



INTEGO
GROUP

COVID-19 OUTBREAK VISUALIZATION USING CLINICAL DATA SCIENCE PLATFORM



US Connect 2021



Iryna Kotenko

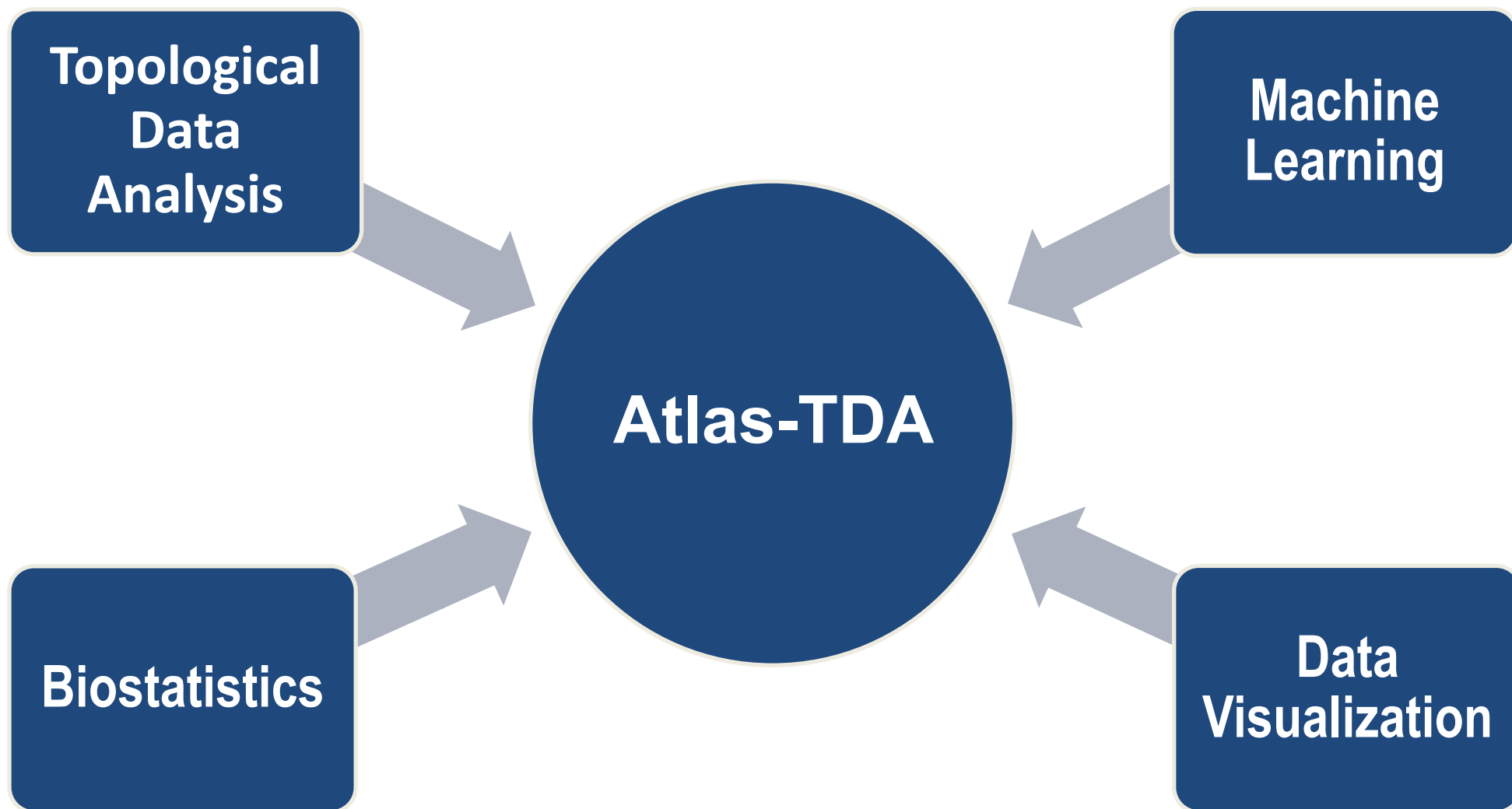
Site Lead, Intego Group, Kharkiv, Ukraine

Iryna graduated with a Master's in Applied Mathematics from Kharkiv Polytechnic University. Her fourteen-year career as a statistical programmer spans numerous CROs as a clinical SAS programmer and data analyst. Over the last eight years, she has held the position of Site Lead for Clinical Programming Services, where she leads a group of over 100 statistical programmers in Ukraine. She is also heavily involved in a partnership program with Kharkiv National University.

Sergey Glushakov

Managing Director, Intego Group, Orlando, FL, USA

Sergey has an extensive educational background, combined with advanced experience in key areas of business, technologies, and management. He holds an M.Sc. (Applied Math) and a Ph.D. (Engineering) from top Ukrainian universities, and an MBA from Duke University. Sergey has held various positions in the information technology, software, and outsourcing industries. He began his career as a software engineer and researcher before advancing to a C-level executive position and co-founding several companies.



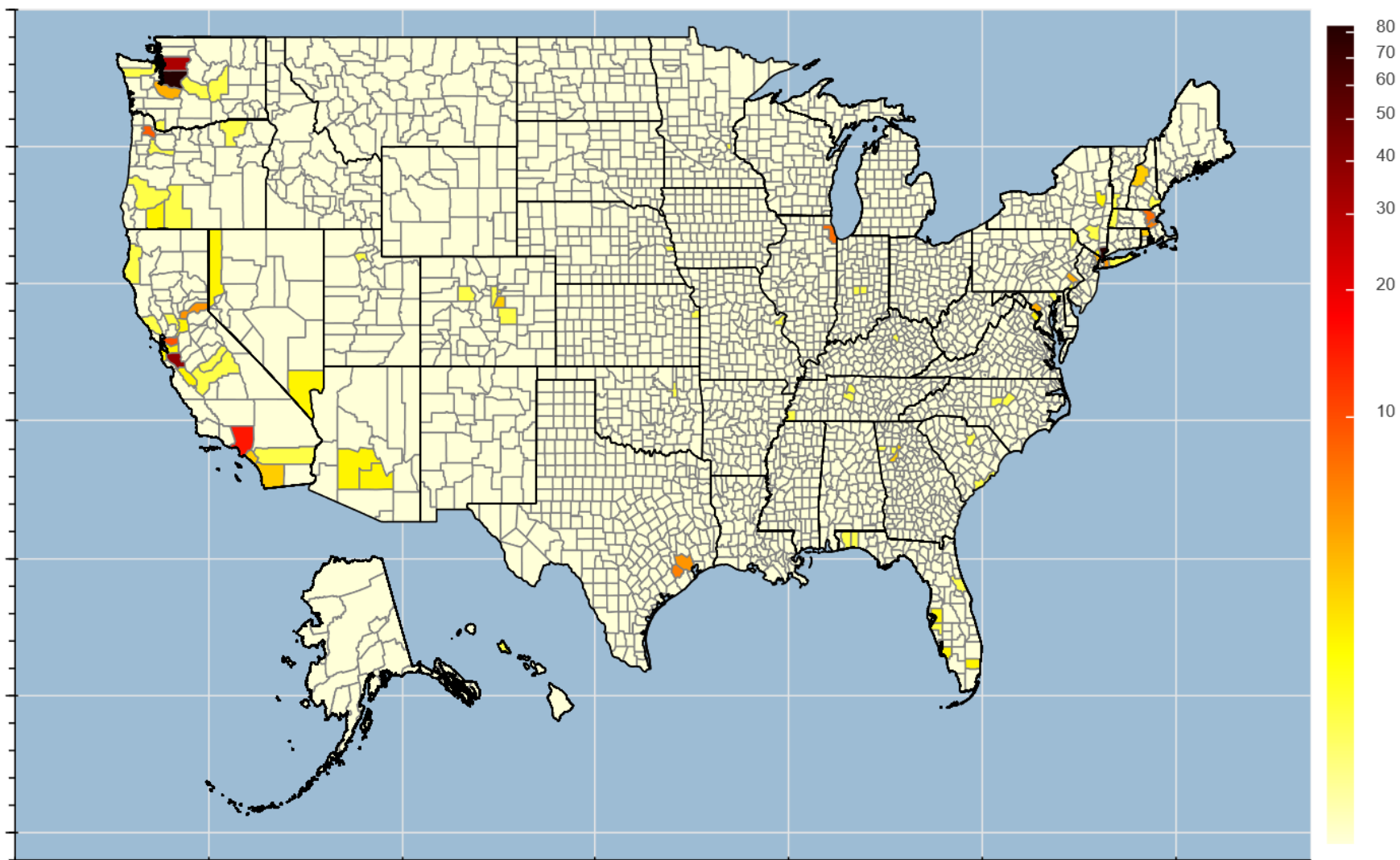
Atlas-TDA is a computational platform that enables researchers to extract topological models from clinical datasets and perform visual explorations of hidden relationships within a set of interrelated clinical outcomes

The goal of software demonstration:

- Analyze how the spread of COVID-19 has advanced in every county of the United States, looking for similarities in a specific time interval
- Build the graph to unveil geometric properties of the dataset and hidden interdependencies
- Using Atlas-TDA, discover a set of unrelated features that could have caused the similarity in the pandemic spread

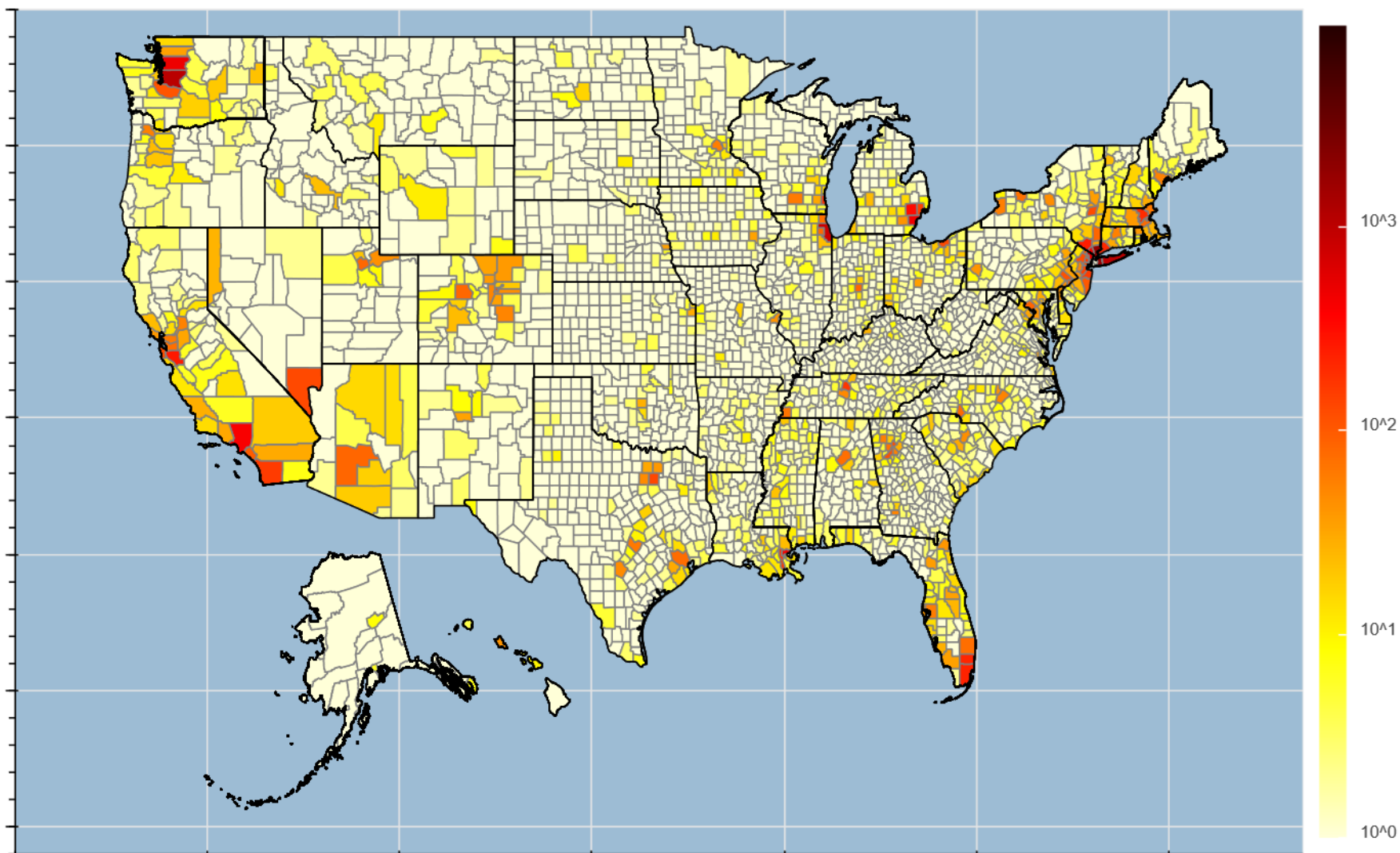
Number of confirmed cases **451**

Day **47**, March 8, 2020



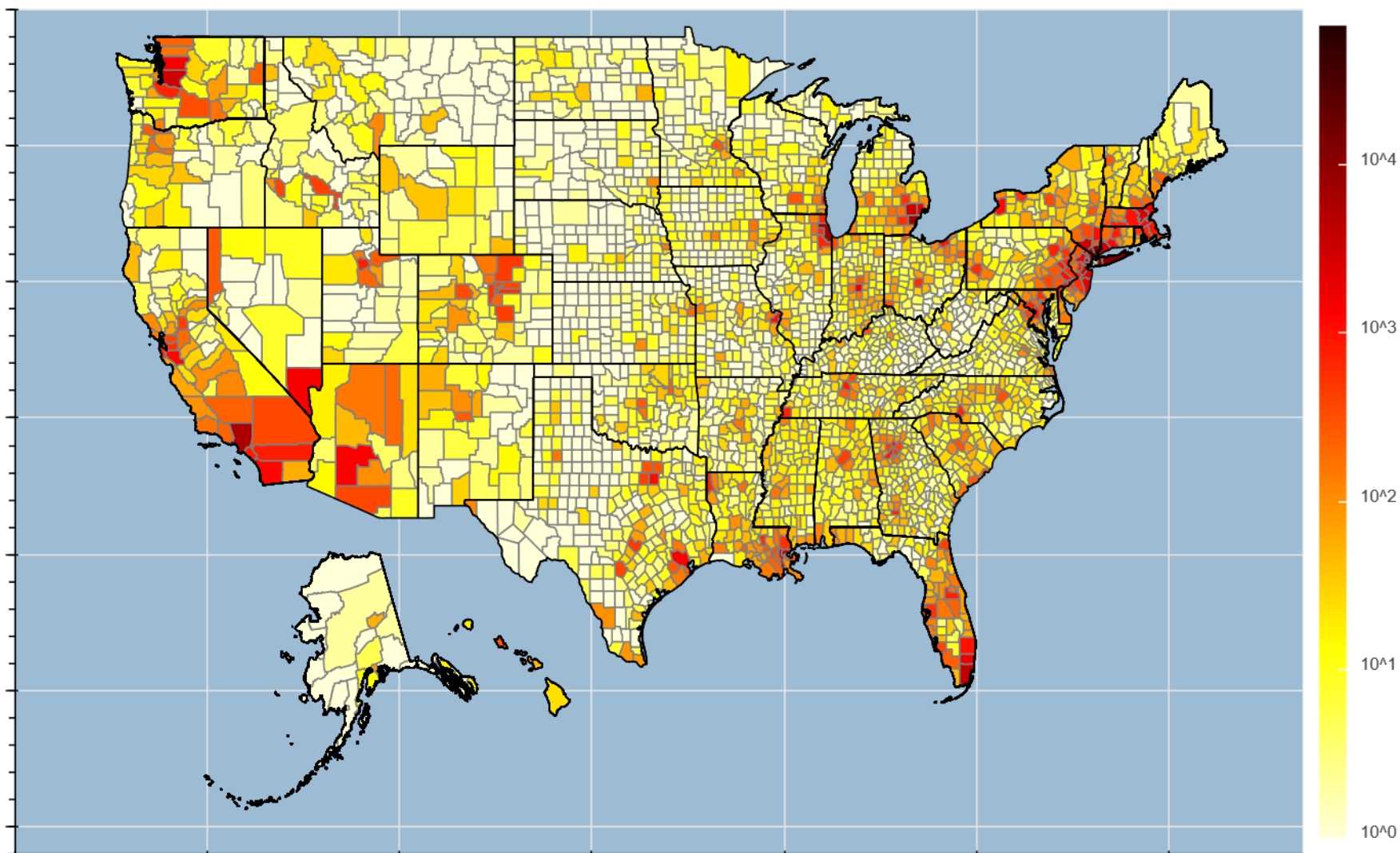
Number of confirmed cases **32,899**

Day **61**, March 22, 2020

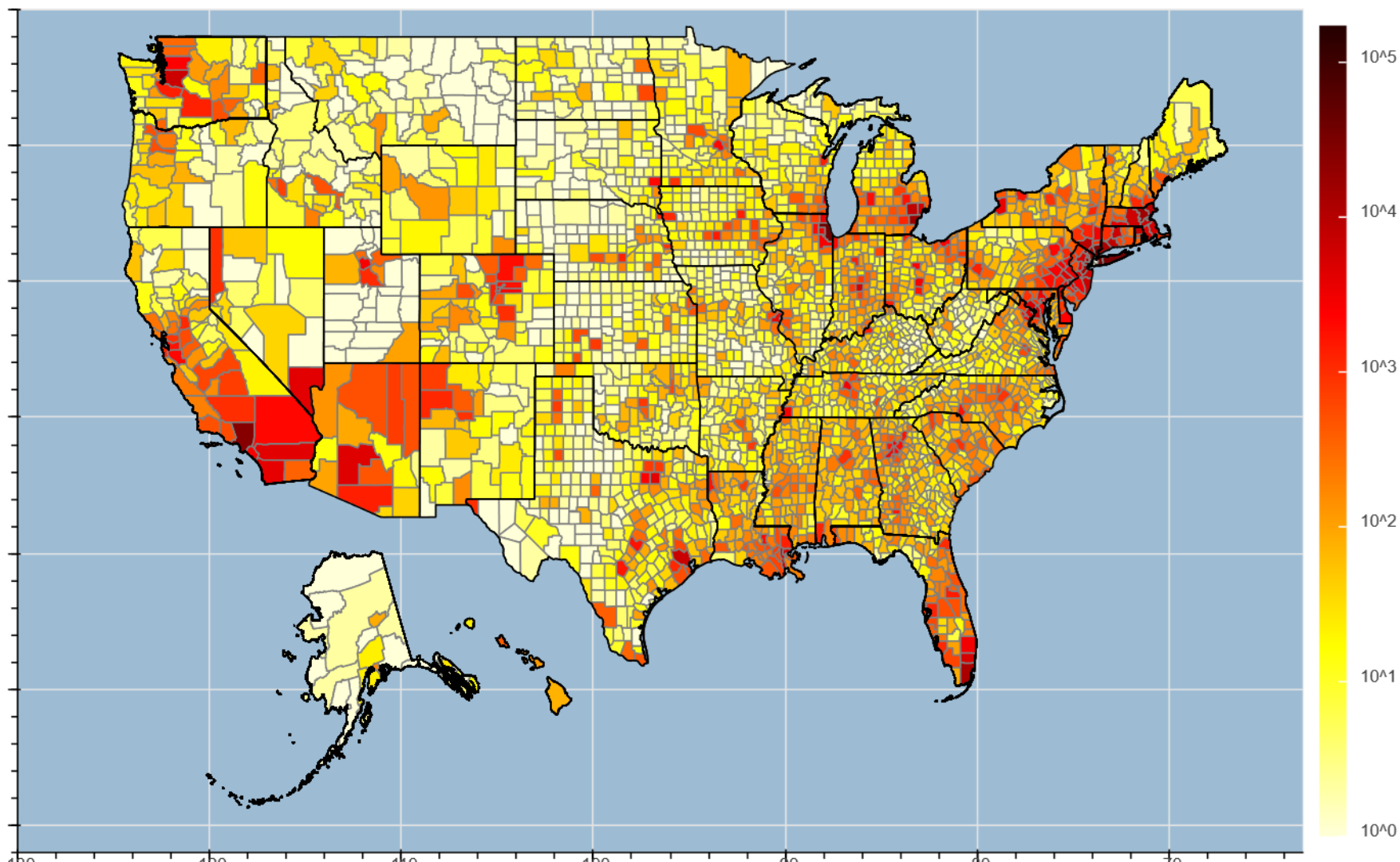


Number of confirmed cases **330,384**

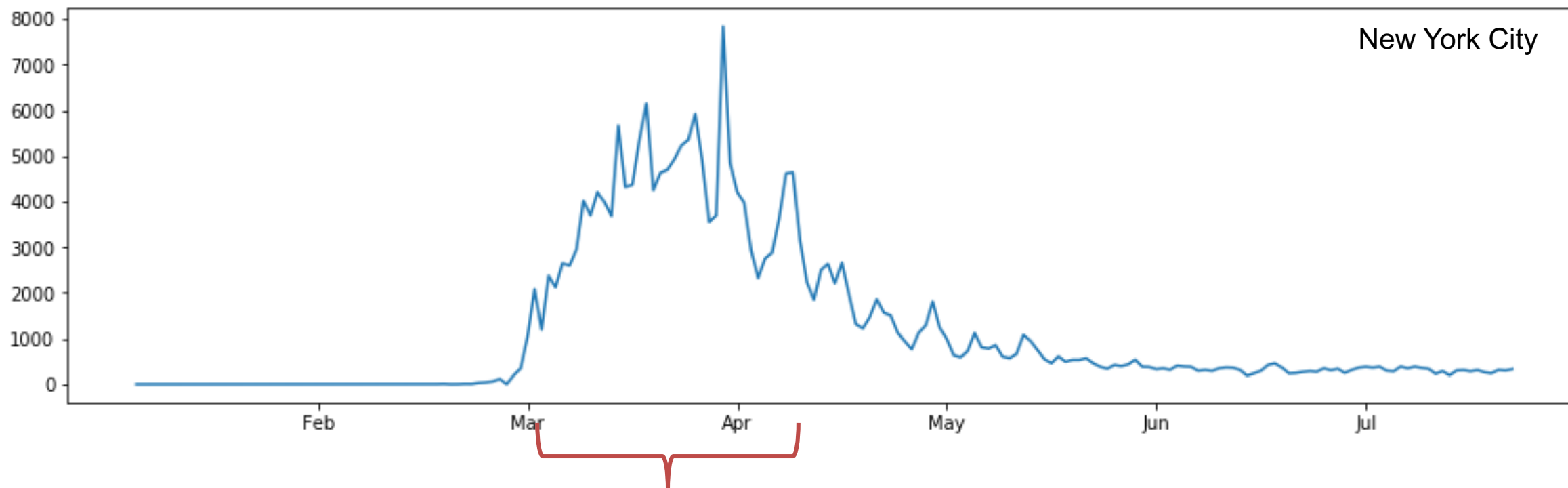
Day **75**, April 5, 2020



Number of confirmed cases **1,151,933**
Day **103**, May 3, 2020



Time series observation interval



Interval=39 days

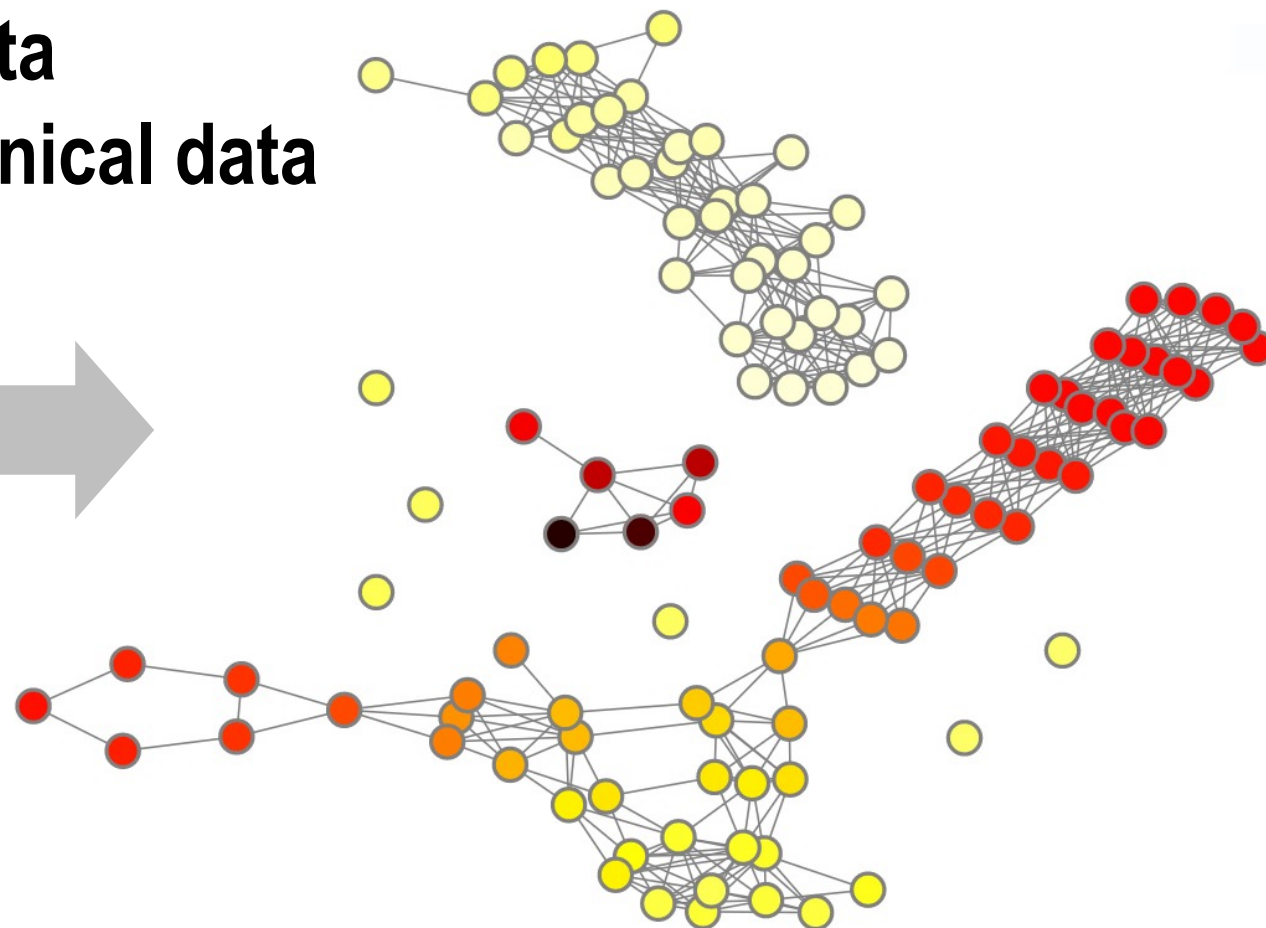
Start_day

End_day

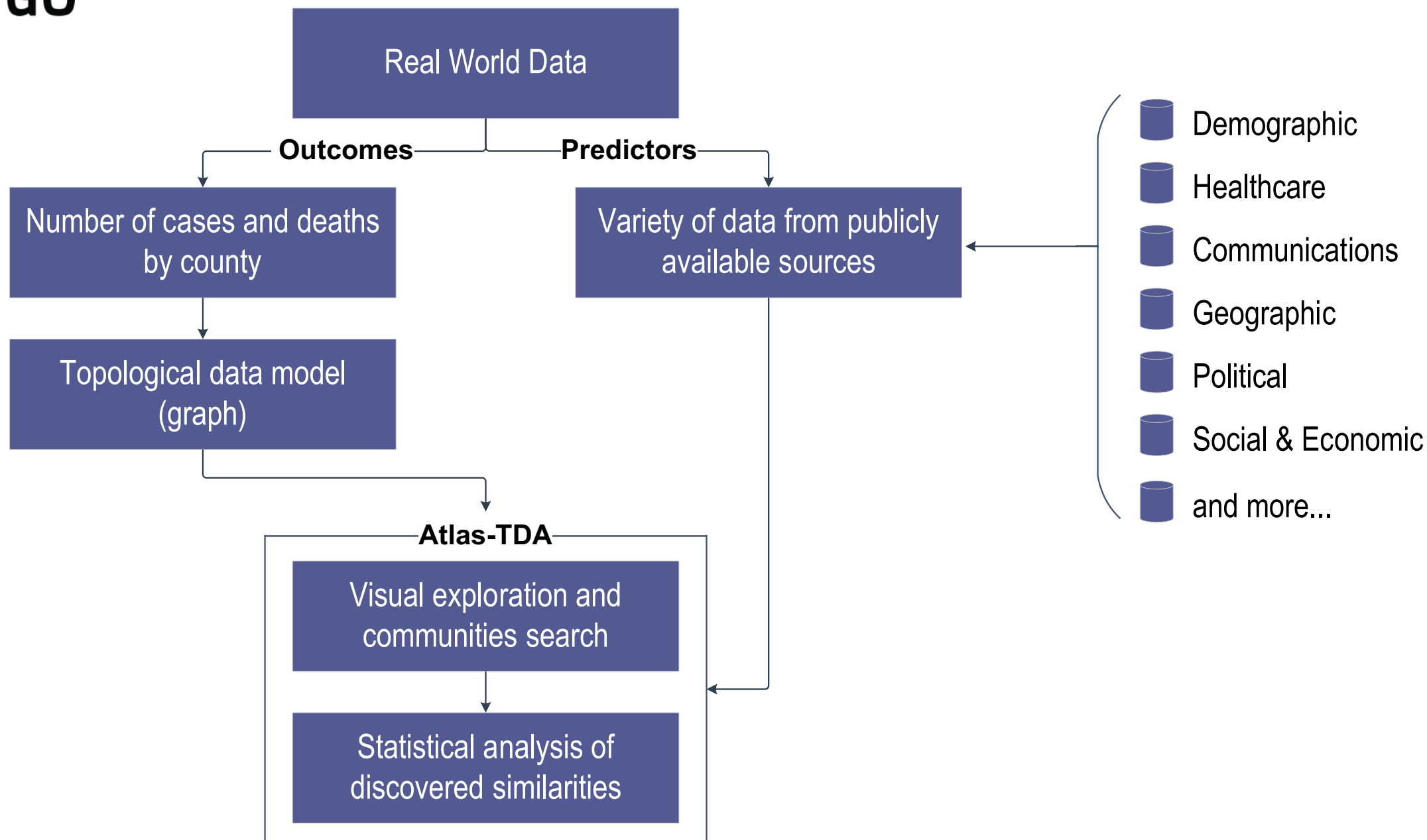
Topological Data Analysis for clinical data



Each **node** represents one
subject



Two nodes are connected
if they are **similar** in terms of **outcomes**



Examples of predictors included in model

Demographic

Sex, Age, Population, GDP,
Gini index, Density, Ethnicity,
Marital status, Religious
affiliation, Housing

Social & Economic

Households statistics, Poverty,
Labor data, Education,
Criminal, Income inequality,
Suicide rate, Unemployment

Healthcare

ICU beds, Hospital beds,
Insurances, Medicare, Medicaid,
Vaccinations, Mortality rates,
MDs and other professionals

Geographic

Climate, Rural/Urban,
Average temperature, Water/
Land areas, Precipitation,
Administrative division

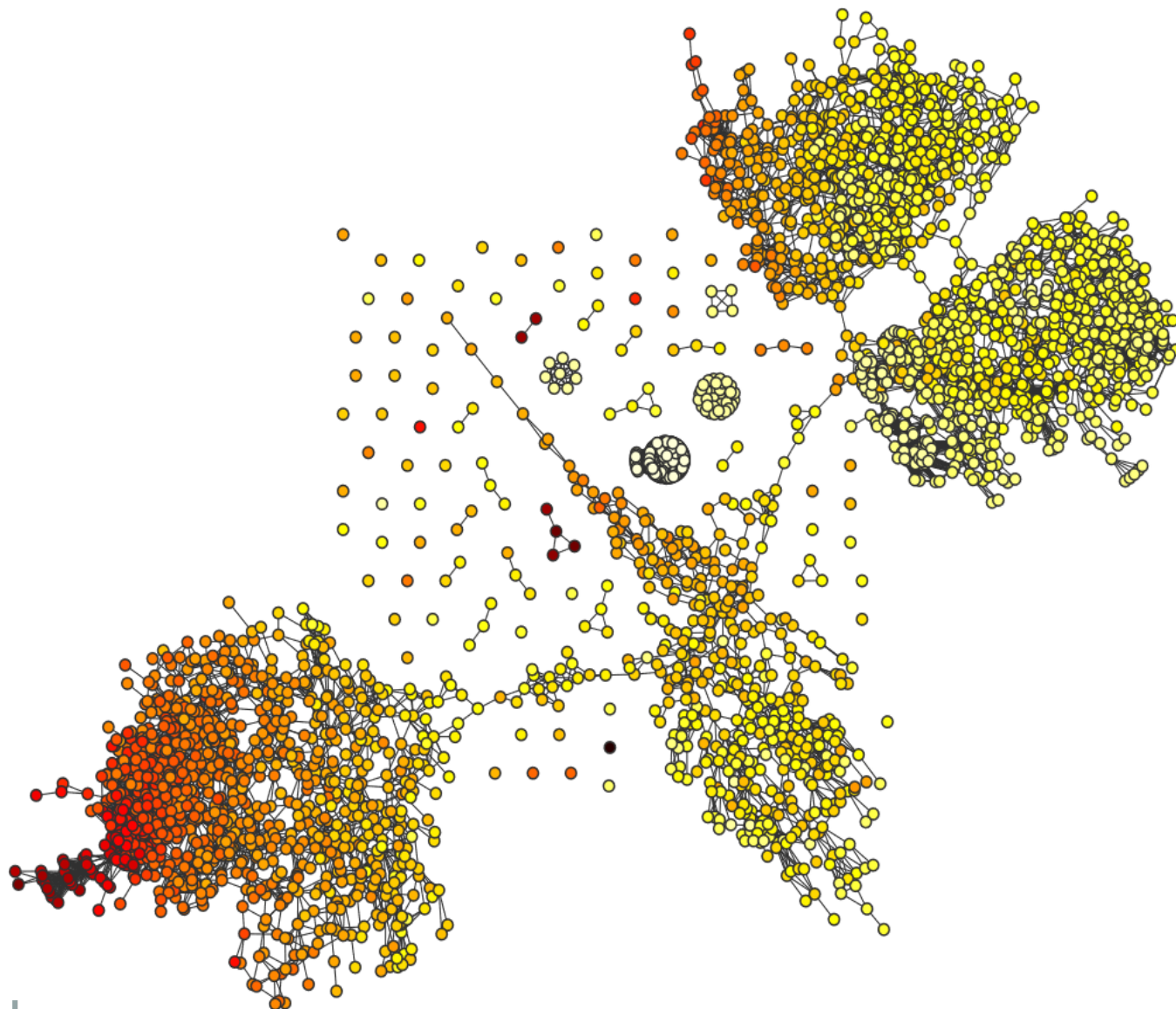
Political & Lifestyle

Elections results, Affiliation,
Drug legalization, Food
indices, Physical inactivity,
Smoking, Obesity, Drinking

Real-World
Data

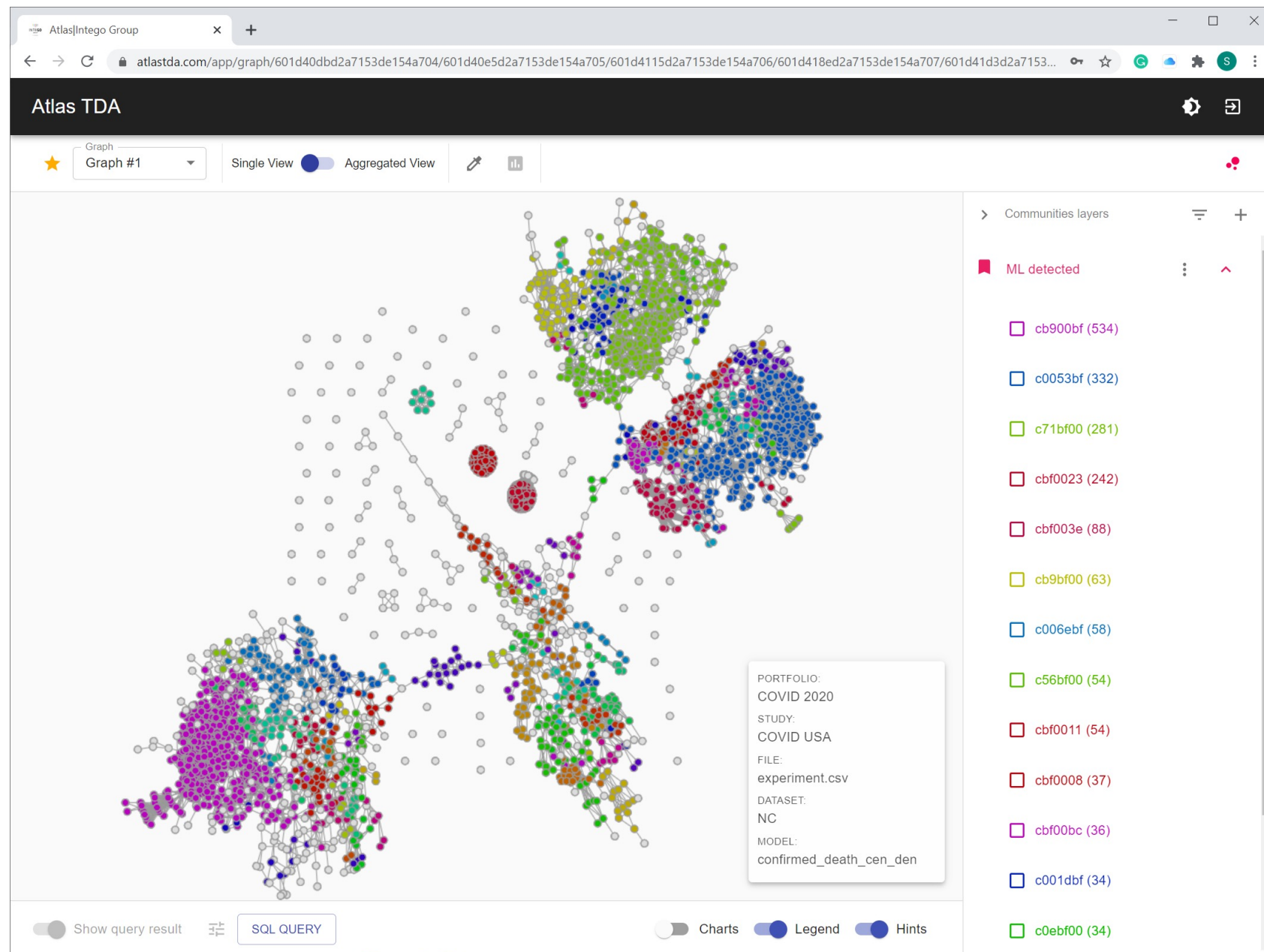
250+ predictors were integrated into the model

Topological model of COVID-19 spread over the US



- Each node on the **graph** corresponds to one county of the United States (total **3,142 nodes**)
- Two nodes are connected with the edge if they are **similar** in terms of predefined outcomes
- Outcomes integrate the number of confirmed **cases and deaths** within a **39-day observation interval** from the start of the pandemic
- **The color of the nodes** corresponds to the value of the selected (by user) outcome or predictor

Atlas-TDA LIVE DEMO





THANK YOU

Intego Group, LLC
555 Winderley Place, Ste. 129,
Maitland, FL 32751
Phone: +1 (407) 512-1006
www.intego-group.com/tcdm

