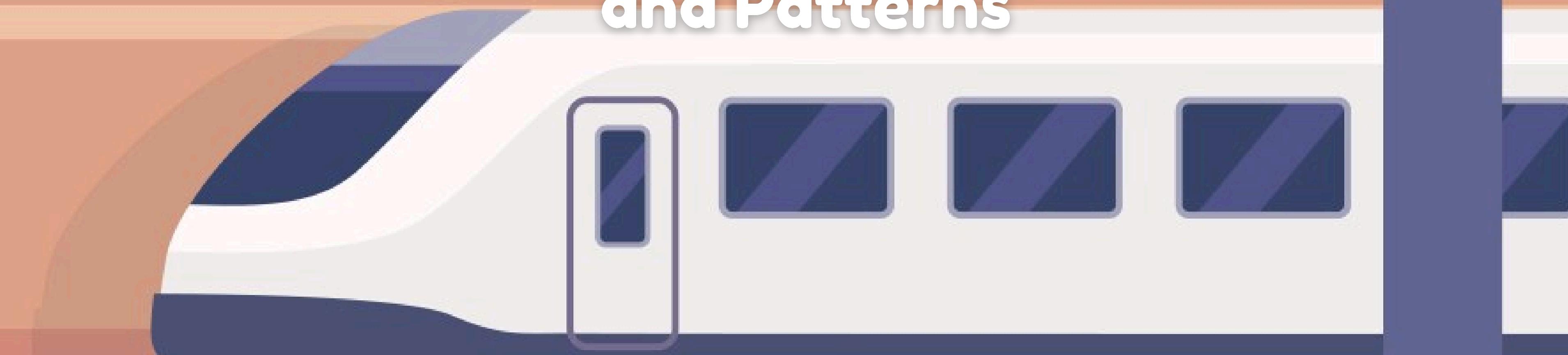
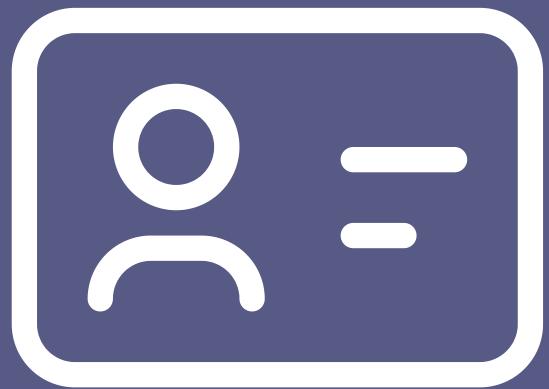


# Team IC25057 - Beyond the Commute: Investigating DC WMATA Ridership Trends and Patterns



Alexa Chu, Sophia Narido, Amira Tlemsani

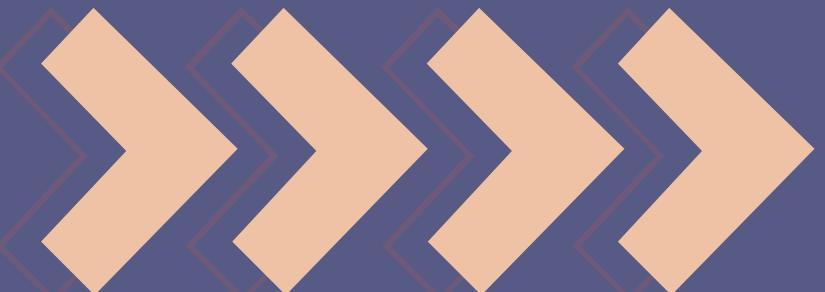


## Research Questions



### Main Research Question:

**How do business and retail hubs impact average daily entries for metro ridership?**



- **How do top stations differentiate based on weekdays and weekends?**
- **Which jurisdictions in the DMV have the most average daily entries?**



# Approaches

## 1. Python:

- Pandas
- Matplotlib
- BeautifulSoup

## 2. ArcGIS

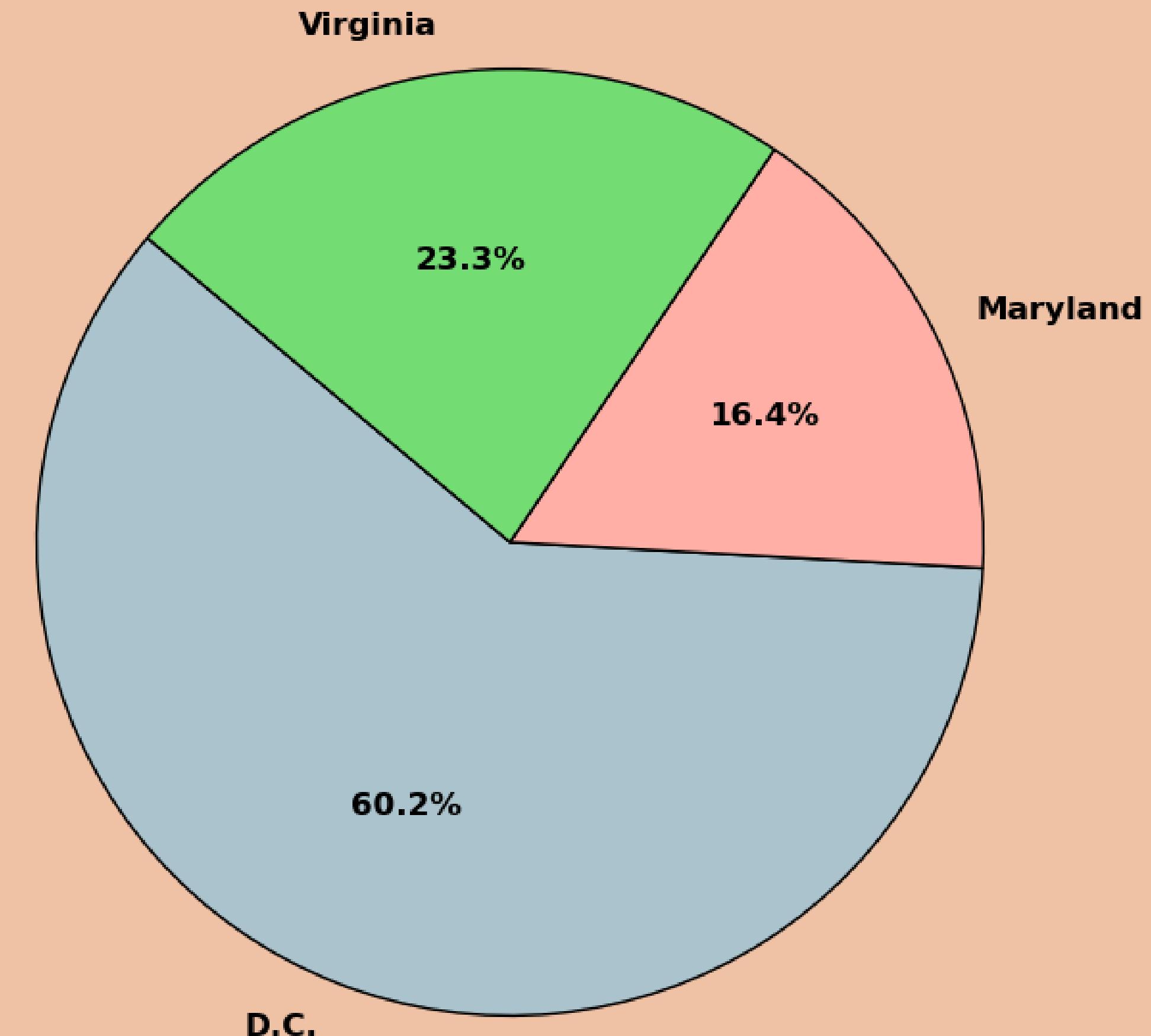
- Used Open Source Data
- Mapped high ridership stations.
- Mapped business and retail hubs

## 3. Research:

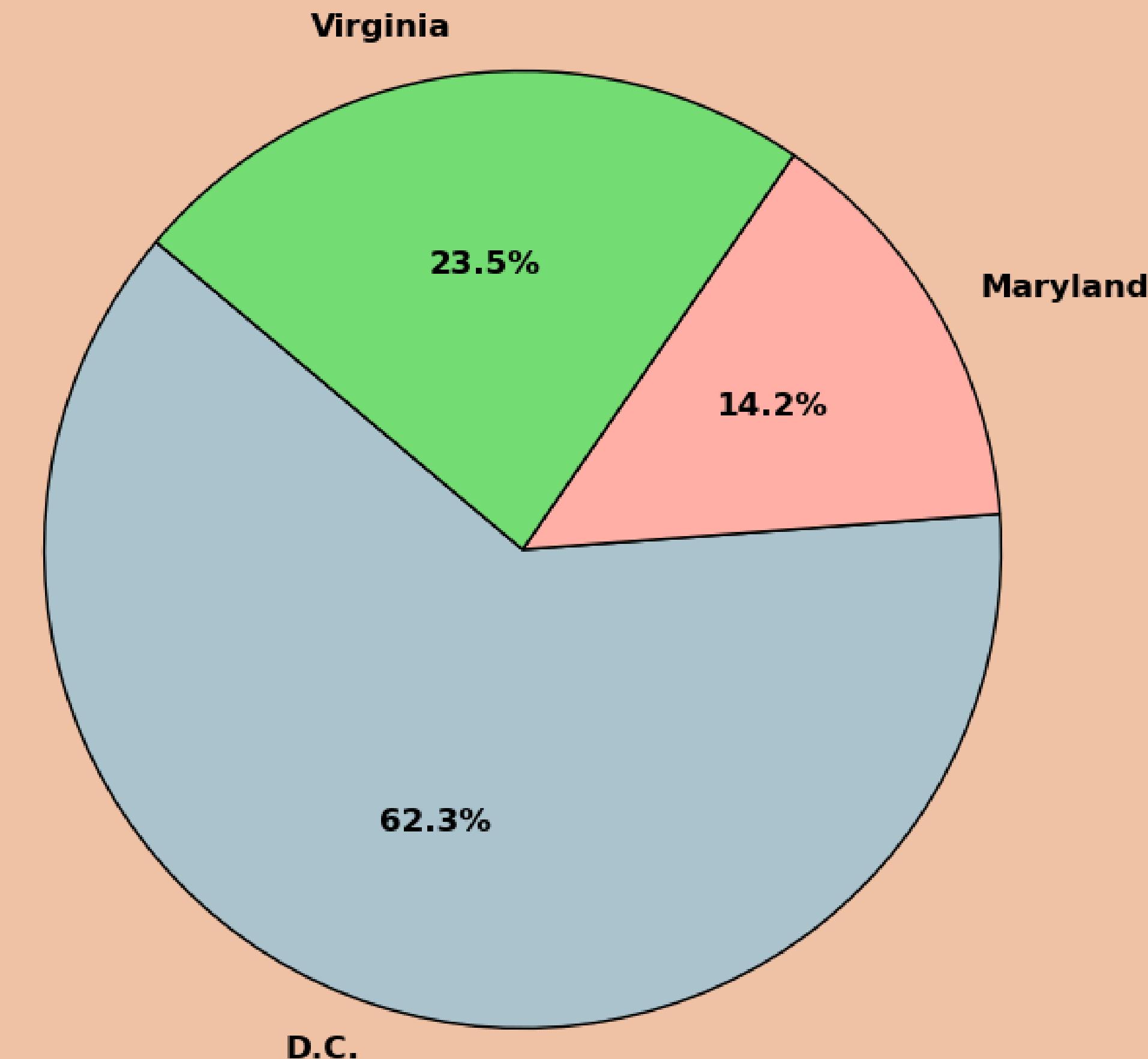
- Transit authority data
- News & policy analysis

# Visualizations

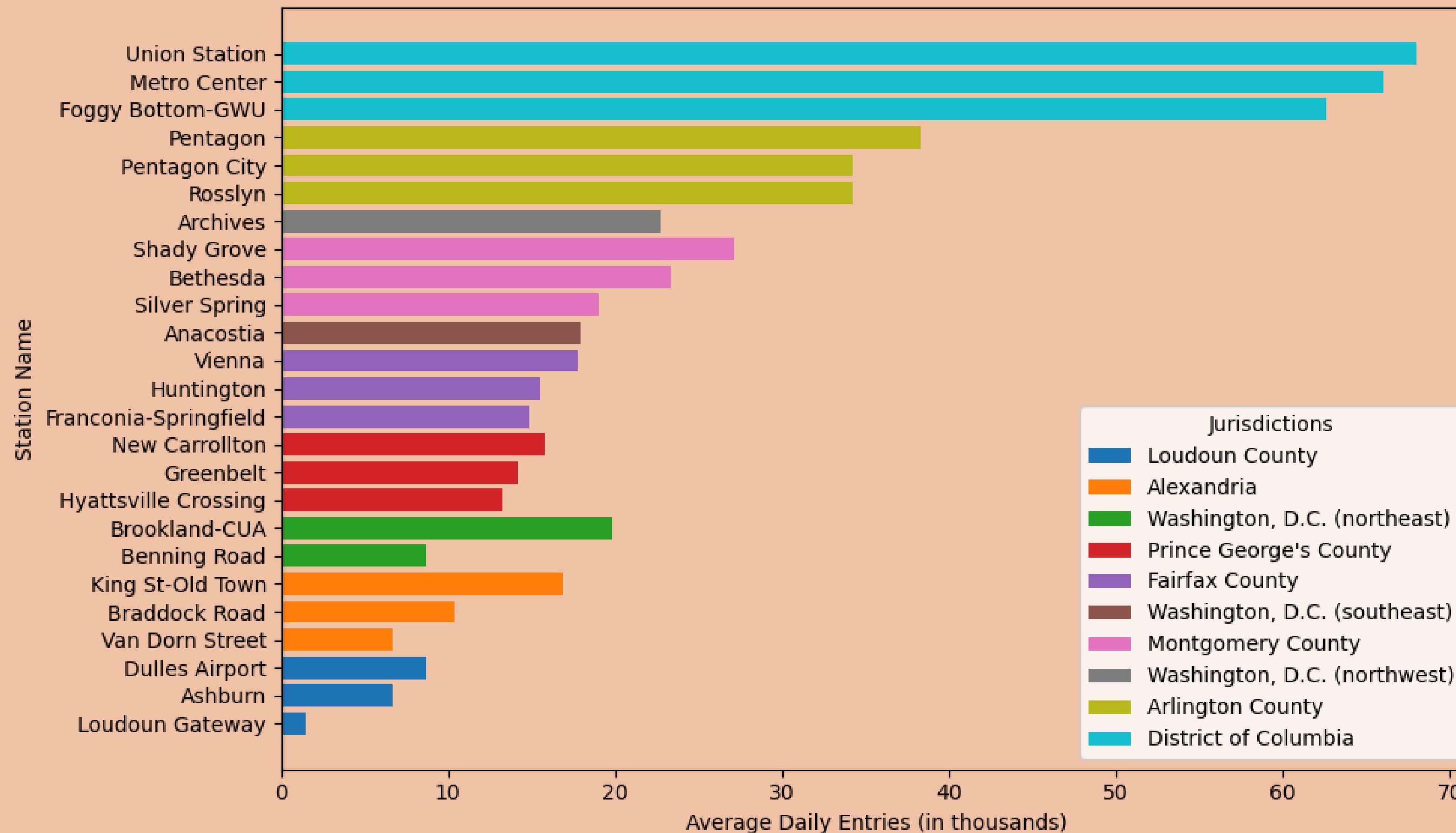
# Percentage of Total Average Ridership By Region (Weekdays)



# Percentage of Total Average Ridership By Region (Weekends)

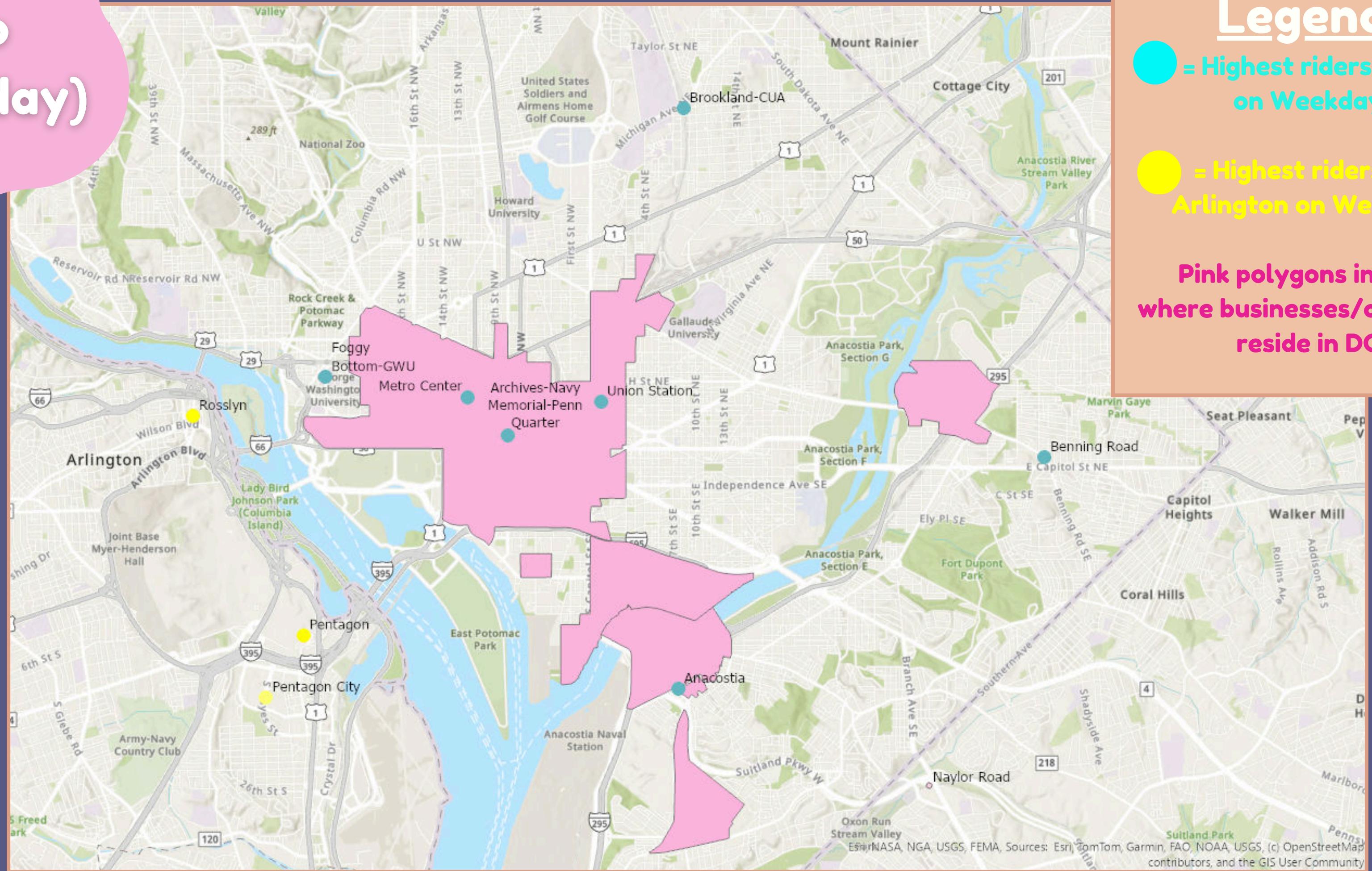


## Top 3 Stations by Jurisdiction: Weekdays



# Map

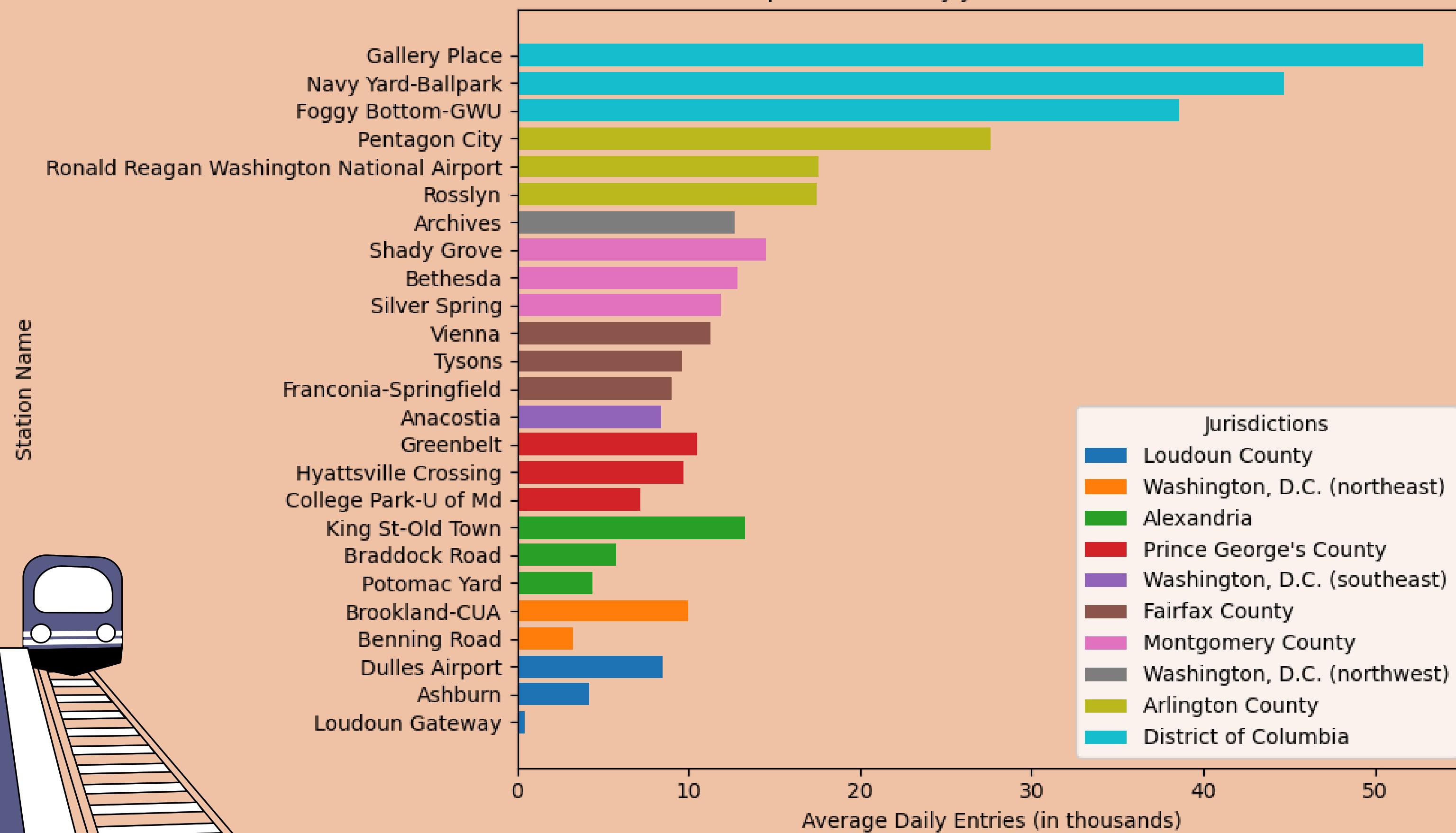
## (Weekday)



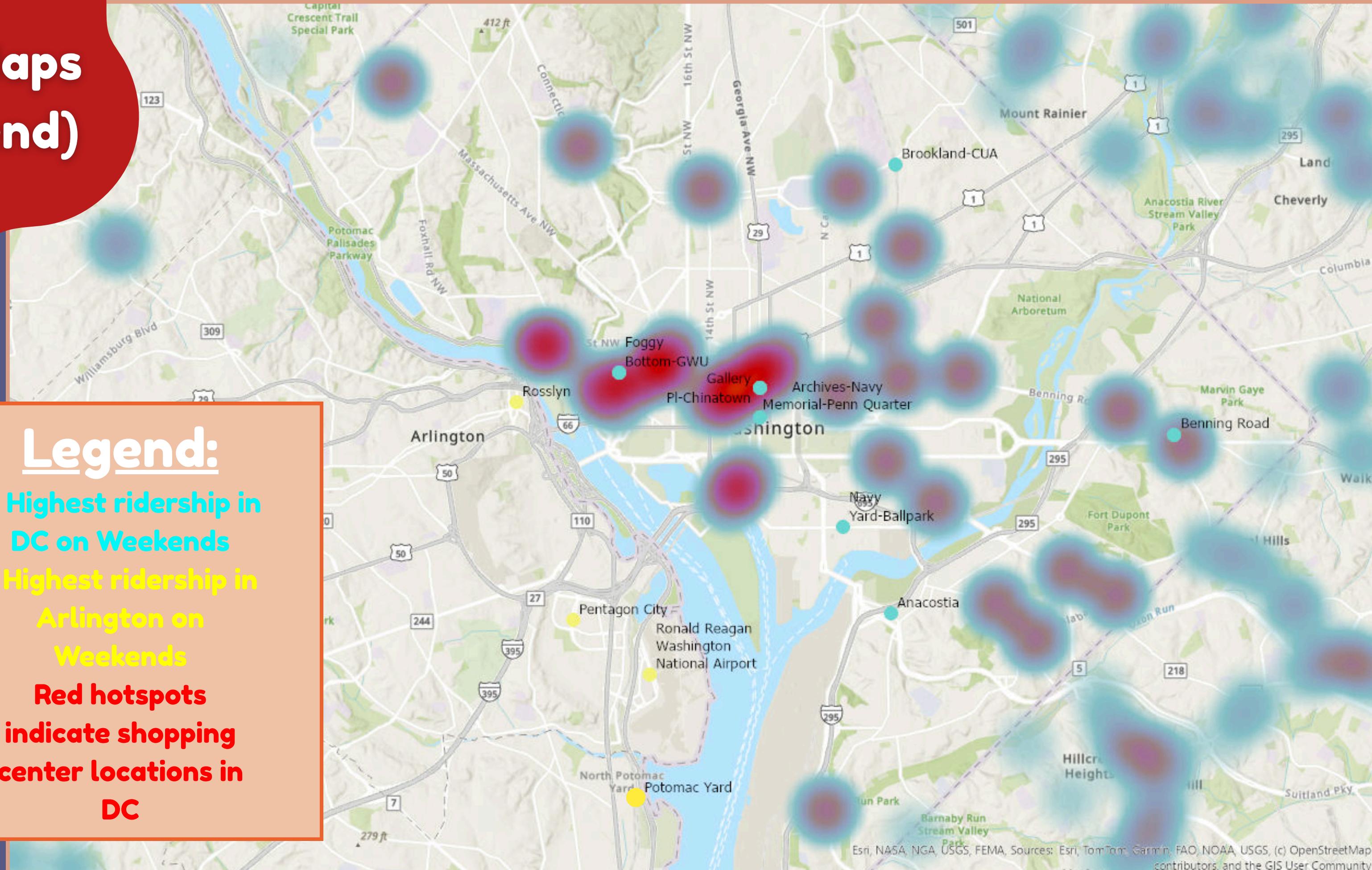
# Metro Line Correlations Weekdays

- **Green Line: Archives (DC), Anacostia (DC), Greenbelt(MD), Hyattsville Crossing(MD)**
- **Red Line: Union Station(DC), Metro Center(DC), Shady Grove(MD), Bethesda(MD), Silver Spring(MD), Brookland-CUA(DC)**
- **Blue Line: Metro Center(DC), Foggy Bottom-GWU(DC), Pentagon(Virginia), Pentagon City(Virginia), Rosslyn(VA), Franconia-Springfield(VA), Benning RD(DC), King St-Old Town(VA), Braddock RD(VA), Van Dorn Street(VA)**
- **Silver Line: Metro Center (DC), Foggy Bottom-GWU(DC), Rosslyn(VA), Benning RD(DC), Dulles Airport(VA), Ashburn(VA), Loudoun Gateway(VA)**
- **Orange Line: Metro Center (DC), Foggy Bottom- GWU(DC), Rosslyn(VA), Vienna(VA), New Carrollton(MD)**
- **Yellow Line: Pentagon (VA), Pentagon City(VA), Huntington(VA), King St-Old Town(VA), Braddock RD(VA), Archives(DC)**

## Top 3 Stations by Jurisdiction: Weekends



# Heat Maps (Weekend)



Esri, NASA, NGA, USGS, FEMA, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

# Metro Line Correlations of Weekends

- **Green Line: Gallery Place(DC), Navy Yard-Ballpark(DC), Anacostia(DC), Greenbelt(MD), Hyattsville Crossing(MD), College Park-U of MD(MD)**
- **Red Line: Gallery Place(DC), Archives(DC), Shady Grove(MD), Bethesda(MD),Silver Spring(MD), Brookland-CUA(DC)**
- **Blue Line: Foggy Bottom-GWU(DC), Pentagon City(VA),Ronald Reagan National Airport(VA), Rosslyn(VA), Franconia- Springfield(VA), King St-Old Town(VA), Braddock RD(VA), Benning RD(DC)**
- **Silver Line: Foggy Bottom-GWU(DC), Tysons(VA) ,Benning RD(DC), Dulles Airport(VA), Ashburn(VA), Loudoun Gate(VA)**
- **Orange Line: Foggy Bottom-GWU(DC), Rosslyn(VA), Vienna(VA)**
- **Yellow Line: Gallery Place(DC), Pentagon City(VA), Ronald Reagan National Airport(VA), Archives(DC), King St-Old Town(VA), Braddock RD(VA), Potomac Yard(VA)**

# Differences (Weekend vs Weekday)



## Navy Yard-Ballpark

Events that occurred:

- Washington Nationals home game against the Miami Marlins @ 1:35 pm
- Episcopal Night @ 4:00 pm - 7:00 pm
- 2024 Taiwan Day @ 4:00 - 7:00 pm

- Average Daily Entries: 7.4 K
  - Highest entry compared to other dates
  - Example: June 05, 2024 (a weekday) had 4.1 K daily entries



## Union Station

- Peak PM hours (3:00 pm - 7:00 pm) are when employees go home
  - Commuters are likely to use metro station
- Average Daily Entries: 6.7 K
  - Highest compared to other dates
  - Example: June 15, 2024 (a weekend) had 2.5 K daily entries

## Future Works/Applications

**Our research provides a valuable foundation for companies, bussiness, or retail stores seeking ideal locations for expansion, suggesting that the best locations would be near the high-traffic stations we identified.**

**In the future, we could further analyze which specific times of day experience the highest average daily entries to gain deeper insights.**

# Sources



## Metrorail Ridership Summary

Metro news and service information for the Washington, DC, Maryland, and Virginia region.

 WMATA

W

## List of Washington Metro stations

The Washington Metro (commonly called Metro, and branded Metrorail) is a rapid transit system servin...

w Wikipedia

## Metro Stations Regional

This data is used for the planning and management of Washington, D.C. by local government agencies.

opendata.dc.gov

## Shopping Centers

Shopping centers in the District of Columbia.

opendata.dc.gov

## Shopping Centers (Places of Interest)

Shopping Centers in Montgomery County, Maryland.

arcgis.com

## Central Employment Areas

Polygons representing the location and attributes of Central Employment Area (CEA).

opendata.dc.gov

## Shopping Centers

The locations of the shopping centers within Fairfax County.

arcgis.com

<https://www.crummy.com/software/BeautifulSoup/bs4/doc/>

<https://gisdata.pgplanning.org/opendata/search.asp?s=Shop>

<https://edow.org/event/episcopal-night-at-the-nationals-stadium/>

[https://allevents.in/washington/2024-taiwan-day-washington-dc-nationals-park/200026333532700#google\\_vignette](https://allevents.in/washington/2024-taiwan-day-washington-dc-nationals-park/200026333532700#google_vignette)



**QUESTIONS?**