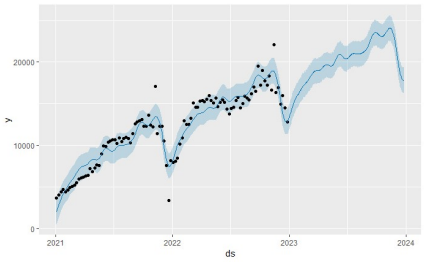
CLIMATE CORPS
A PROGRAM OF SEI

Routes to Safer, Cleaner, and More Reliable Transit
Capitol Corridor Joint Powers Authority

Projects: Transit Planning and Saving Lives

Predicting Future Ridership Trends for Operations Planning

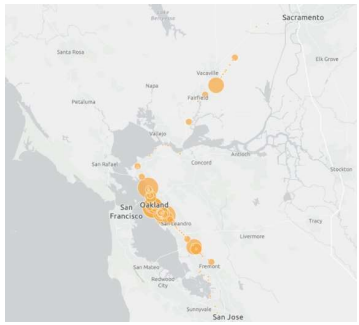


Machine learning/time series analysis can predict future ridership from historical data.

Especially as transit agencies begin to reach the end of COVID-19 emergency funding and declining farebox recovery from lower ridership, analytic tools that help understand passenger behaviors will help agencies plan through the upcoming fiscal cliff.

Graph showing a non-linear time series additive model that predicts 2023 ridership from 2021-22 ridership. Parameter uncertainty at 80% determined by a Hamiltonian/hybrid Monte Carlo algorithm.

Applying Geographic Information Systems and Data Analytics to Increase Rail Corridor Safety on *Capitol Corridor* Trains



By combining Python scripting, data visualization, and geographic information systems, we can identify hotspots for train accidents. Working with city, state, and federal partners will help save lives at at-grade crossings along the rail corridor.

Locating places that require additional fencing and deterrence measures will increase train reliability and frequency.

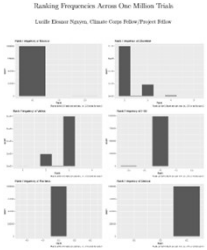
Map showing the location and count of at-grade accidents along the Capitol Corridor route, 2019-2022.

Results

Estimation for Multi-Criteria Decision Analysis Problems

A dynamic Monte Carlo algorithm that I developed in Python over the course of my fellowship was utilized in the planning and analysis of a new multi million-dollar rail crossing across the Carquinez Strait. Over 1,000,000 trials were run, and the results were delivered to the Capitol Corridor board.

This algorithm has applications to engineering, public policy, and sustainability.



Next Steps

- Refine prediction algorithms for ridership and develop new forecasting methods that consider exogenous factors (economic recovery, cell phone activity in city downtowns, &c.)
- Work on the applications for remote sensing and machine learning on train ridership detection and crowding.
- Develop Geographic Information Systems to identify hotspots of train incidents and work with partners to implement an accident prevention program.

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Pursuing a career in sustainability, operations research, data science/analytics, and machine learning.

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