Visualizing Extreme-Scale, Next-Generation Epidemic Simulations

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Background

- Dr. Chen and others have developed the “Loimos Project” to forecast the outcome of an epidemic with different parameters, like R number, vaccination rate, variant emergence, etc.
- Next-generation parallel contagion simulation code on a scale that has not been done before
- Loimos generates massive timeseries data on a county-basis for the entire US across a multitude of scenarios
- Problem: How to effectively understand this data and its consequences?
- Next step: How to use this understanding to minimize the spread/effects of the epidemic?

Project Goals

- Develop a front-end visualization dashboard to help people analyze complex Loimos-generated geospatial data and draw meaningful conclusions
- Generalize this dashboard to allow visualizing other projection data provided in a certain format
- Make the dashboard compatible with real-world data so the projections can be compared with the ground truth

References

COVID-19 Map. (n.d.). Johns Hopkins Coronavirus Resource Center. Retrieved July 28, 2022, from https://coronavirus.jhu.edu/map.html

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Hullman, J. (n.d.). How to Get Better at Embracing Unknowns. Scientific American. https://doi.org/10.1038/scientificamerican0919-80

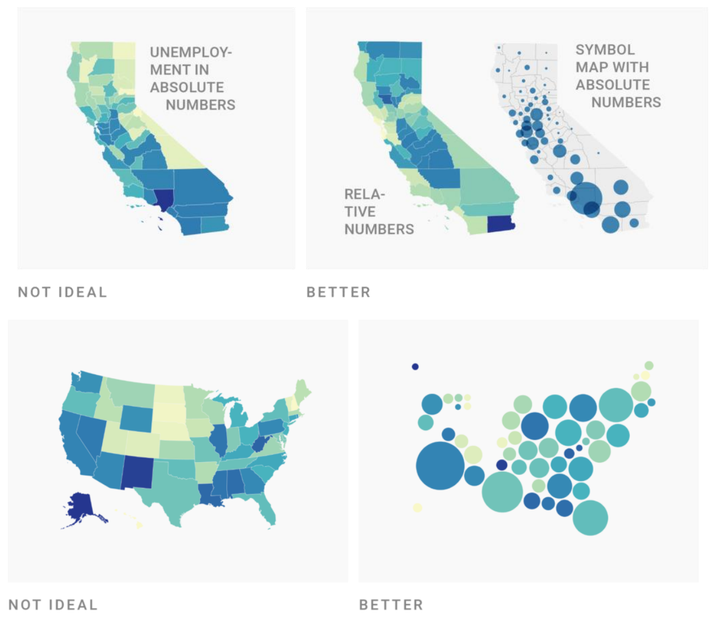
What to consider when creating choropleth maps. (n.d.). Retrieved July 28, 2022, from https://blog.datawrapper.de/choroplethmaps/

Current Work

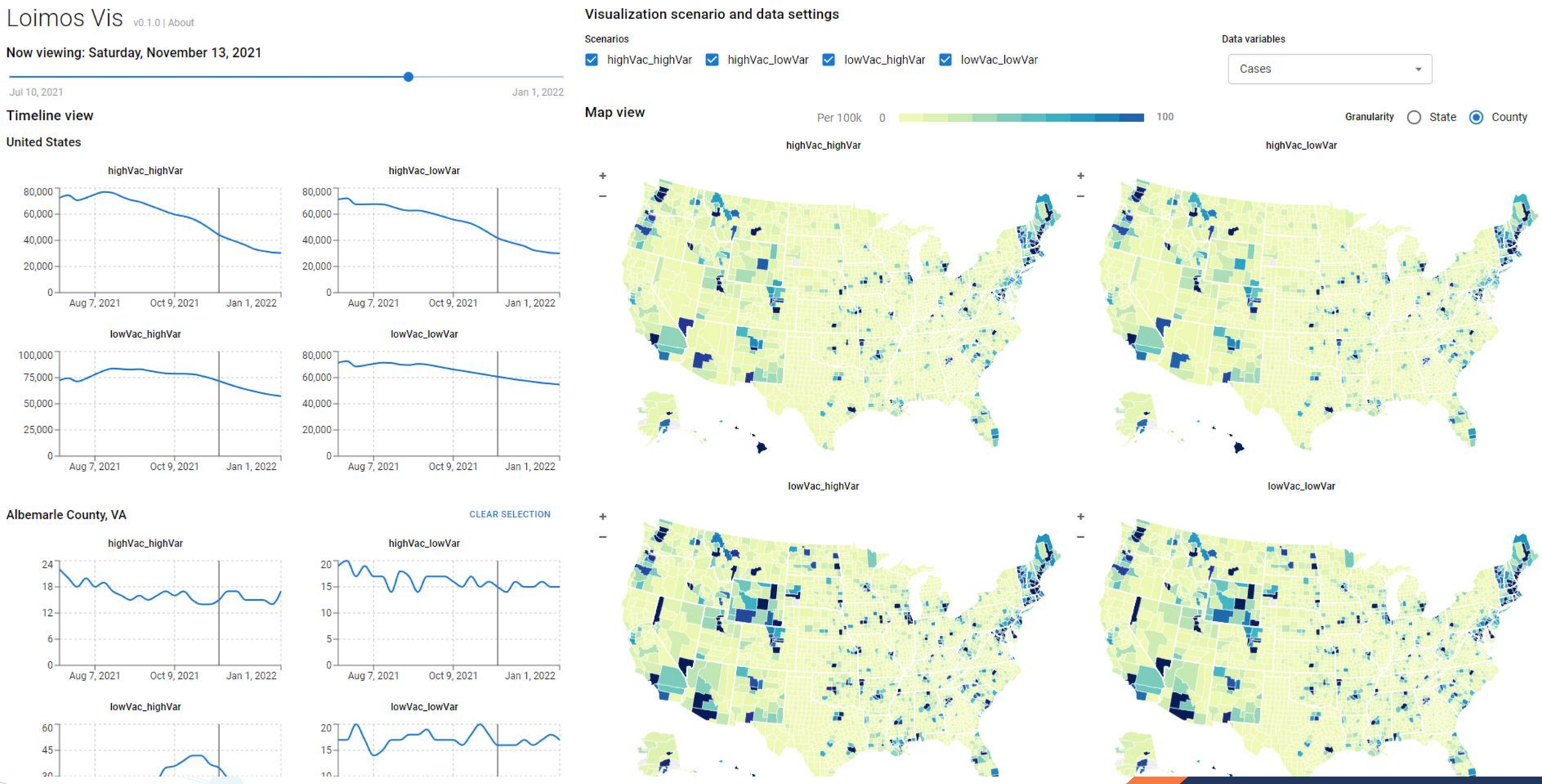
- Developing a visualization dashboard using React on the front-end and Python on the back-end
- Researched existing literature about visualizations, and websites/dashboards with COVID visualizations and projections like New York Times, Johns Hopkins University, and others
  - Determined that small multiples work best in overall for comparing different scenarios over time
- Determined which UI, charting, and mapping frameworks/libraries work best for our use case

Future Work

- Extend support for non-Loimos data (for instance, IHME projection data and ground truth)
- Add more visualizations, like cartograms and symbol maps, on top of existing choropleth maps
- Research novel visualization techniques that showcase results better than existing methods
- Implement a consistent branding (logo, favicon, colors, fonts)
- Improve user experience by optimizing React and OpenLayers performance to make animations smoother



Alternative methods of visualizing data
Image courtesies of DataWrapper



Screenshot of dashboard

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