We want to aid MIDAS researchers

We are making tools to study infectious diseases.

SPEW - Synthetic Populations and Ecosystems of the World

SPEW View - a tool for visualizing historical diseases in the US

SPEW View - a tool for Early Data Analysis

- Project Tycho data
  - diphtheria, hepatitis, measles, mumps, pertussis, polio, rubella, and smallpox
- 6 interactive tabs
  - animated maps, time series, correlations, clustering, choropleths, and data download
- 1st Place in Pittsburgh Supercomputing Center Public Health Hackathon

Snapshot of the app seen in the figure to the right.

Disease Modelers Need Synthetic Ecosystems

Problem: Researchers often lack data
Result: Models are hard to make and/or train
Solution: Simulation via Agent-Based Models (ABMs)

ABMs require Synthetic Ecosystems!

ABMs can incorporate:
- Transmission type
- Reproduction number
- Cultural factors
- Prevention strategies

SPEW - Synthetic Populations and Ecosystems of the World

SPEW is our general framework/package used to create synthetic ecosystems.
- ~ 4 billion agents
- 70+ countries and counting!
- Automatic diagnostic reports
- Multiple sampling schemes
- MIDAS Network custom ecosystems

Available at stat.cmu.edu:3838/sgallagh/speview/

Place Assignment and Agent Sampling

Place of Worship Assignments
Shadyside, Pittsburgh, PA

Place Assignment
Included in SPEW is a function to assign environmental variables to agents. We currently include school and workplace assignments but also include a general place assignment function.
- Probabilistic
- Weights from distance and capacity

In the above figure, we have assigned a fraction of our agents to attend a place of worship (△).

Agent Sampling
We include modules to sample agents including:
- Uniform Sampling
- Moment Matching
- Iterative Proportional Fitting

These methods use different sources of data and emphasize different features of the resulting synthetic ecosystem. The user can select which features as the most important ones to synthesize.

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