WhereCovid-19 Space-Time Explorer Web App

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INTRODUCTION

The CyberGIS Center for Advanced Digital and Spatial Studies at the University of Illinois at Urbana-Champaign has established the WhereCOVID-19 platform to pursue important knowledge of multi-scale spread and impacts of COVID-19 while producing a unique and critically urgent capability for spatial decision support.

Specifically, WhereCOVID-19 maps and predicts where COVID-19 is spreading across a number of spatial and temporal scales while providing an online spatial decision support system for identifying populations at risk and targeting health care interventions. The platform is developed collaboratively with public health and epidemiology researchers as well as public health officials with the aim to provide a one-stop geospatial data and analysis system to support cutting-edge research and timely decision-making.

WhereCOVID-19 is committed to providing mapping and spatial decision support capabilities based on scientific understanding of how spatiotemporal patterns and trends of COVID-19 relate to population characteristics and health care resources.

Currently, the Space-Time Explorer Web App (https://wherecovid19.cigi.illinois.edu/) provides a collection of static and dynamic maps for estimating the spread and exposure risk of COVID-19 at various spatial and temporal scales. (Scan QR code for more)

GOALS

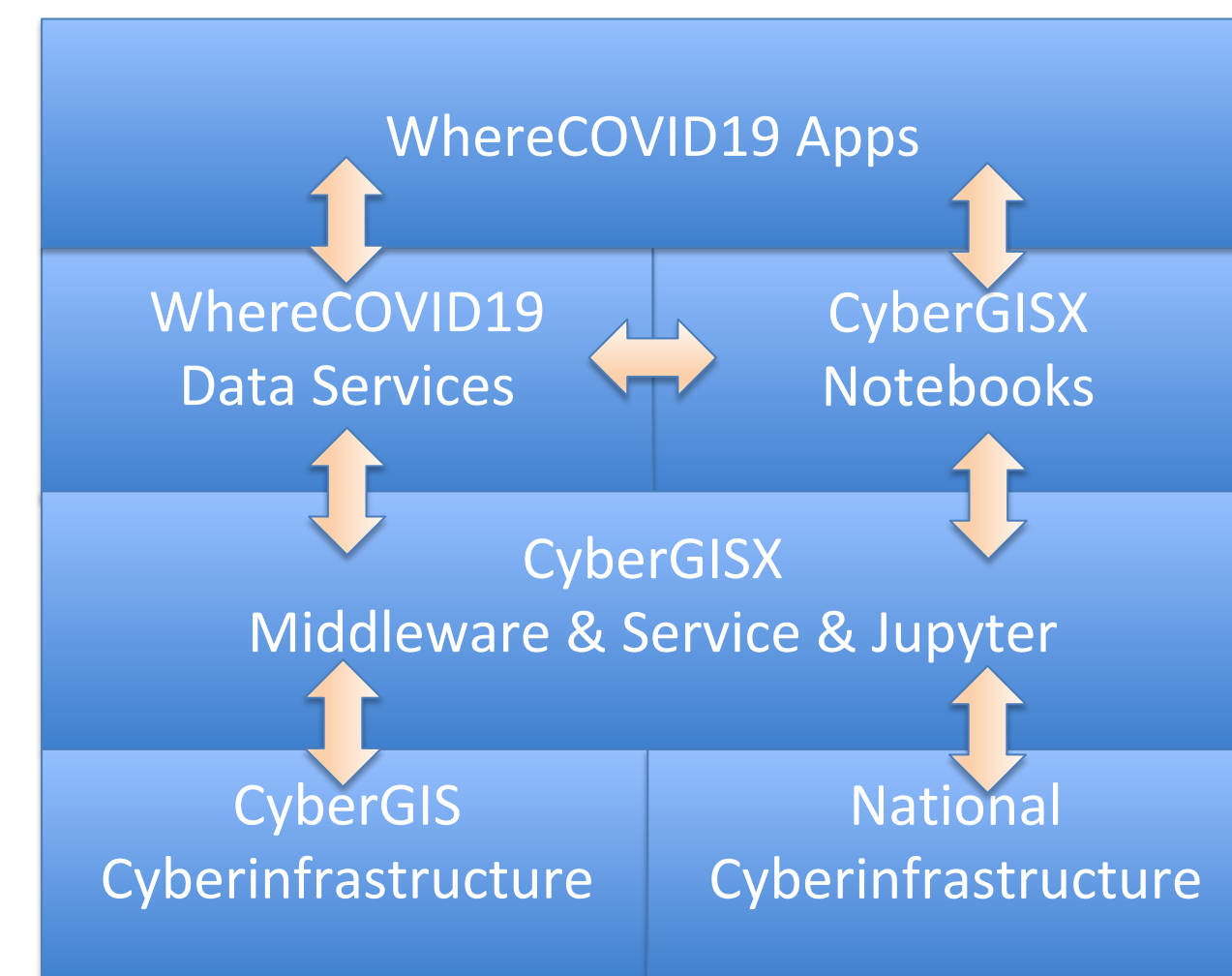### To answer multiple "WHERE" questions

- Where COVID-19 cases are and will likely be?
- Where vulnerable populations are?
- Where containment and mitigation measures should be applied?
- Where health services might be overwhelmed?
- Where additional healthcare resources should be deployed?
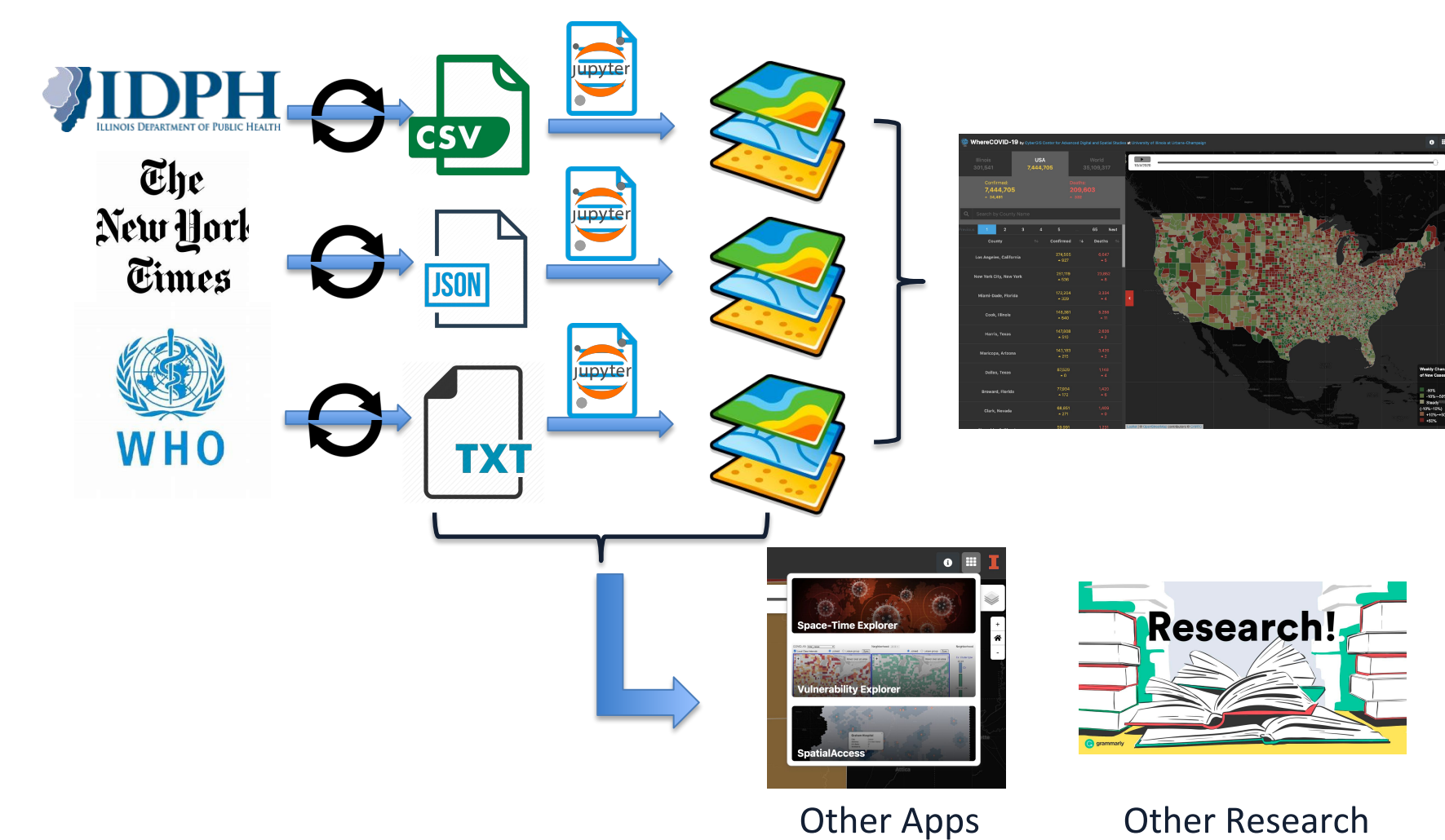
Further Influences

- Leverage CyberGISX capabilities and services
- Automate data collection & pre-processing for pandemic and related geospatial data
- Facilitate integration with built-in geospatial libraries in the Jupyter notebook environment
- Streamline access to advanced cyberinfrastructure resources
- Enable sharing of research outcomes
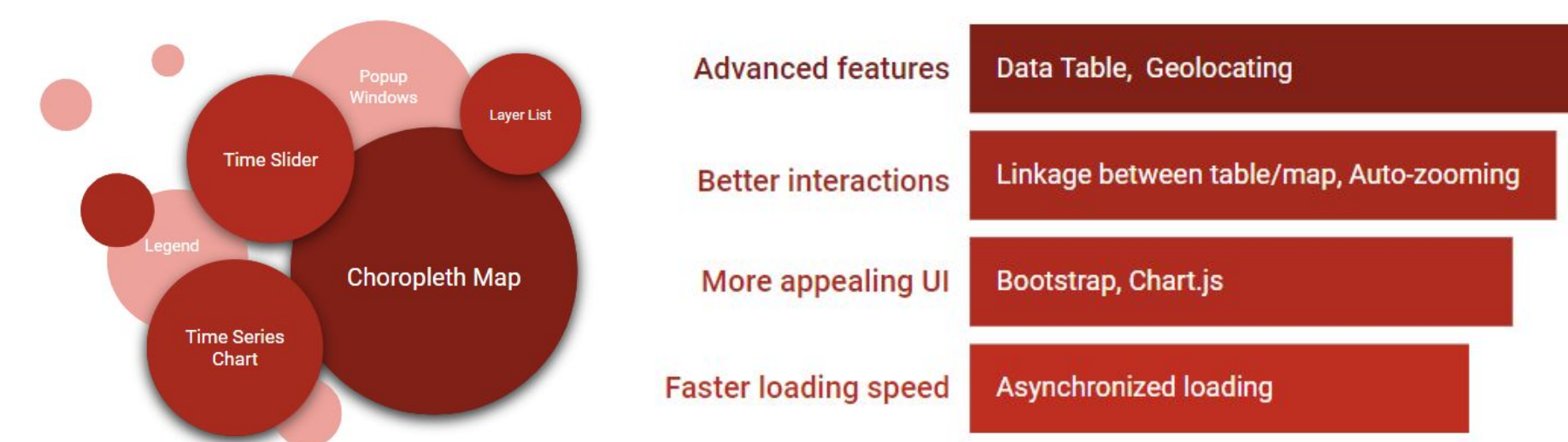- Support collaborative research

METHOD

System Architecture

Data Processing Workflow

Map Elements & Functions Design

Advanced features	Data Table, Geolocating
Better interactions	Linkage between table/map, Auto-zooming
More appealing UI	Bootstrap, Chart.js
Faster loading speed	Asynchronized loading

Technology

WhereCovid-19 Space-Time Explorer Web App uses a number of open source projects to work properly:
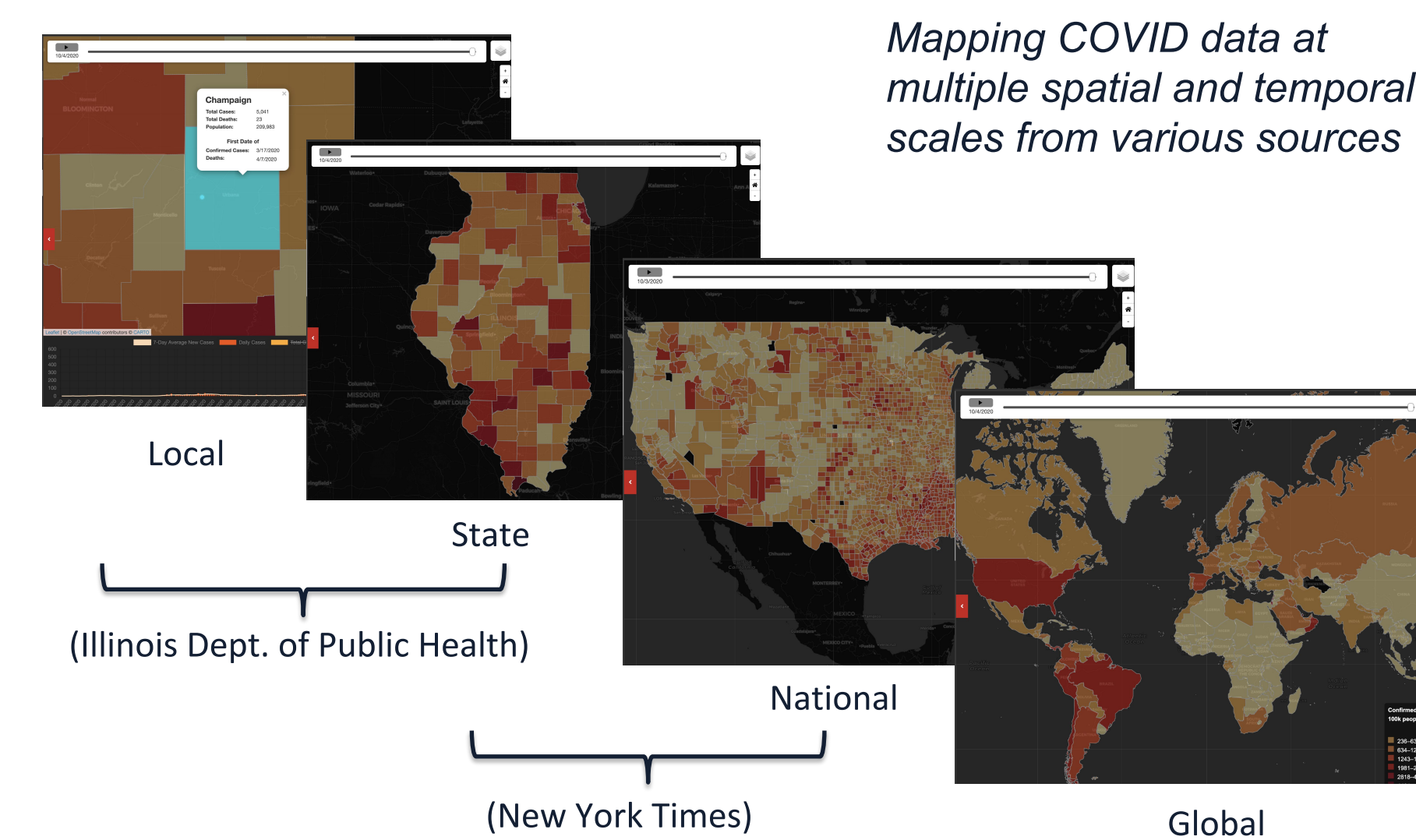
- Leaflet - open-source JavaScript library for mobile-friendly interactive maps
- jQuery - fast, small, and feature-rich JavaScript library
- Popper - tooltip & popover positioning engine
- Bootstrap - most popular front-end open source toolkit
- Chart.js - simple yet flexible JavaScript charting for designers & developers
- Font Awesome - most popular icon set and toolkit
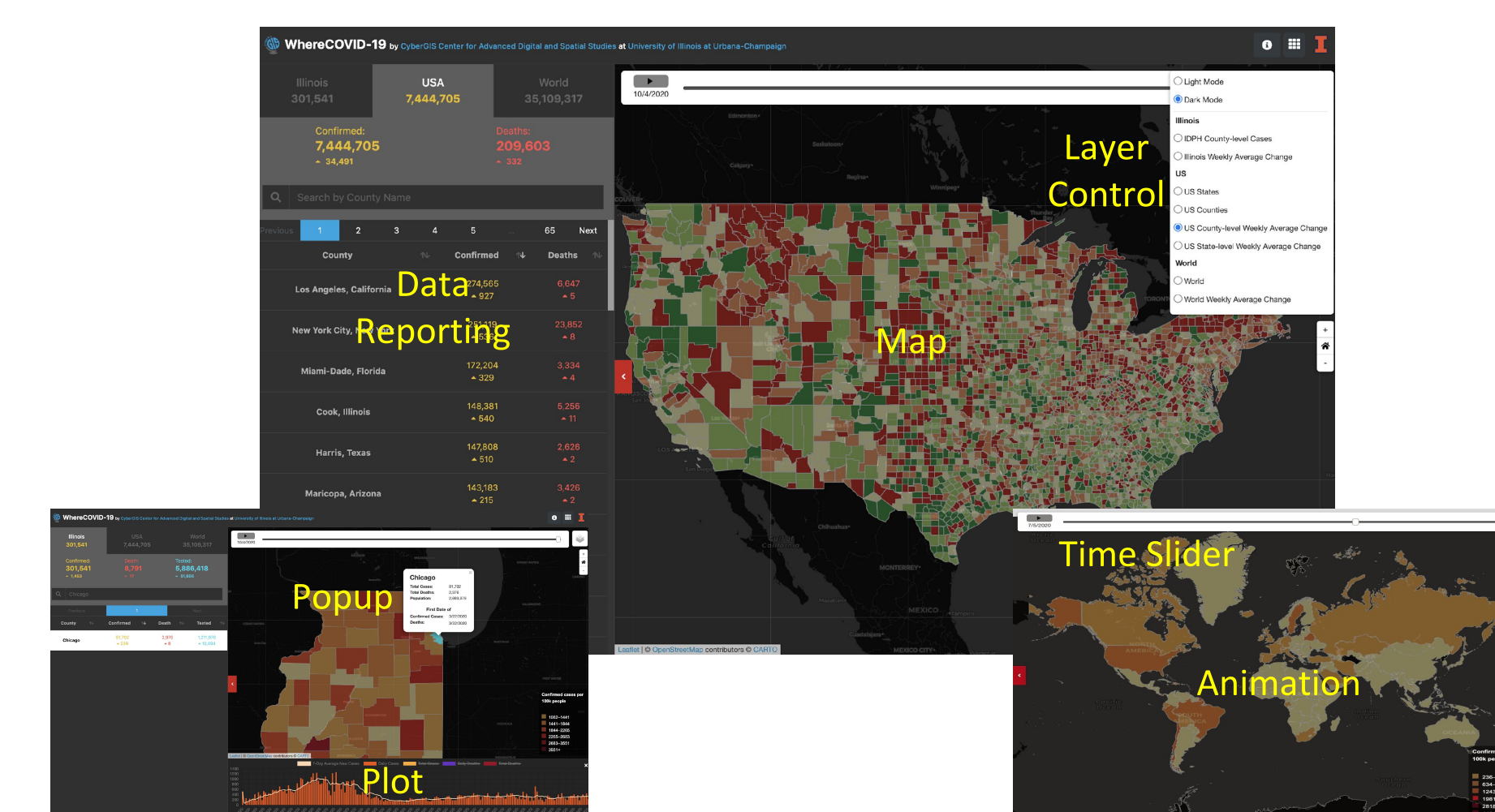- Jupyter - create and share documents that contain live code

Plugins

- Esri Leaflet
- Leaflet.timeline
- leaflet-ajax
- leaflet-groupedlayercontrol
- leaflet-fullHash

RESULTS

Multiple Spatial & Temporal Scales

Mapping COVID data at multiple spatial and temporal scales from various sources

Rich Up-to-date Information

Multi-Platform Support

Open-source & Shareable Maps by Simple Links

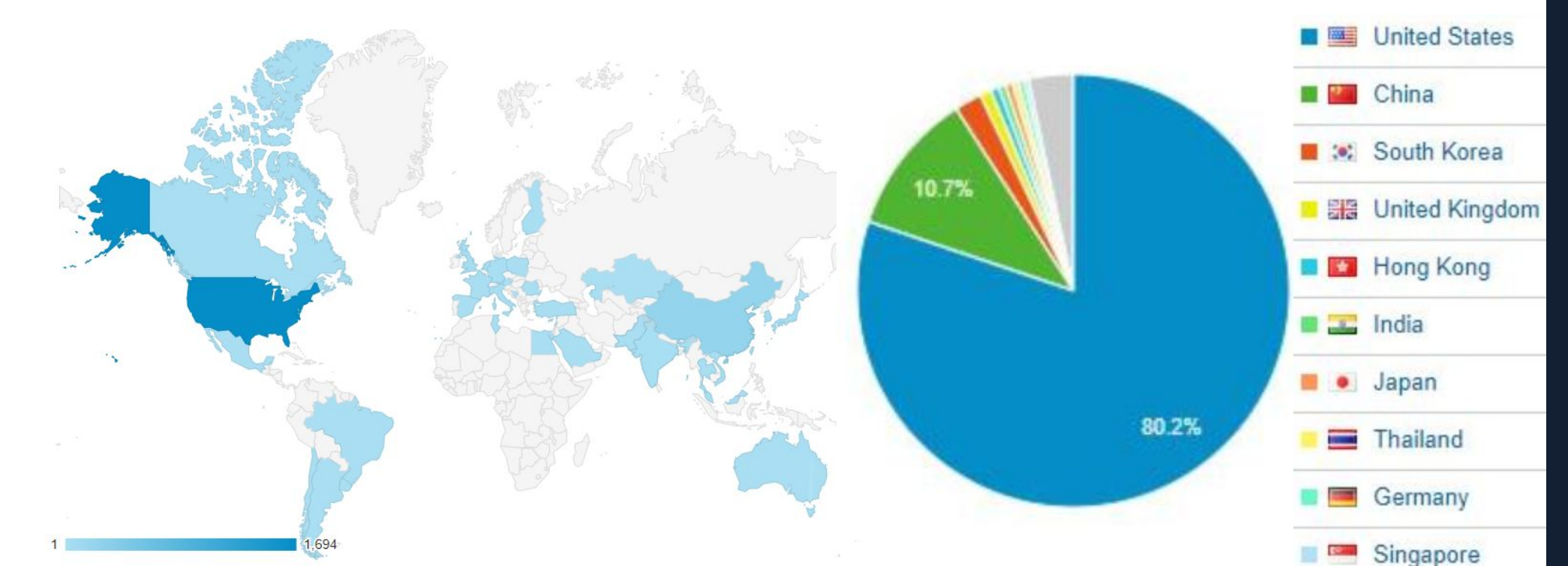https://wherecovid19.cigi.illinois.edu/#4/37.00/-96.00/Dark_Mode-us_county_weekly_case/298

DATA & CODES ACCESS

CyberGIS collects the latest COVID-19 data from Illinois DPH, New York Times and WHO regularly:

- IDPH (http://www.dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/coronavirus)
  ◻ Cases, Deaths and Testing time series for Illinois counties

- New York Times (https://github.com/nytimes/covid-19-data)
  ◻ Cases and Deaths times series data for US Counties and States

- WHO (https://covid19.who.int/)
  ◻ Cases and Deaths time series for all member countries

- Raw data and processed data are put in a shared folder on CyberGISX

- GitHub repo of all app source codes and Jupyter notebooks is at https://github.com/cybergis/wherecovid19_webapp

INFLUENCES

The WhereCOVID-19 platform was made available to the general public in April, 2020. Since released, it has attracted users from 39 countries and regions.

ACKNOWLEDGEMENTS

ILLINOIS