Risk Assessment Model

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1. Define the problem
2. Gather the data
3. Explore the data
4. Model with data
5. Evaluate the model
6. Answer the problem

PROBLEM STATEMENT

- **Where should FEMA first deploy resources in a disaster?**
- **Specifically, which Massachusetts census tracts should they focus on?**

APPROACH TO THE PROBLEM

- **Build a risk assessment model**

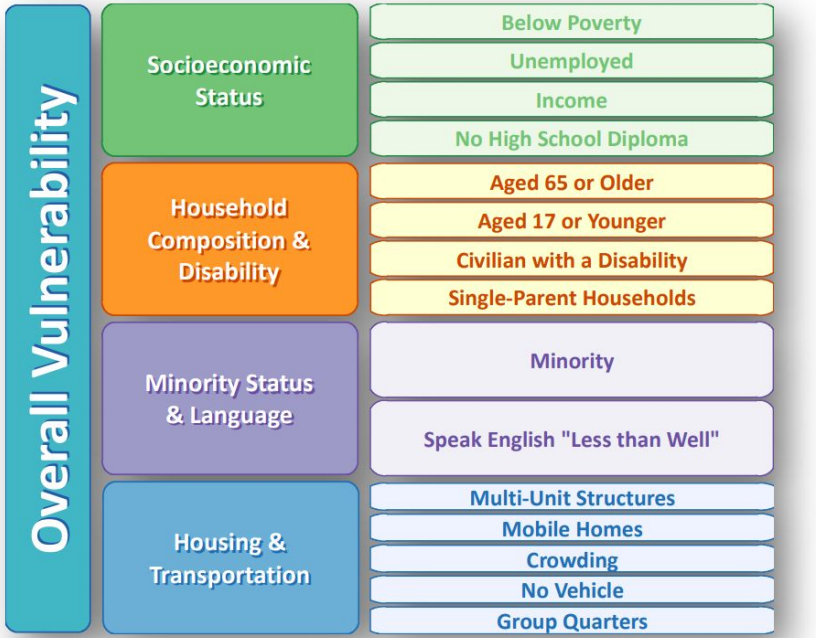
  Risk = Vulnerability - Resources

- **Visualize risk on census tract map of MA**

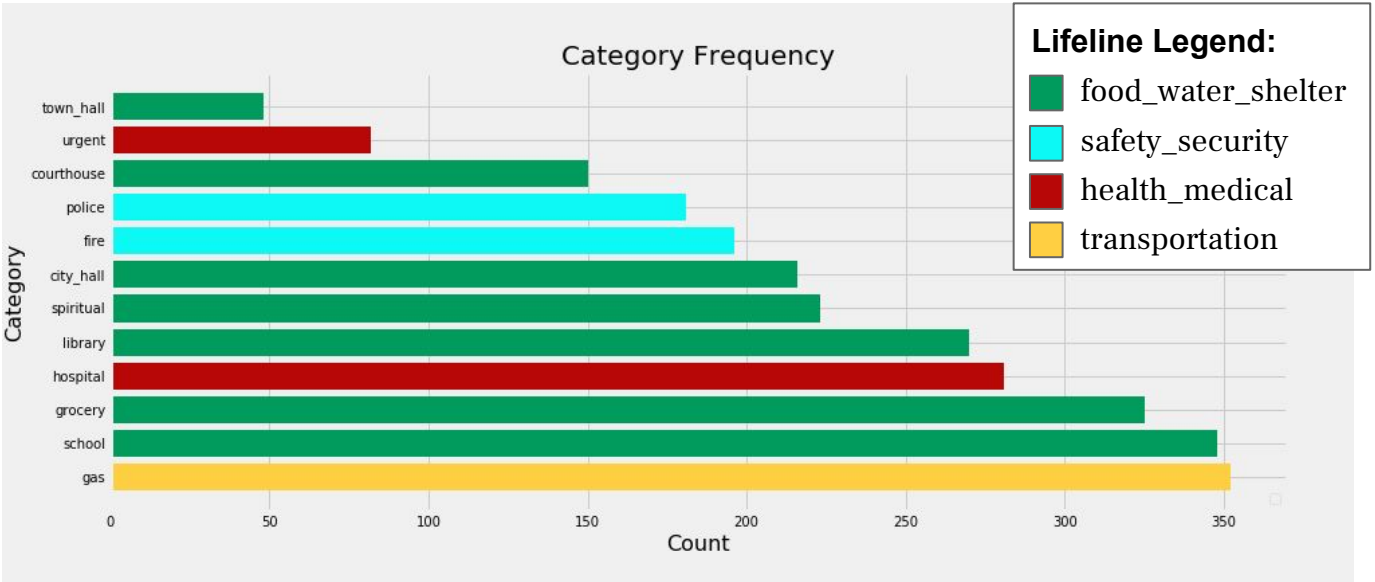
GATHER THE DATA

- **Vulnerability**: CDC social vulnerability data
- **Resources**: social media webscraping
  - Initially Yelp API
  - Changed to Foursquare API

EXPLORE THE DATA



EXPLORE THE DATA



EXPLORE THE DATA

- **Challenges:**
  - **Foursquare limitations**
  - **Combining lifeline and vulnerability dataframes in Geopandas**

EVALUATE THE MODEL

Assessing the riskiest census tracts

Risk Rank	County	Total Risk	=	Social Vuln.	-	Safety & Security	-	Food, Water & Shelter	-	Health & Medical	-	Trans.	+	Hazardous Waste
1	Hampden	1.072		0.839		0.016		0.000		0.000		0.000		0.250
2	Middlesex	1.060		0.810		0.000		0.000		0.000		0.000		0.250
3	Hampden	1.056		0.813		0.000		0.002		0.000		0.003		0.250
4	Norfolk	1.027		0.779		0.001		0.000		0.000		0.000		0.250
5	Berkshire	1.023		0.774		0.000		0.000		0.000		0.000		0.250

ANSWER THE PROBLEM

Distribution of risk ratings

FUTURE RESEARCH

- Higher weighting to resource metrics
- Expanding lifeline data and measuring categories impact on risk
- Building distance-based rather than census tract-based model

RESOURCES

- https://svi.cdc.gov/A%20Social%20Vulnerability%20Index%20for%20Disaster%20Management.pdf
- https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2018&layergroup=Census+Tracts
- https://svi.cdc.gov/data-and-tools-download.html
- https://developer.foursquare.com/
- https://www.mass.gov/guides/hazardous-waste-facilities-recyclers
- https://hifld-geoplatform.opendata.arcgis.com/datasets/electric-power-transmission-lines/data?geometry=-73.3%2C41.958%2C-69.626%2C42.669&page=7