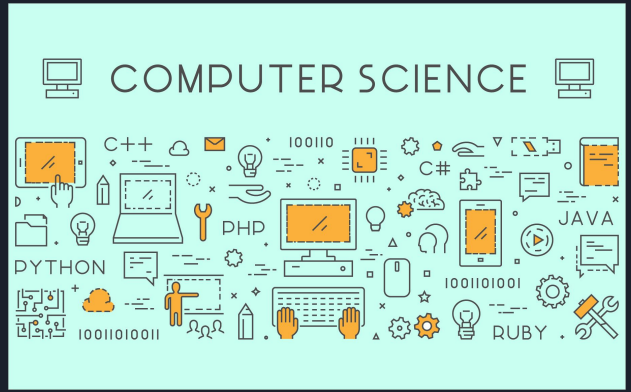
DataFest

By Jason Gates and Stanley Yang
ENGR180 – Summer 2022
06/17/2022

Who are we?

- My name is Jason Gates and I'm a 4th year majoring in Computer Science and Engineering. I am from Los Angeles, California.
- My name is Stanley Yang and I'm also a 4th year majoring in Computer Science and Engineering.

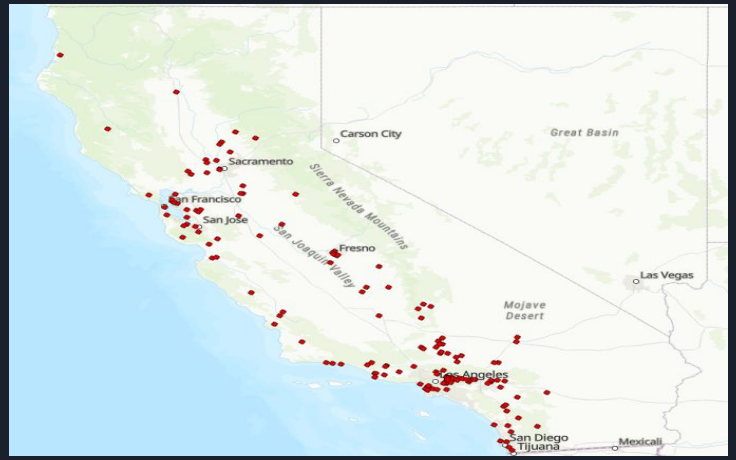


Background Info and Hypothesis

- The question we will explore is “Do more densely populated places in California have more power lines and power outages?”.
- Power outages were on the rise in California and in 2019, **25,281** power outages occurred which is a substantial amount from 2018 (**20,598**). This is why it's important to find what can possibly cause power outages or what correlates with them.
- California has **25,526 miles** of power lines and we wondered if areas with an abundance of power lines in highly populated places (like SF or LA) were more prone to power outages than rural places (smaller population).

- **Hypothesis:** Yes densely populated areas usually have more power lines and have more power outages because there are more people using electricity.

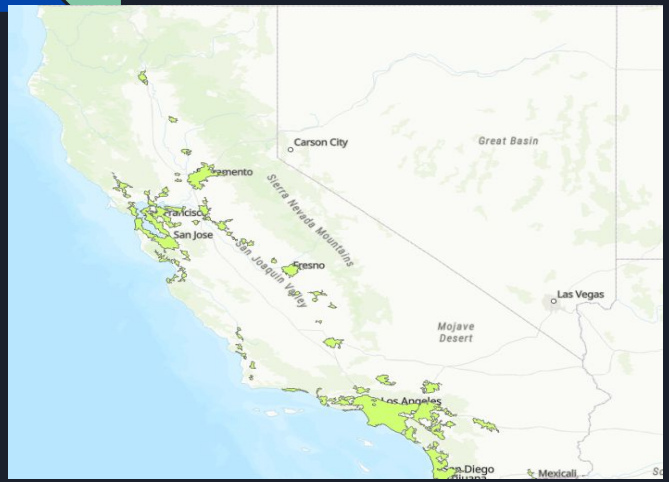
Datasets (Electrical)



- Power Outages in California on June 2022 By CA Governor's Office of Emergency Services
- Link & Source: https://gis.data.ca.gov/datasets/CalEMA::power-outage-incidents/explore?location=36.501396%2C-120.398687%2C7.32 (Steps: California State Geoportal Online search -> searched power outages in California)
- **Issues:**
  - Limited Data (week or two of data)
    - Yearly or a few years of outages would be better.
  - The size of the data points were too big which made it harder to see each layer

- Powerlines in California By California Energy Commission
- Link & Source: https://cecgis-caenergy.opendata.arcgis.com/datasets/260b4513acdb4a3a8e4d64e69fc84fee_0/explore?location=37.221216%2C-120.929034%2C9.27 (Steps: California Energy Commission Online search -> searched electric transmission lines in California)
- **Issues:**
  - Source is from 2017 meaning more powerlines could've been built.
  - Some powerlines went outside of California and we needed to clip it.
  - Powerline color needed to be adjusted to make other layers more seeable.

Datasets Part 2 (Areas)

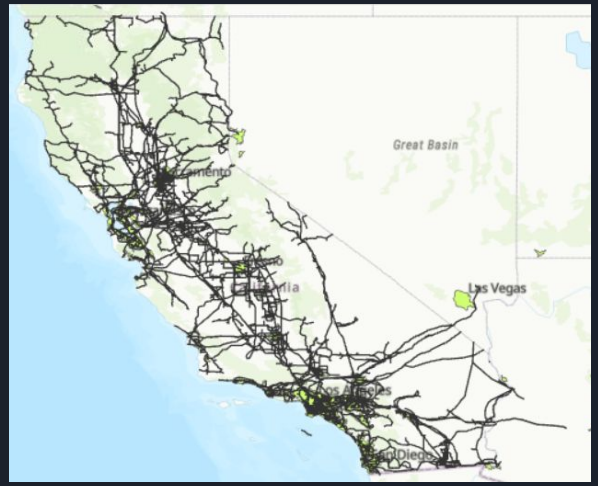


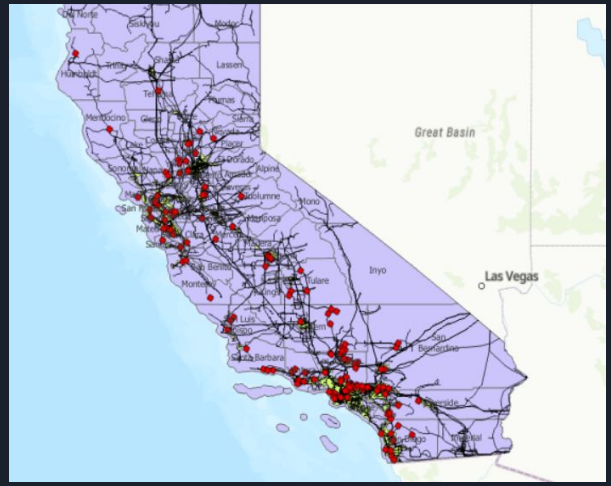
- Highly Populated Areas in California By National Pipeline Mapping System
- Link & Source: https://www.npms.phmsa.dot.gov/PopulationData.aspx (Steps: Googled population density data shapefile and clicked on the 8th result.)
  - Derived from the U.S. Census Bureau's TIGER Urban Areas data
- **Issues:**
  - Gave populated areas of other states so we had to clip it.
  - Layer was created using data from 2010 (Data is still usable because it gives the general areas of populated areas.). Populated areas also most likely got bigger and non-populated areas in 2010 most likely got bigger.
  - Not a primary source

- Counties in California By Census
- Link & Source: https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.2020.html (Steps: Census Online search -> searched TIGER/Line Shapefiles then clicked on FTP Archive by Layer and clicked the county folder link. Click on the 2020 folder and then choose the 6th county zip file)
- **Issues:**
  - Position & font size of counties were difficult to see with other layers
  - County boundaries in this map are from 2020 (boundaries could have changed)

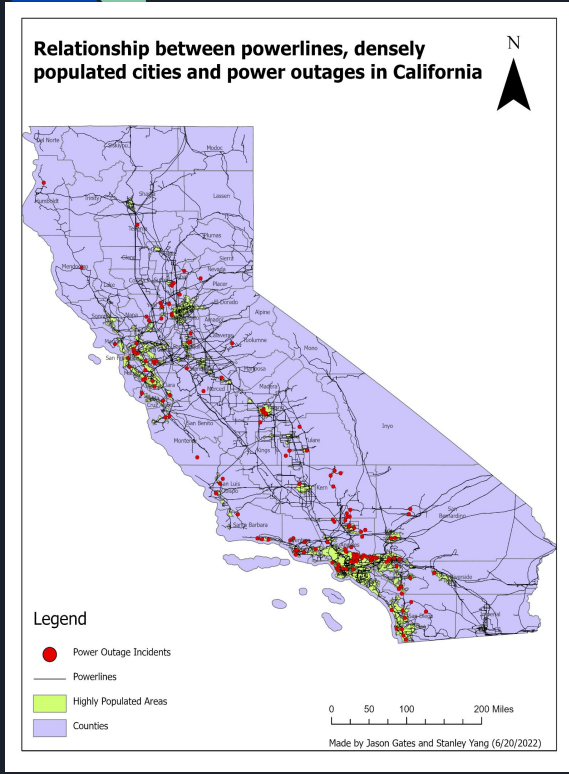
Analysis Workflow

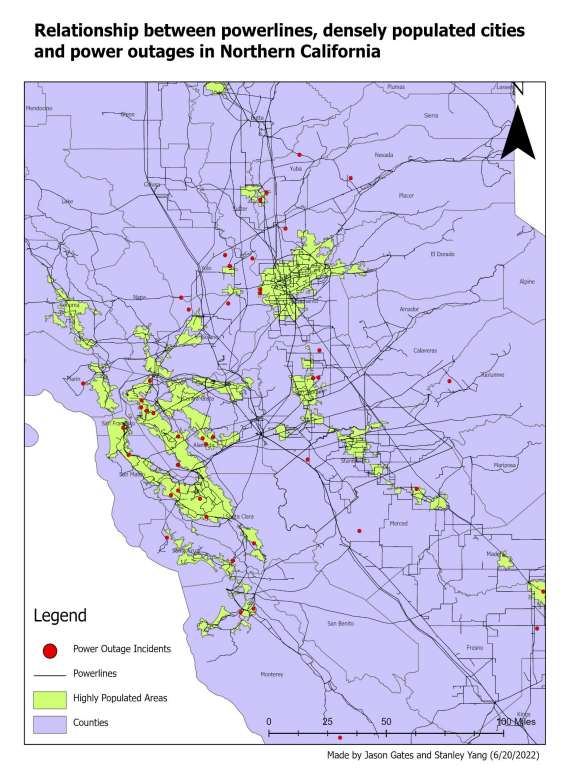
- Import powerlines, power outage incidents, and dense population areas.
- Clip datasets to show results in California
- Buffer and Intersect Datasets for power outages in and near populated areas
- Normalize

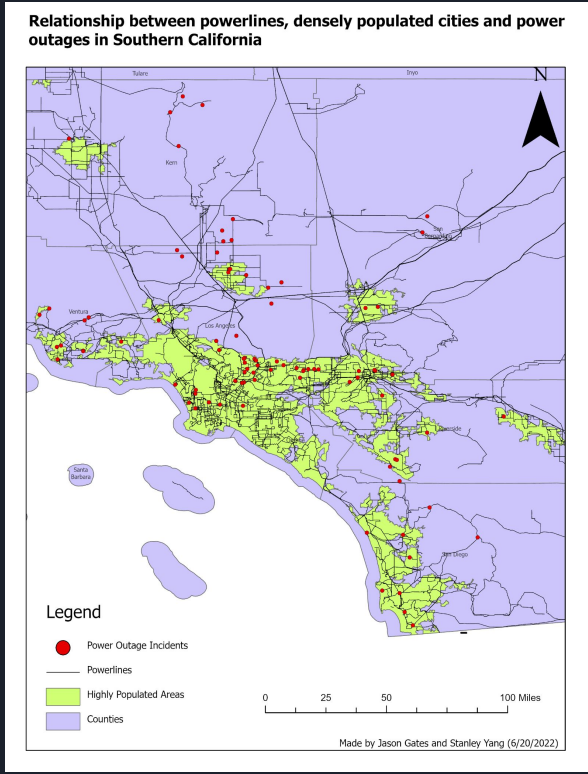




Geovisualization of the dataset







Significance and Techniques + Geovisualization Part II

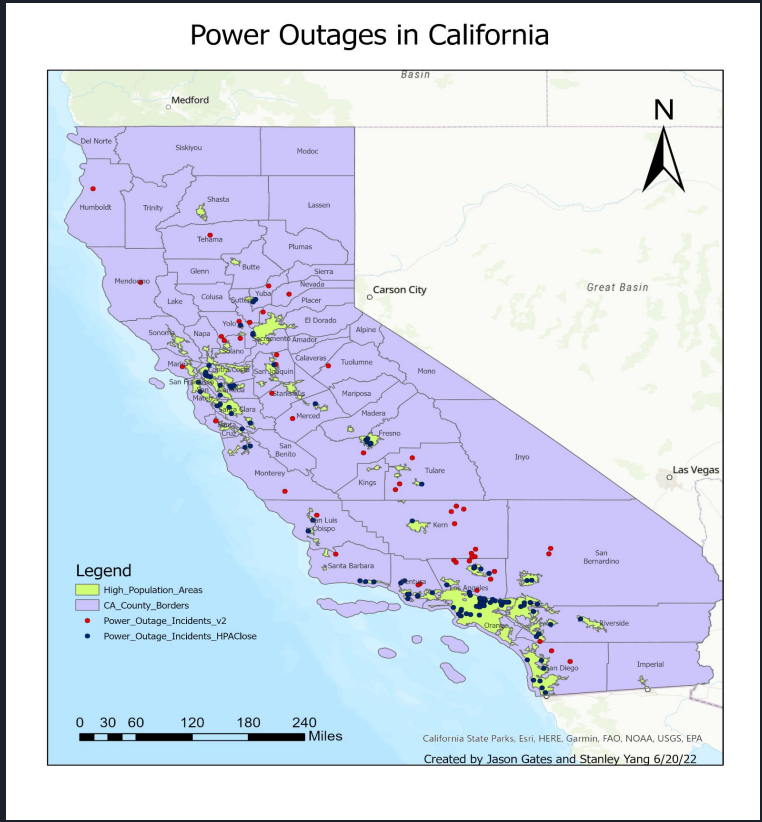
Clip: Allows us to isolate the area of interest

Buffer: Buffers areas around the populated areas, allowing us to catch outages nearby

Intersect: Allows us to see which power outages are near the highly populated areas

The use of all the techniques allowed us to filter the data into the results we wanted.

We got **126 outages** near or in the highly populated areas out of the **209 outages**



Results

Initial Hypothesis:

- Densely populated areas usually have more power lines and have more power outages because there are more people using electricity

Conclusions & Findings:

- Our findings seem to show there is a **correlation between power outages and high population areas**. However! There are a lot of other certain factors that are or could be influencing this result. Therefore we can only say densely populated areas at most is a factor in having more frequent power outages.
- Other factors can include: some tracked outages can be planned(?), weather, natural disasters, small sample size, etc.
- Our findings also show a **correlation between power lines and high population areas.** As shown in the geovisualization slide the power lines are more packed together in more populated areas.

References

- National Pipeline Mapping System. (2018, January). *High Population Areas (HPA) Data*. Retrieved June 19, 2022, from https://www.npms.phmsa.dot.gov/PopulationData.aspx
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ANY
QUESTIONS
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