighttime and daytime for human dynamics simulations.

CHALLENGE

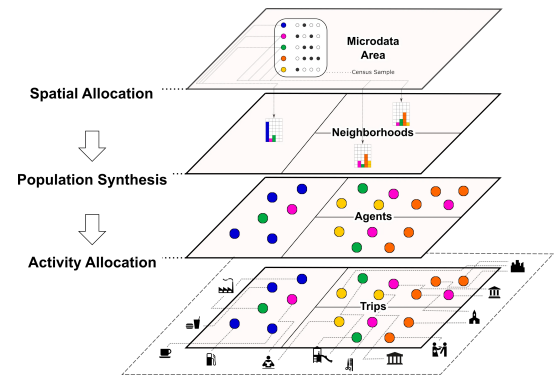
The framework's core capabilities bridge household/individual and neighborhood profiles from the American Community Survey and combine them with daytime activities (commutes, school attendance) to generate complete, realistic, and demographically rich synthetic populations at multiple times of day for any location in the United States.

APPROACH

- Synthesize residential populations representative of the social fabric of neighborhoods and communities with respect to demographics
- Simulate everyday activity spaces using real-world transportation networks, commute statistics, critical facilities, and points of interest
- Use ORNL high-performance computing resources to scale synthetic populations and activity spaces to county, state, or nationwide coverage
- Support uncertainty quantification for human dynamics simulations via synthetic population ensembles

IMPACT

- Leader in representing nighttime and daytime activity spaces with nationwide coverage of the United States
- Large-scale applications in human dynamics models of natural hazards, energy affordability, transportation/accessibility, and public health
- Open-source Likeness Python toolkit helps develop reproducible research that is customizable by location and population attributes



Generating realistic nighttime/daytime synthetic populations from open census data.

Research Focus

Investigating current and emerging human security needs in human-environment systems related to population risk/vulnerability and resource access.

- Spatial microsimulation
- Population distribution and dynamics
- High-performance computing



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