# Micromobility in Seattle

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# Background

- Why micromobility?
  - Seattle is growing
  - Low emission, last mile travel solutions
  - Can replace up to 30% of short car trips, reducing VMT
- Seattle has been expanding micromobility (e-scooters/e-bikes)
  - 1.4 million rides (2020-2021)

# Research Questions

1. Where/when do e-scooter and bike share trips cluster?

2. Where/when do collisions cluster?

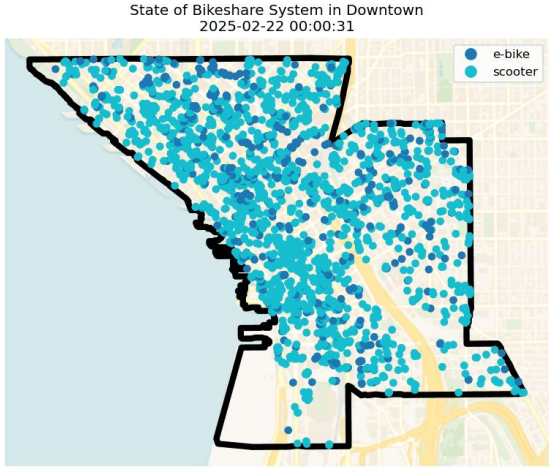
3. How do land use and slope affect micromobility usage and collision risk?

# Research Objectives

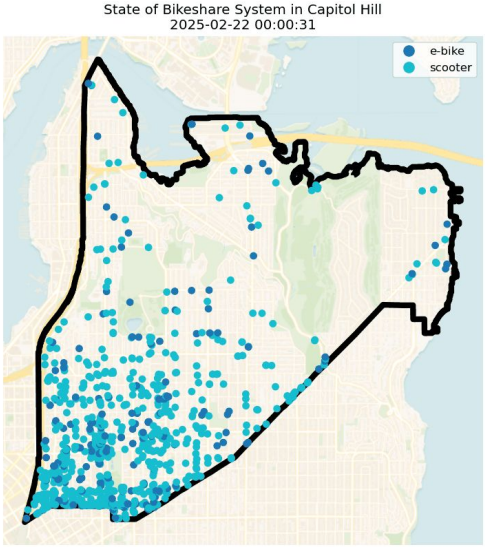
1. **Spatiotemporal Patterns**
    a. Identify ridership peaks
    b. Produce usage hotspot maps
2. **Collision Hotspots**
    a. Pinpoint high usage corridors
    b. Pinpoint collision hotspots
3. **Geographic Factors**
    a. Integrate terrain and slope data to see how they may affect microbility usage

# Where/when do micromobility trips cluster?

# Bikeshare Data Collection



# Bikeshare Data Collection



# When do micro mobility trips cluster?

**Data:**

Bikeshare Data Collection

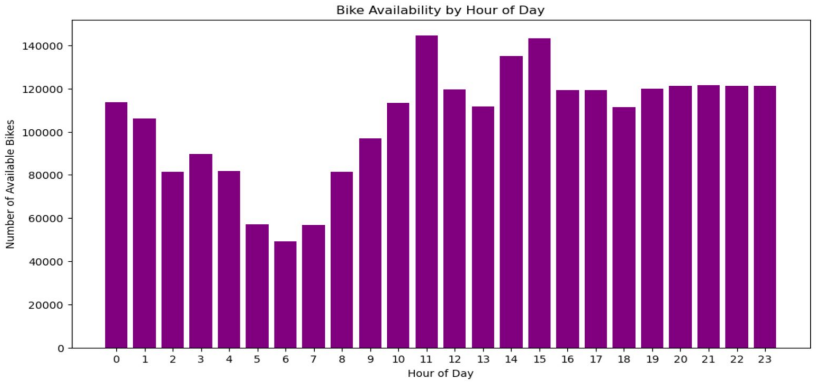
**Q:** What hours & days bikes are used the most?

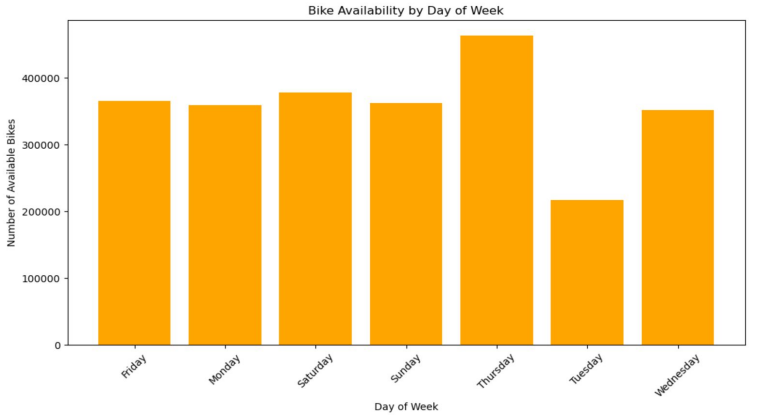
**Q:** Which vehicle type (e-bike or scooter) is most active at different times?

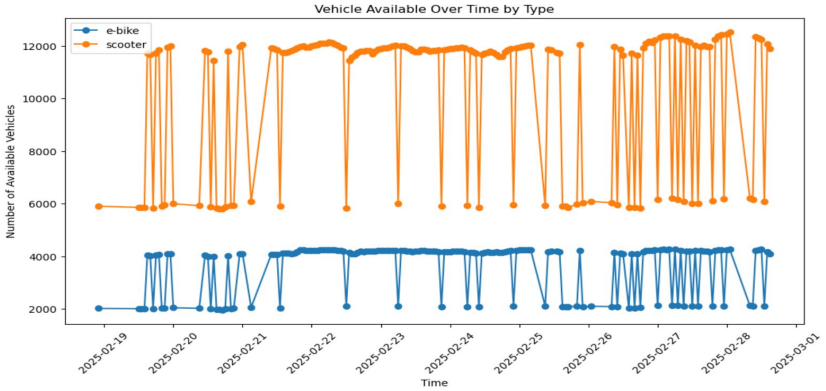
**Steps:**

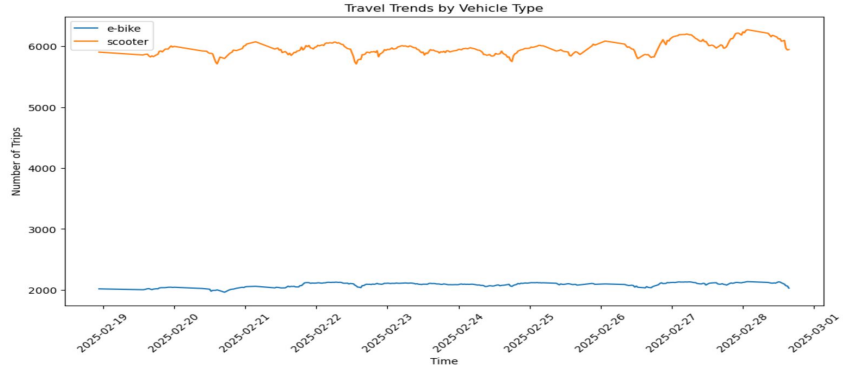
1. Load GeoJSON Data using Geopandas and use as GeoDataframe
2. Data cleaning process
3. Perform Spatiotemporal Analysis
    a. Time Series

# When do micro mobility trips cluster?



# Where/when do collisions cluster?

# Methods - Collision Hotspots

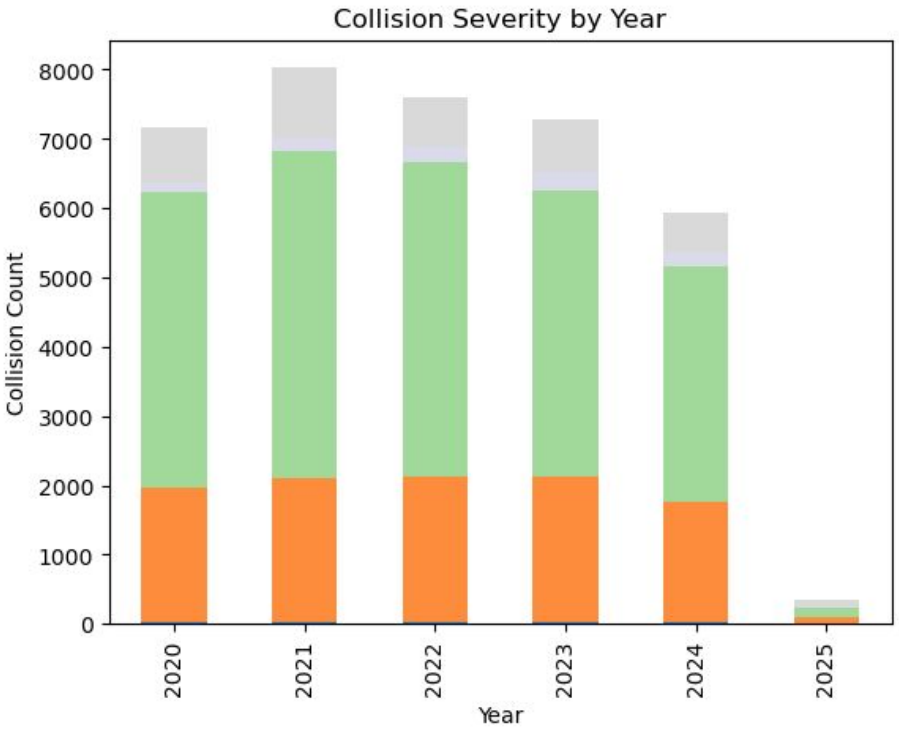
**Dataset:**

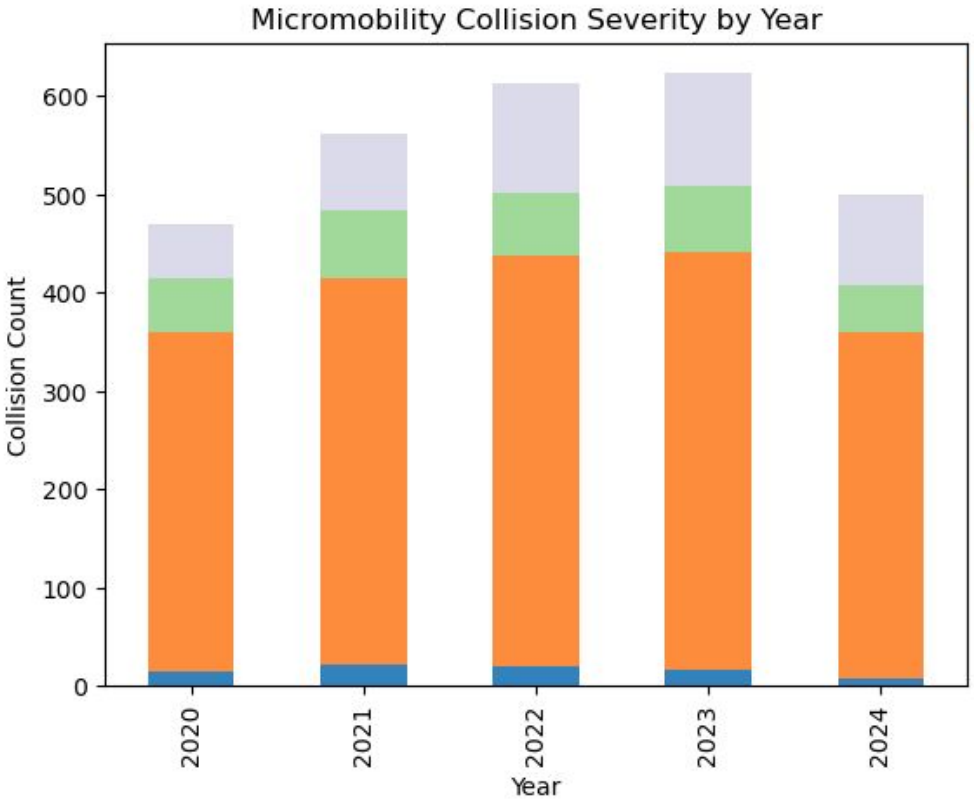
1. **SDOT Collision Data (All Year)**
   ➔ 2020-2025 (February)
2. **SDOT Bike Facilities Dataset**
   ➔ Bike facilities & Multi-use Trails
3. **Seattle Sidewalk Data**
4. **Household Types and Populations—Seattle Neighborhoods**

**Steps:**

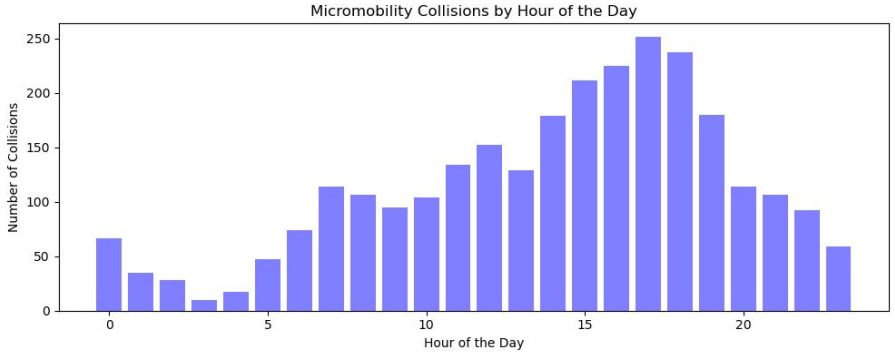
1. Load Data using API as GeoJSON and use as GeoDataframe
2. Data cleaning process
3. Perform Spatiotemporal Analysis
   a. Time Series
   b. Spatial Visualization
4. **Proximity Analysis** - Infrastructure
5. Identify Collision Hotspots by using **Kernel Density Estimation**
6. Calculate the **collision per capita (1000 population)** for each neighborhoods

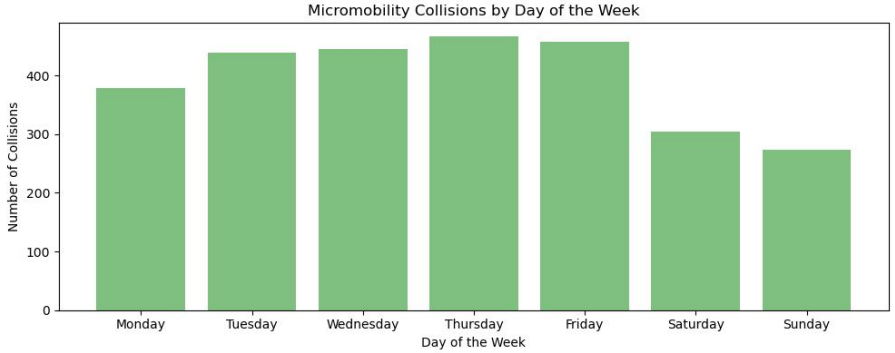
# SDOT Collision Data 2020 - 2025 (FEB)

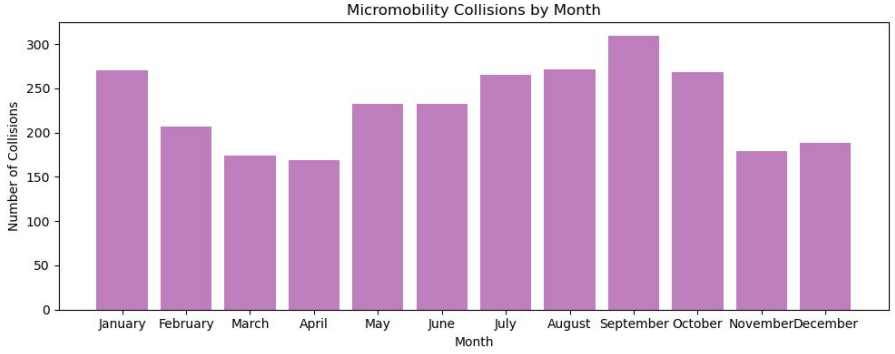



# SDOT Collision Data - Time-Series



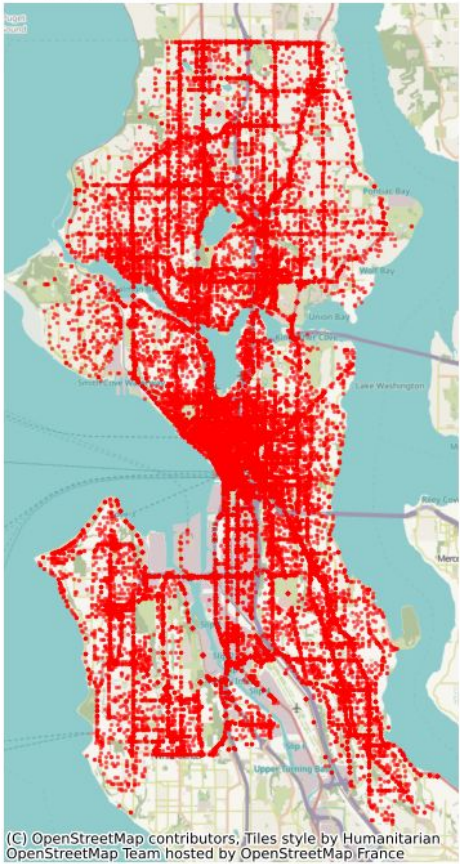



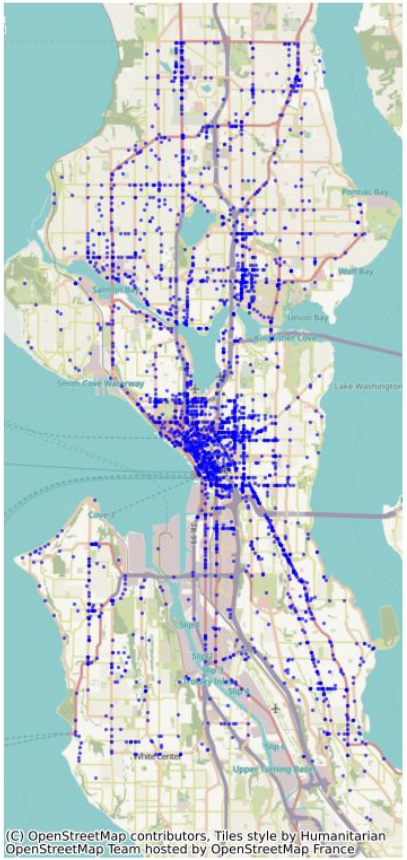
# What areas are prone to collisions?

# SDOT Collision Data - Spatial Visualization

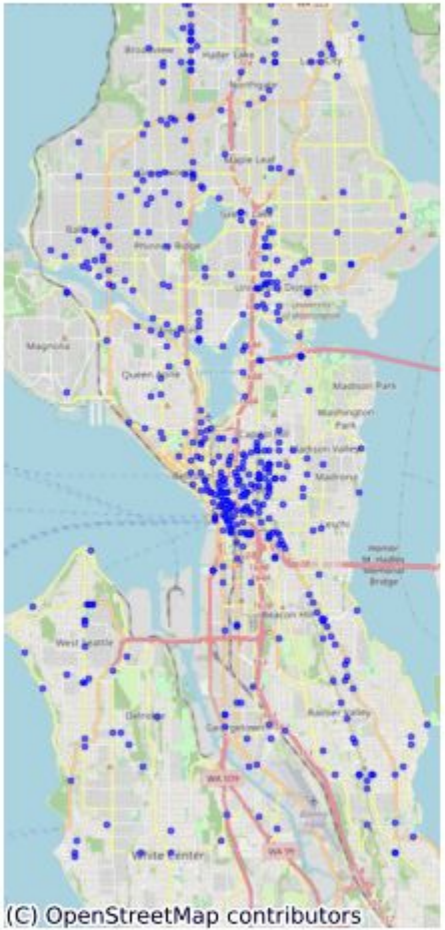
Seattle Collisions 2020-2025 (Feb)



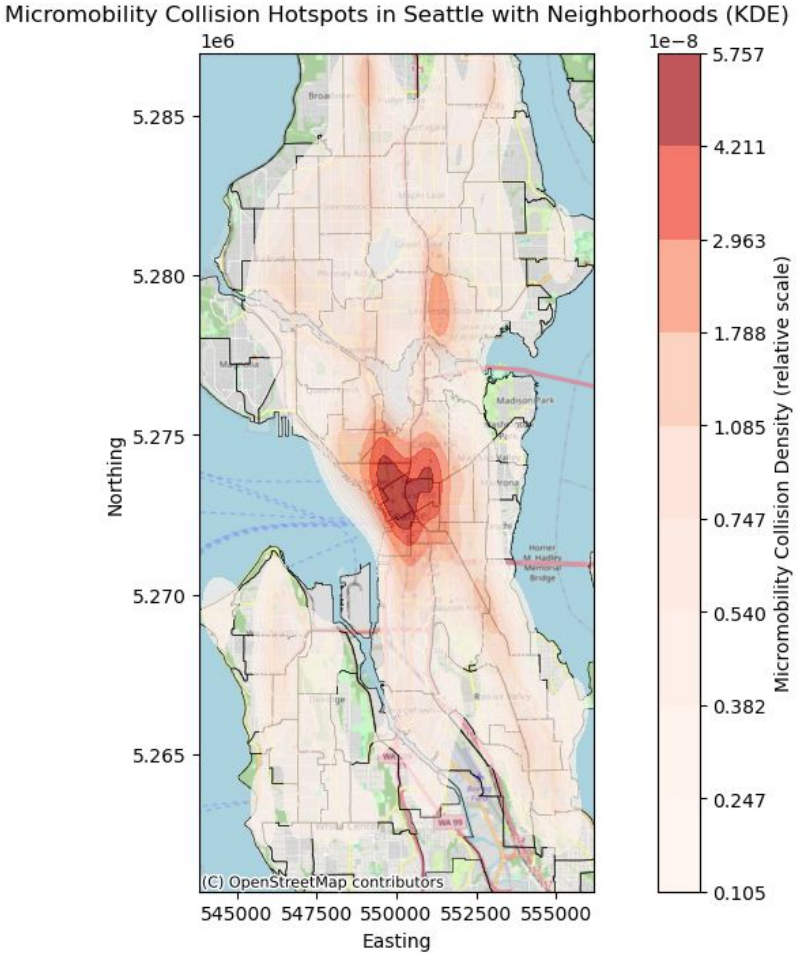

Seattle Micromobility Collisions 2020-2025 (Feb)

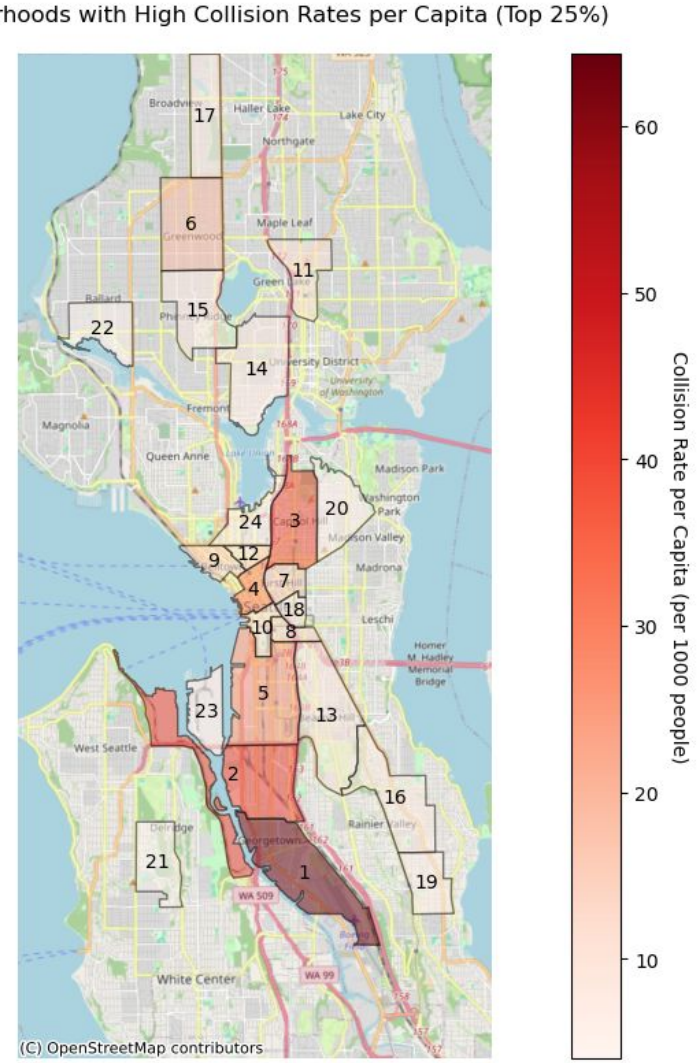



Seattle Micromobility Collisions (2020)

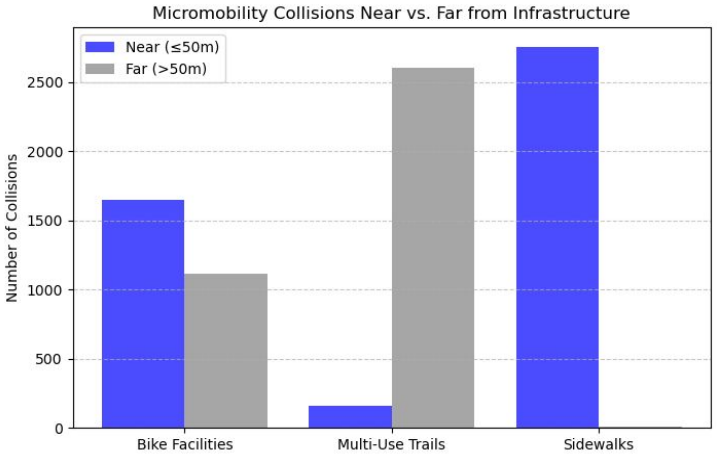


# Results - Collision Hotspots

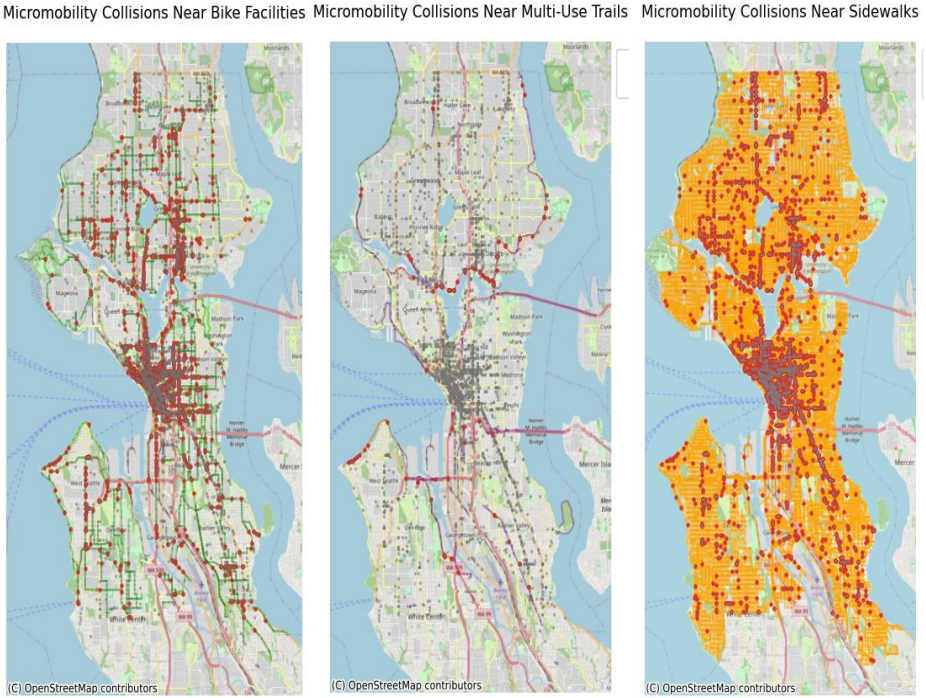


# Does land use affect collision risk?




59.6%  5.71%



How does slope affect usage and collision risk?

# Slope and Collision Risk

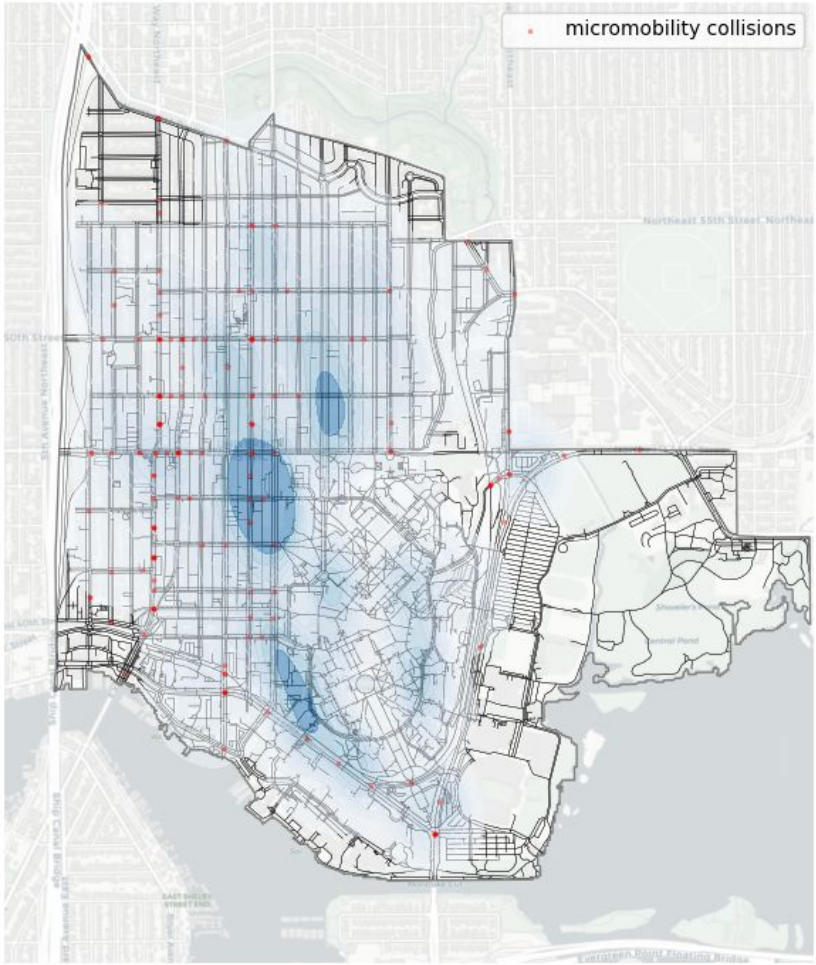
**Data:**

- 2016 King County DTM raster
- Seattle neighborhood boundaries
- Seattle road edges

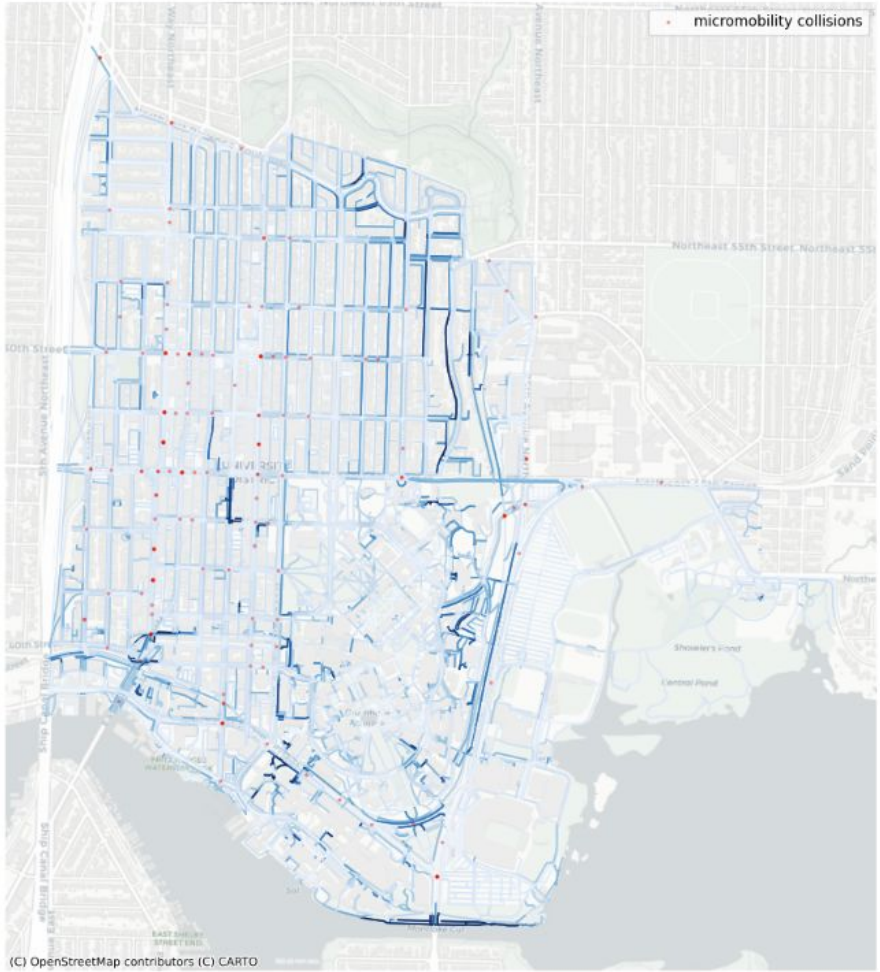
**Main Steps:**

1. Stitch rasters together
2. Calculate slope
3. Clip data to neighborhoods of interest
4. Calculate slope mean using zonal stats
5. Compare with collisions/usage

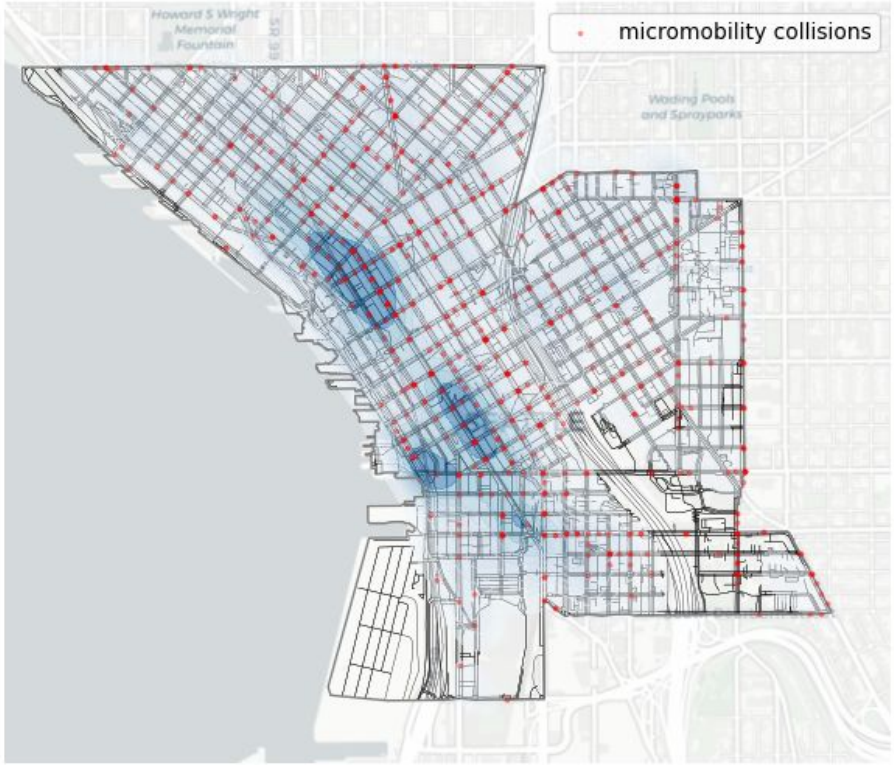
Seattle Lime Bikeshare System Density on 2025-02-22:
University District



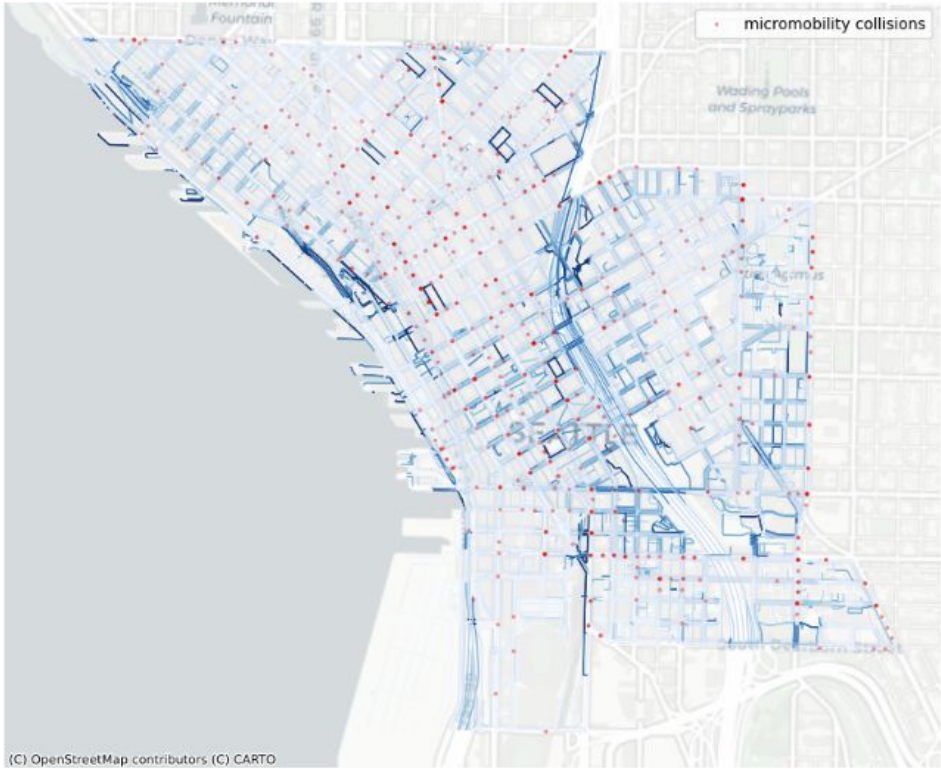

Micromobility Collisions on Seattle Slope Map
U District



Seattle Lime Bikeshare System Density on 2025-02-22:
Downtown




Micromobility Collisions on Seattle Slope Map
Downtown



# Key Takeaways

- Micromobility usage:
  - Cluster around Downtown and U District

- Micromobility collisions:
  - Cluster around Downtown and U District
  - Industrial areas have a higher collision rate (collision per 1000 population)
  - Collisions vary by infrastructure—more **near bike facilities than trails**

- Slope isn’t a strong indicator for any of the above

# Challenges

- Hard to compare using the micromobility data
  - Limited counts, availability vs usage

- Data was more of pop. density indicator

**Next steps:**

- Get actual trip data
- Normalizing all data
- Analyze other geographic factor

Thanks for listening!