A historical map of New York City, showing a grid of streets and various landmarks. A white rounded rectangle is overlaid on the map, containing the title text. The map includes labels like 'EXPLANATION' and 'ARRANGED TO ILLUSTRATE' at the bottom.

Acoustic sensors in urban planning

using sound data to address noise disparities in NYC's
noise-polluted boroughs

Johanna Riddle, MS



GRADUATE SCHOOL OF ARTS AND SCIENCES
Urban and Environmental
Policy and Planning

Background/Research Questions

What can **noise density** reveal about neighborhoods with the most need?



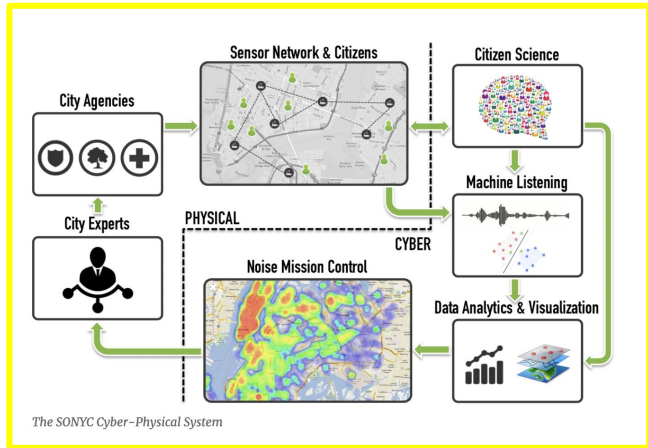
?

What does this reveal about acoustic sensor data as a **quantitative offset** for qualitative 3-1-1 calls?

Data Sources



- Limited open-access
- Brooklyn, Queens, Manhattan
- Continuous data collection



Bello et al., 2019

- Fully open-access
- 10003 and 10012
- ‘Descriptor’ and ‘DayOfWeek’

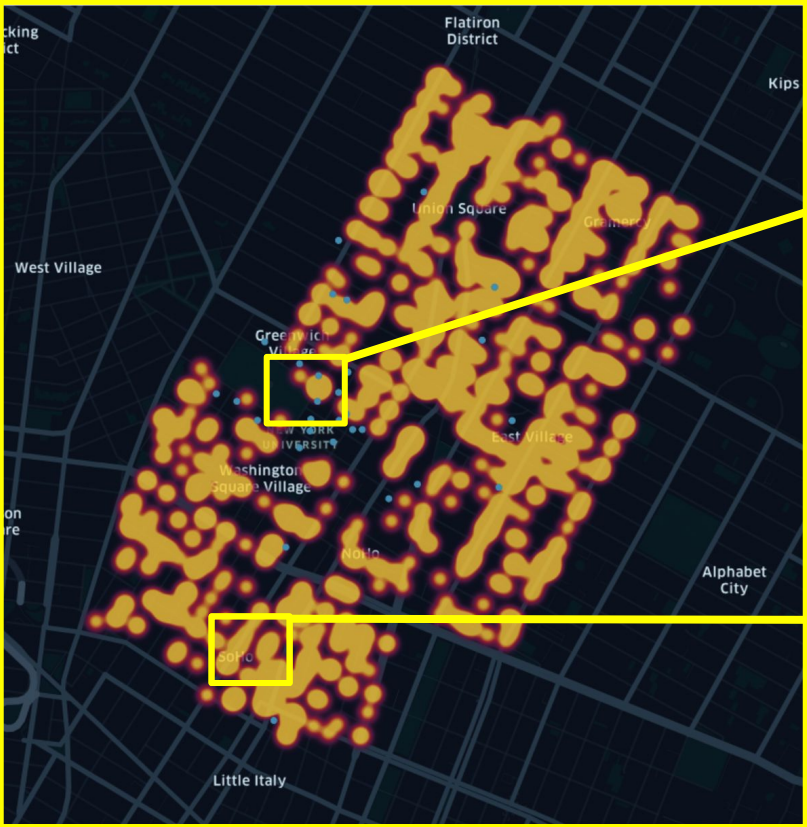


Data sources from the year 2019 only **



Quantitative data as a qualitative offset.

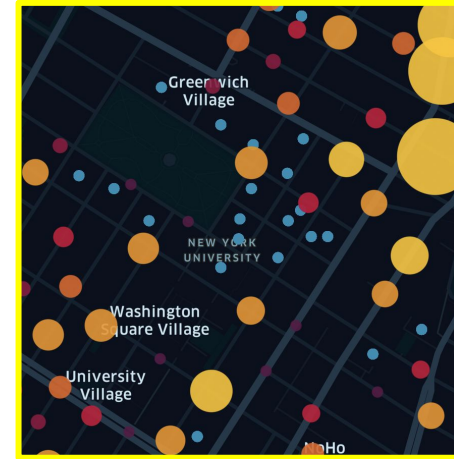
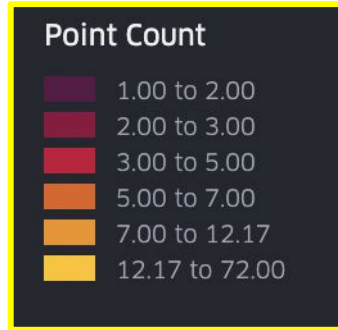
Case Study: Washington Square Park



- SONYC Sensor
- 3-1-1 Call

Results: Spatial Analysis

1. Majority of SONYC sensors **are not** in areas where 3-1-1 calls are the densest.



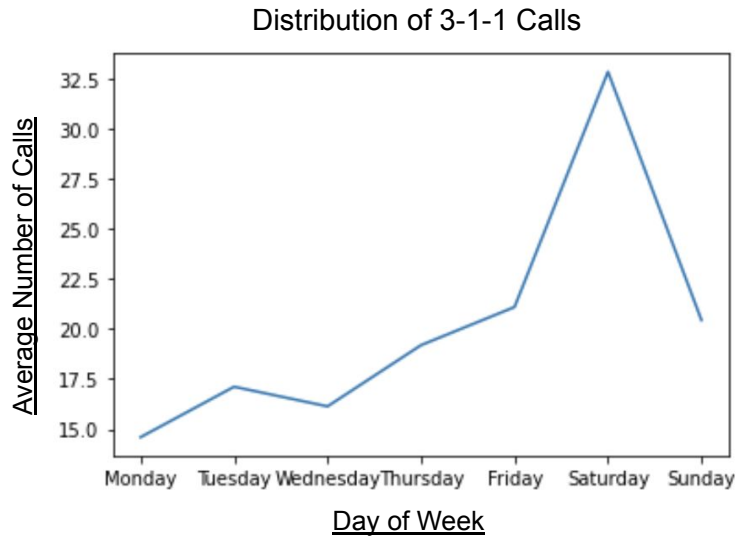
2. Clusters of sensors around Washington Square Park and NYU campus.



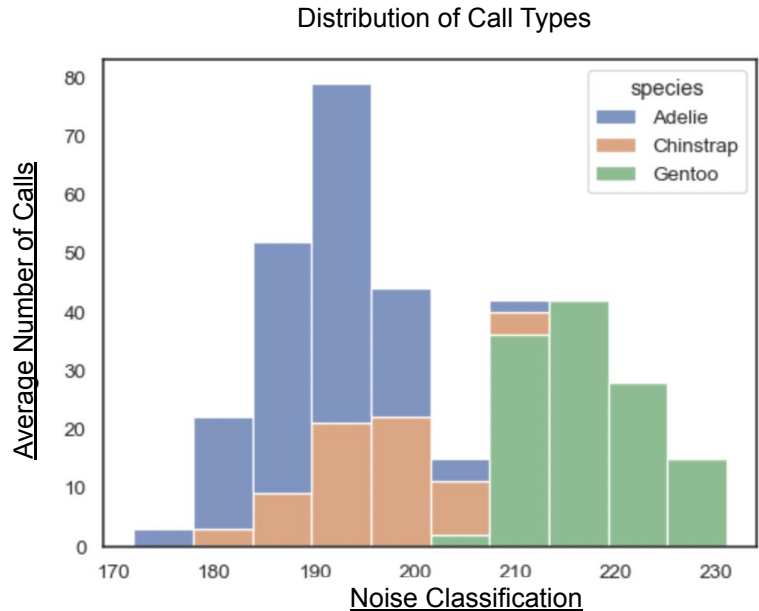
Noise density and technology placement should compliment each other.

Results: Statistical Analysis

1. Highest amount of 3-1-1 calls occur on the weekends.
2. Highest concentration of sounds is 'Loud music/party'



OUTPUT



EXAMPLE

Conclusions

General Conclusions

- Sensors may be in-equitably distributed.
- Acoustic sensor data will improve accountability, vigilance for noise-policy enforcement to protect vulnerable corridors.

Policy Implications

- Emergency vehicle re-routes, revised 311 data collection strategies, general traffic, non-vehicular mobility incentivization.
- Seasonal noise policy modifications, noise-buffering acoustic architecture.

Future Research

- Evaluate dimensions of proximity as a measurable dimension of specificity and soundscape context.
- Compare sensor locations and demographics (ie. annual household income) inside and outside of all three boroughs.
- Analyze reportable decibel thresholds and 3-1-1 reports.
- Compare the experiences/reports of city residents at ground-level and 4 floors+