



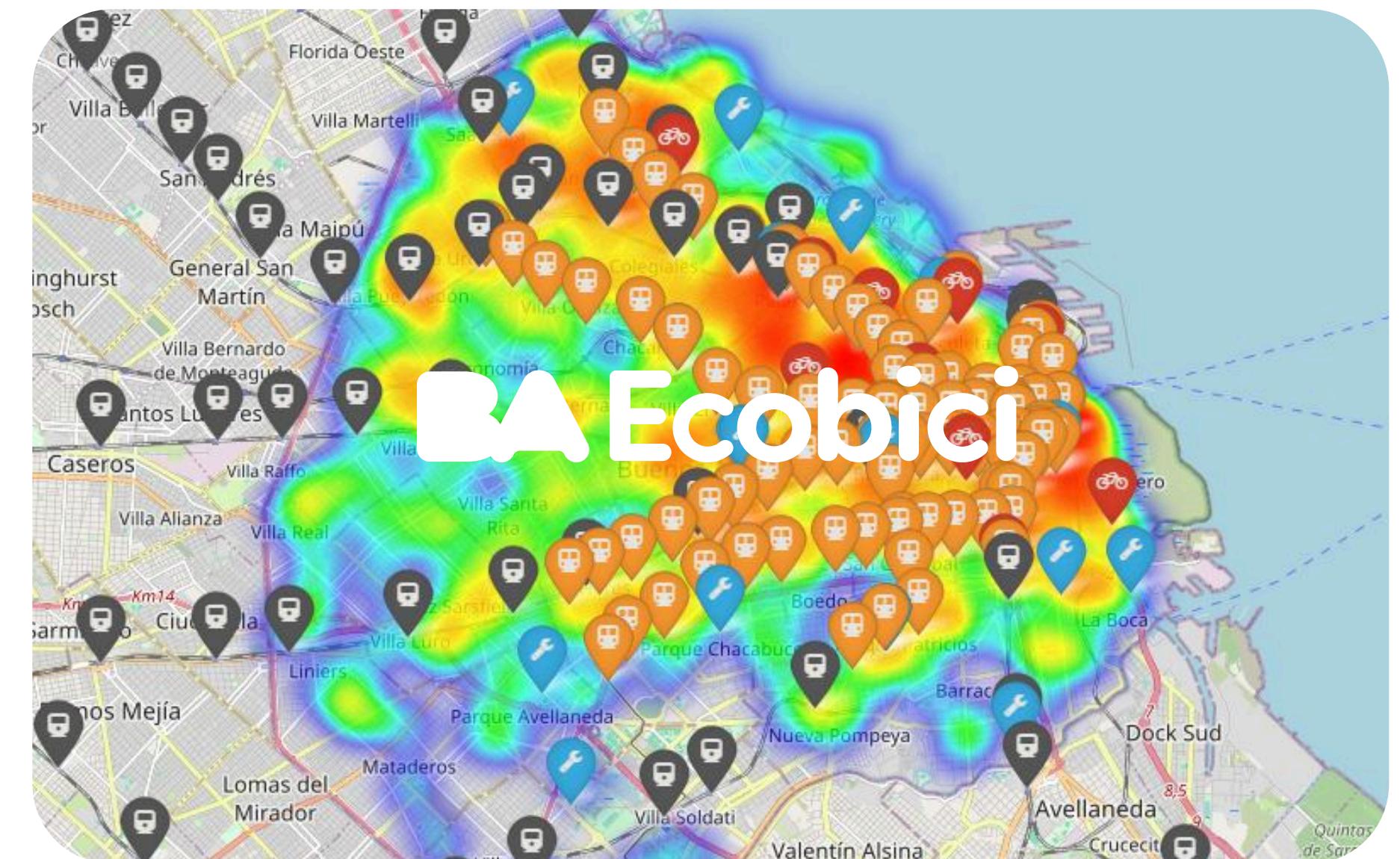
IGNACIO MUÑOZ GOMEÑUKA

# Buenos Aires Public Bike System Analysis

The Buenos Aires Bicycle Company is on a mission to boost the bike ride adoption rate by 18% this year. Achieving this goal requires ensuring better bike availability at stations and optimizing the overall system.

## Objective

Using data-driven insights, this project analyzes bike usage patterns, station trends, ride behaviors, and operational challenges to improve accessibility, optimize bike redistribution, and enhance the user experience.

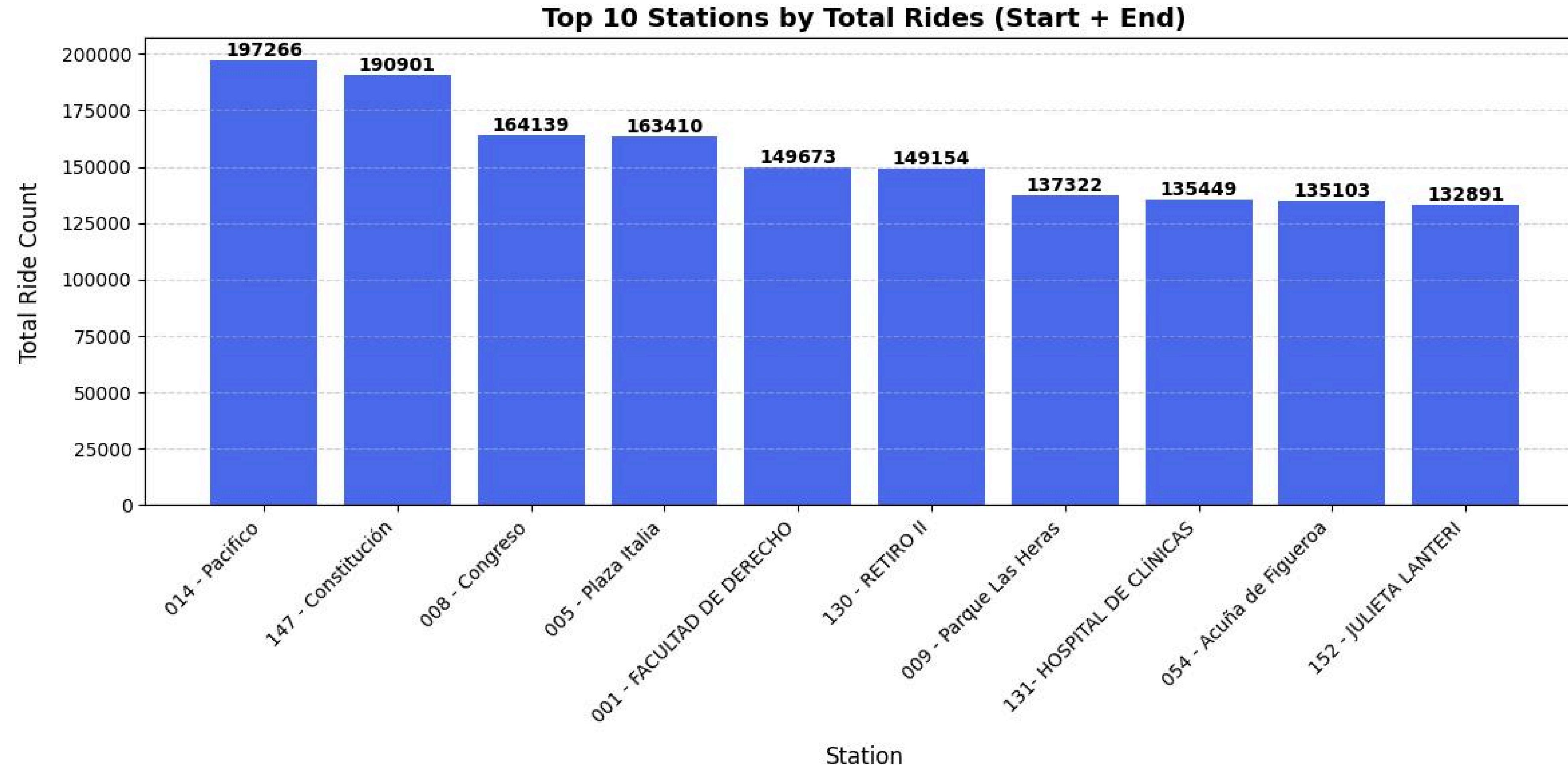


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# Trending Stations

Constitución, a major train station and transit hub, ranks 2nd with 190,901 total rides, reinforcing the strong connection between cycling and public transport.



# Start vs. Finish Trends

**Do the most trending stations differ between starting and finishing locations?**

- **Constitución Shows More Starts than Finishes**

Constitución has a higher start count than end count, suggesting that many riders begin their trips here, likely commuting to other areas. This aligns with the idea of bike-sharing as a last-mile solution for train commuters.

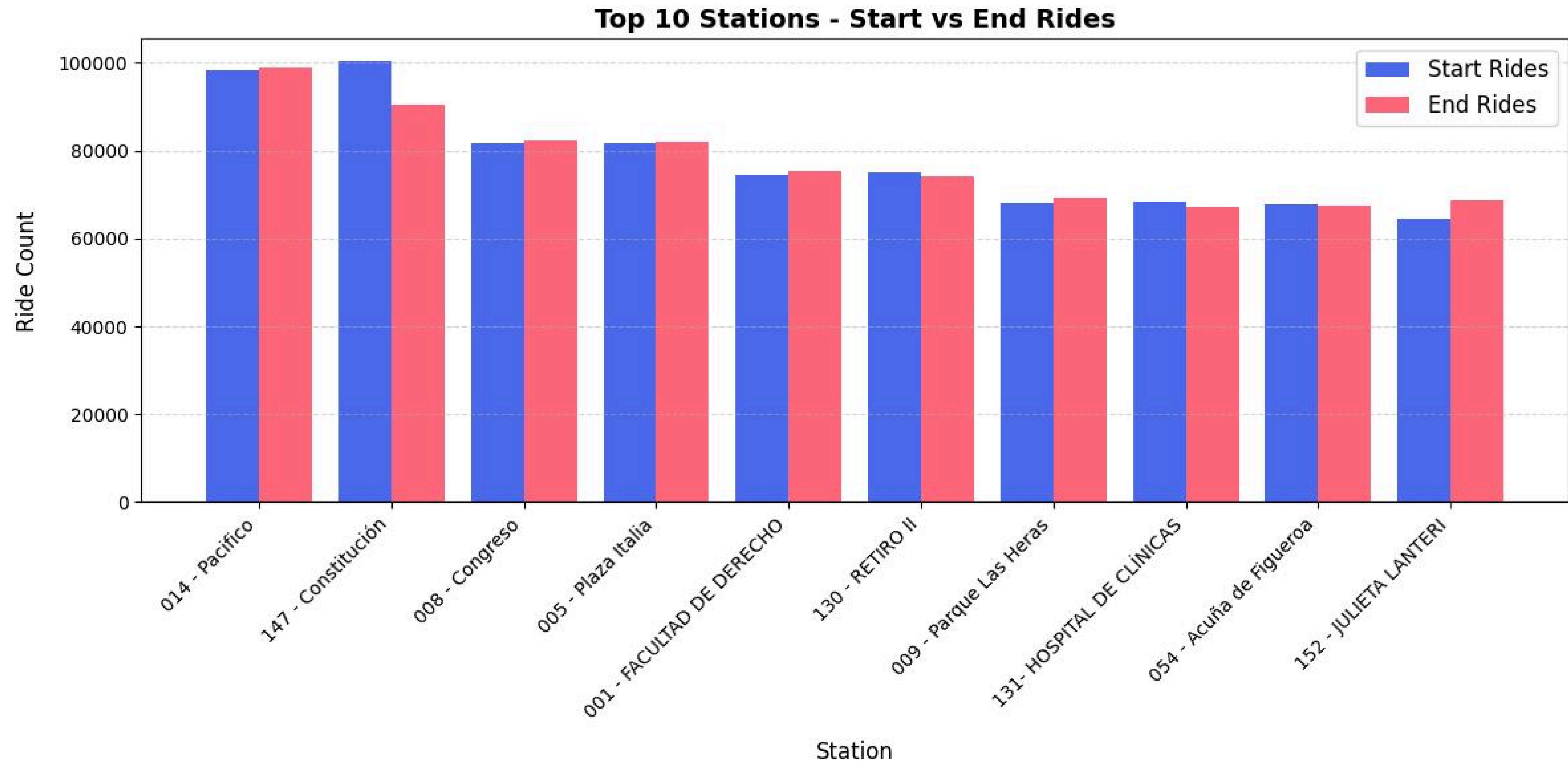
- **Balanced Start/End Stations**

Stations like Pacífico and Plaza Italia have nearly identical start and end counts, indicating they serve as both commuting entry and exit points, likely in high-density business or recreational areas.

- **Slight Differences in Other Stations**

Some stations, like Julieta Lanteri, show a higher number of ending rides than starting rides, possibly serving as a popular drop-off point for commuters or students.

# Start vs. Finish Trends

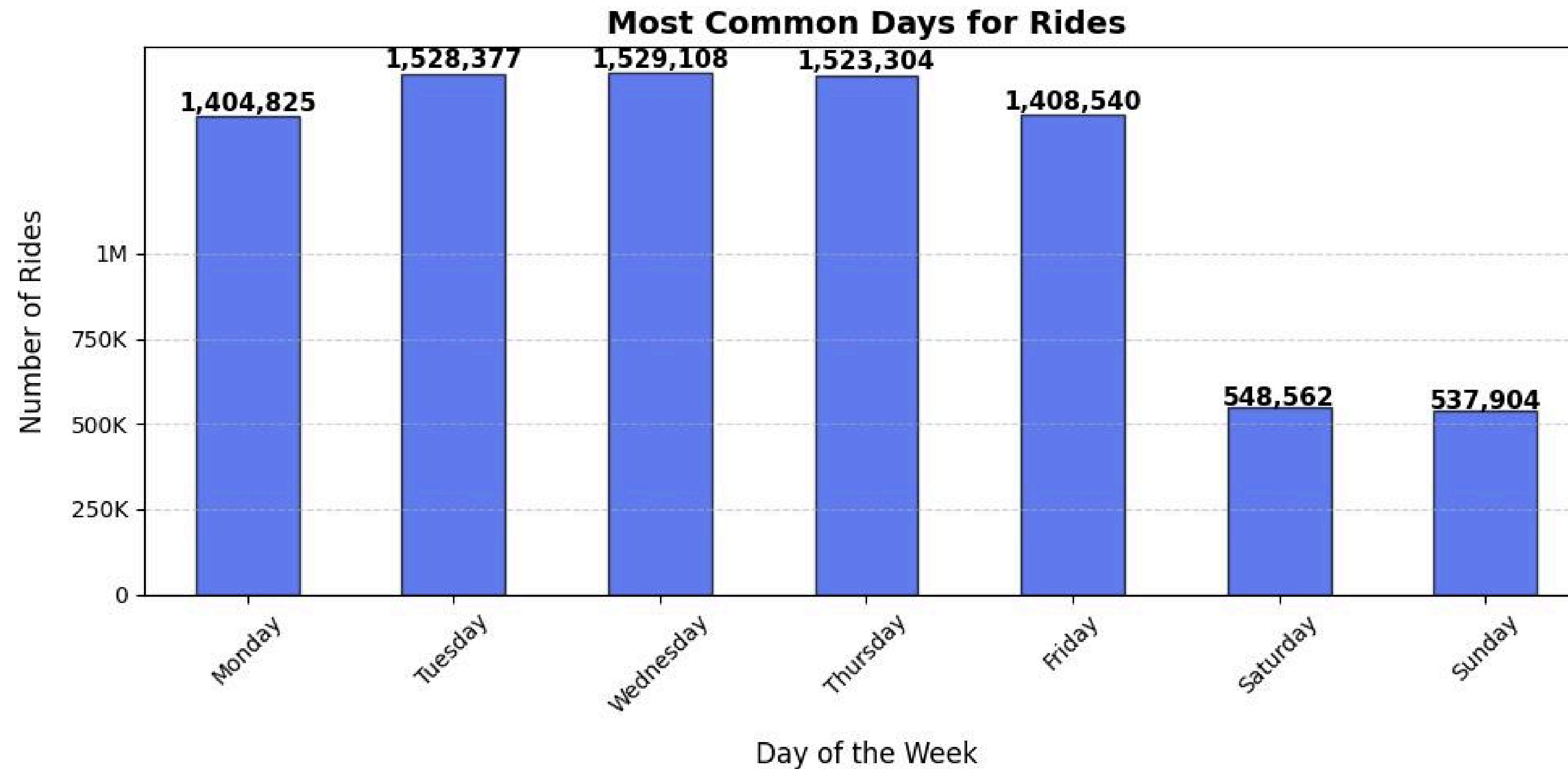


# Popular Timeframes > Most common day of the week for rides

Do the numbers of rides fluctuate during the week?

- Peak Ride Days

The highest number of rides occur on Tuesdays and Wednesdays, with over 1.52 million rides, indicating a strong weekday commuting pattern.



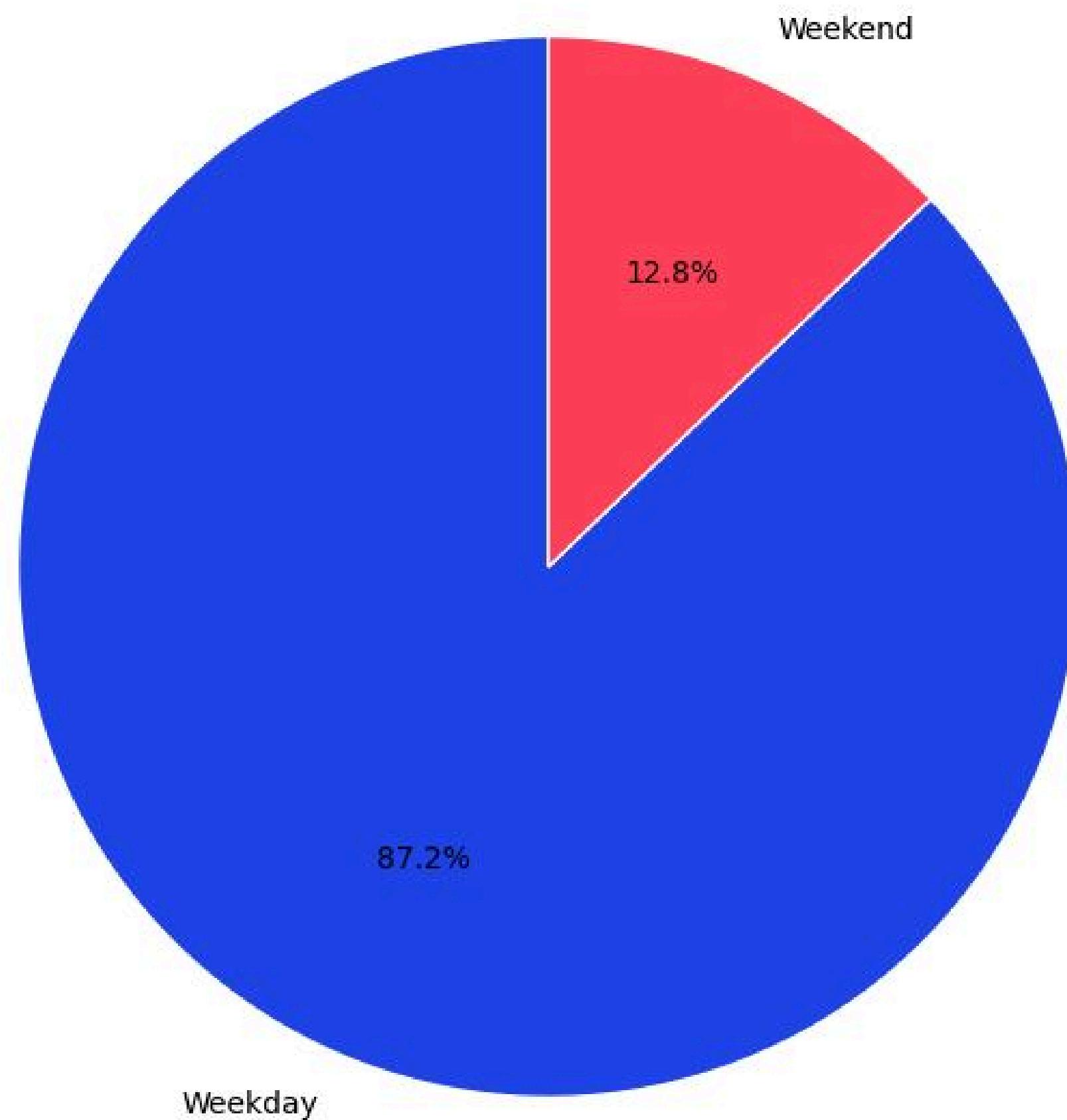
# Popular Timeframes > Most common day of the week for rides

Do the numbers of rides fluctuate during the week?

- **Weekend Drop**

Significant decline in ridership is shown on Saturdays and Sundays, where usage drops to nearly a third of weekday levels. This suggests that the primary use of the system is for work or school commutes, with fewer people relying on it for weekend leisure activities.

**Distribution of Rides: Weekdays vs Weekends**



# Popular Timeframes > Peak riding hours

## Which are the peak hours?

- **Morning Rush Hour (7 AM – 9 AM)**

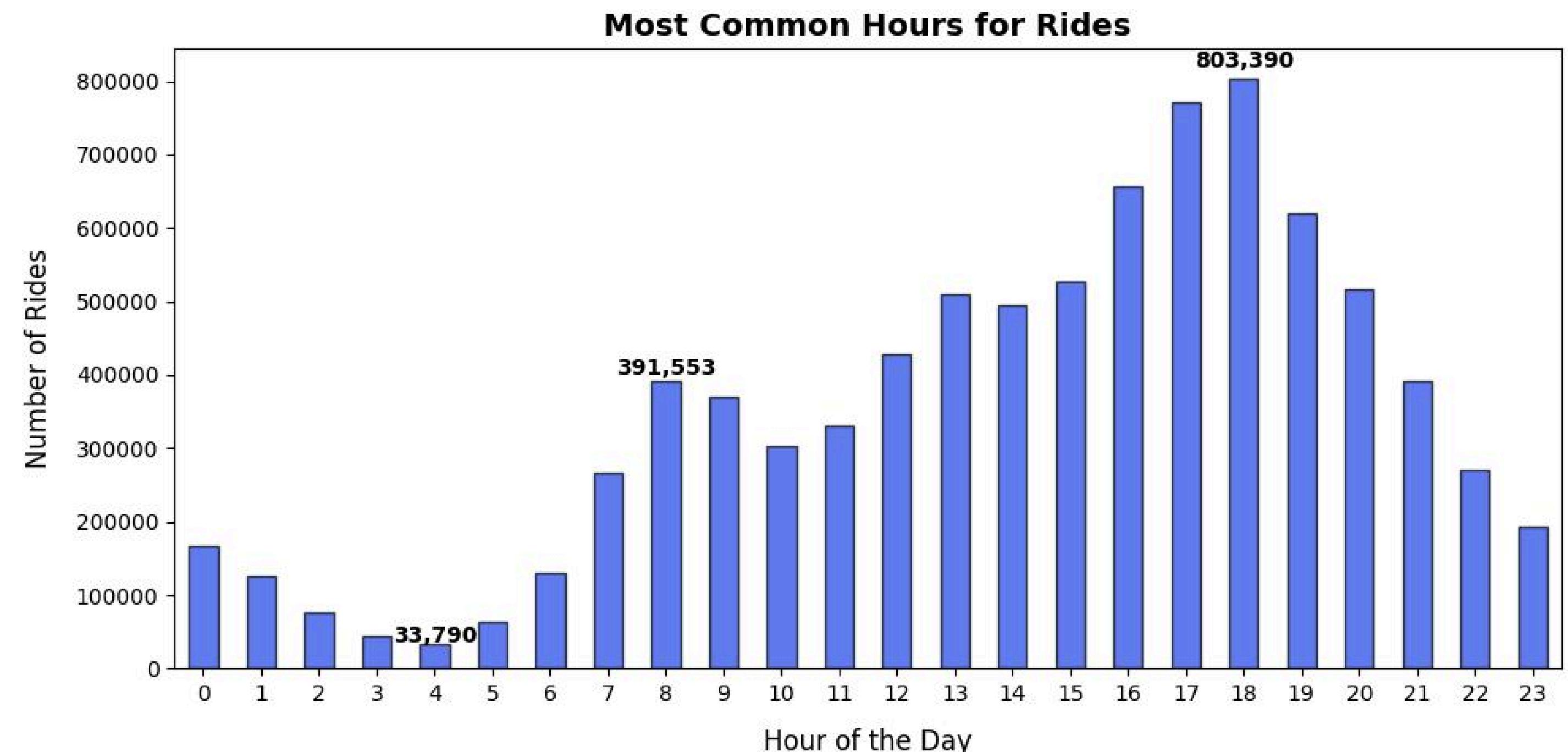
Sharp increase in rides from 6 AM, peaking at 8 AM with 391,553 rides.

This aligns with the typical morning commute to work and school.

- **Evening Peak (4 PM – 7 PM)**

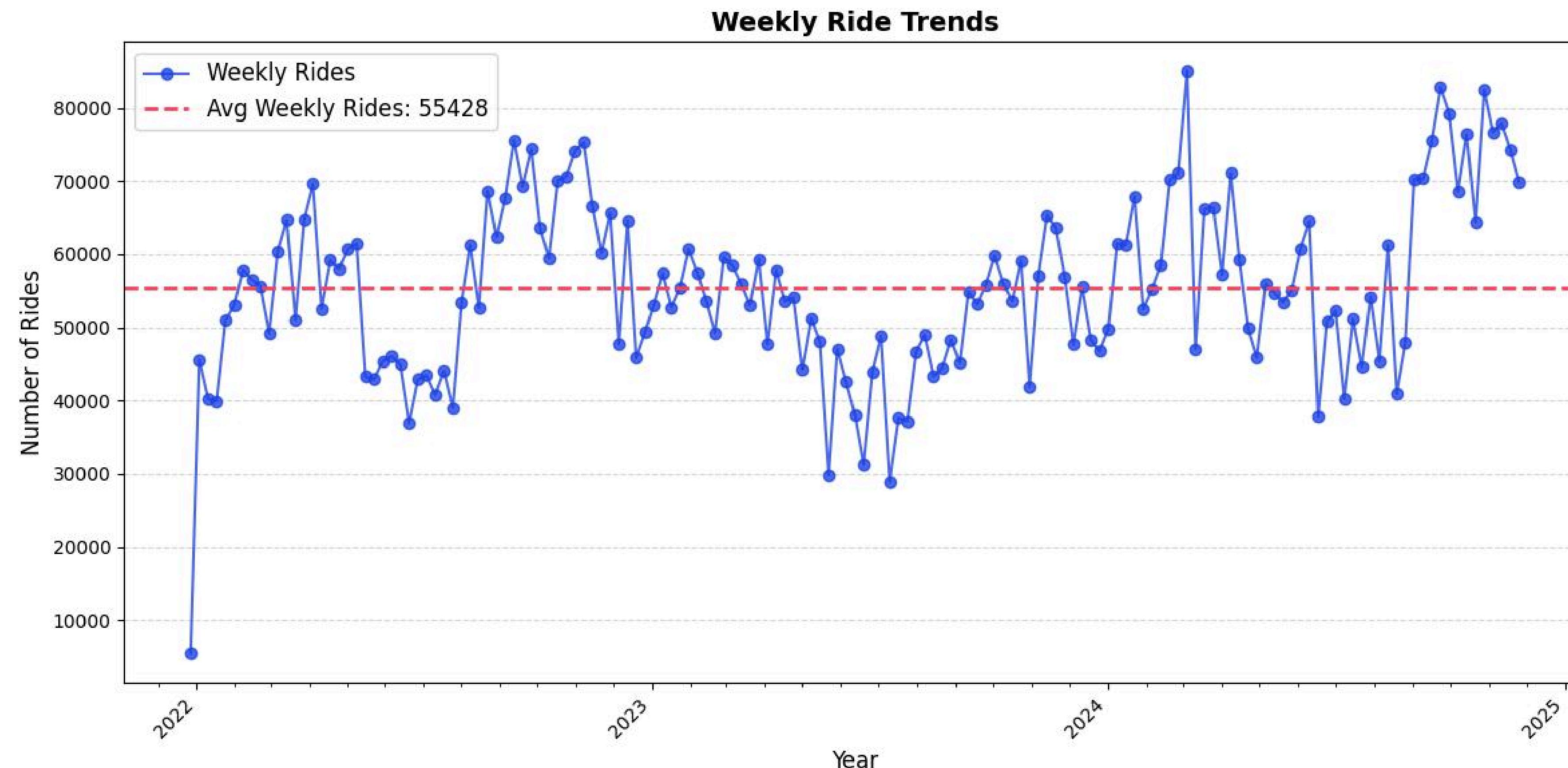
The busiest time of the day is around 6 PM – 7 PM, peaking at 803,390 rides.

This surpasses the morning rush, indicating more flexible work ending times and probably better weather conditions to come back riding a bike.



# Popular Timeframes > Average Weekly Rides

While the overall trend shows increasing bike-share adoption, significant fluctuations in weekly ride numbers highlight the influence of seasonality and external factors. The average weekly rides of 55,428 serves as a benchmark for evaluating performance and identifying areas for improvement.

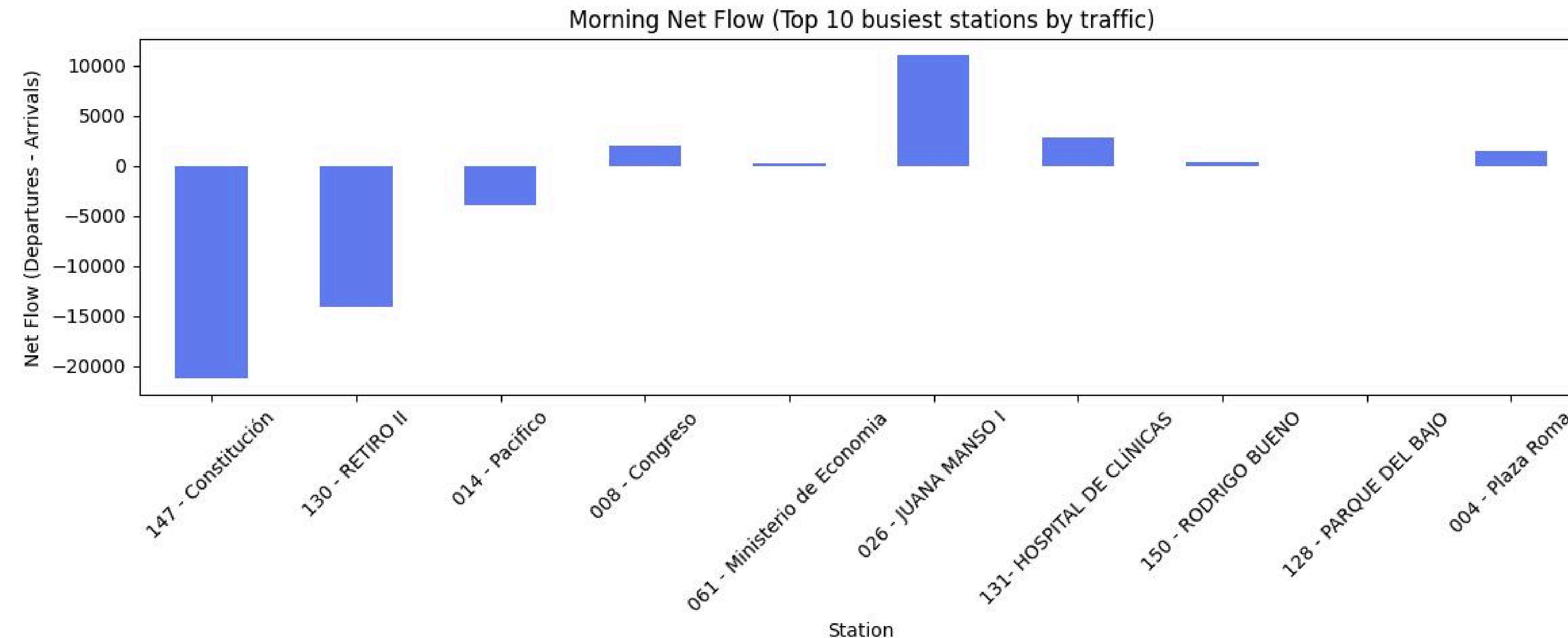


# Bike Distribution Analysis > Morning peak

Based on the peak ride hour analysis, morning and evening net flow analysis was divided.

Constitución and Retiro II show the most negative net flow, meaning more people depart from these stations than arrive. This suggests that these are major departure points in the morning rush, likely for commuters traveling to work.

Ministerio de Economía and Juana Manso I have positive net flow, indicating these are common arrival destinations in the morning.

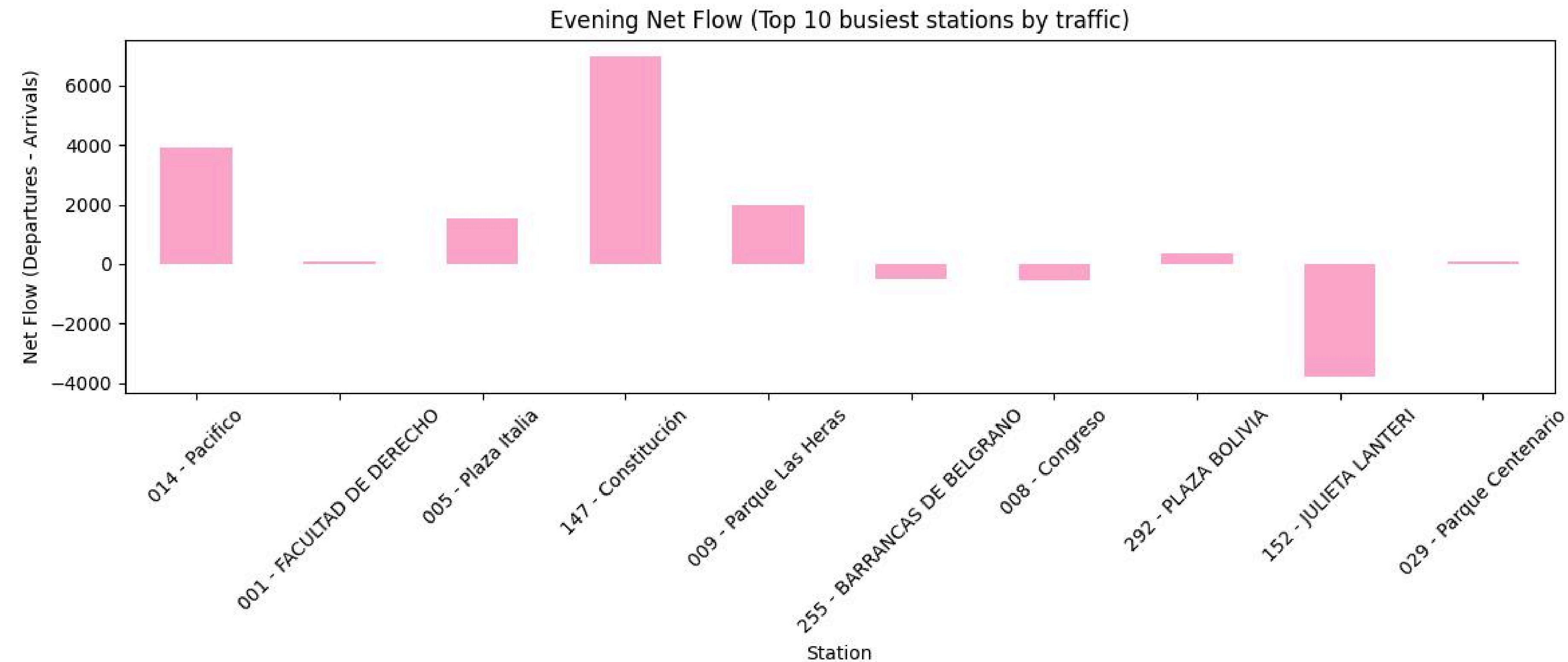


# Bike Distribution Analysis > Evening Peak

The evening net flow chart shows the opposite trend: people returning to home or leisure areas.

Constitución shows the highest positive net flow, meaning many people arrive here in the evening—likely returning home after work.

Julieta Lanteri and Plaza Bolivia show negative net flow, indicating they are common departure points in the evening.



# Bike Distribution Analysis

## Departures vs. Arrivals

Do the most trending stations differ between starting and finishing locations?

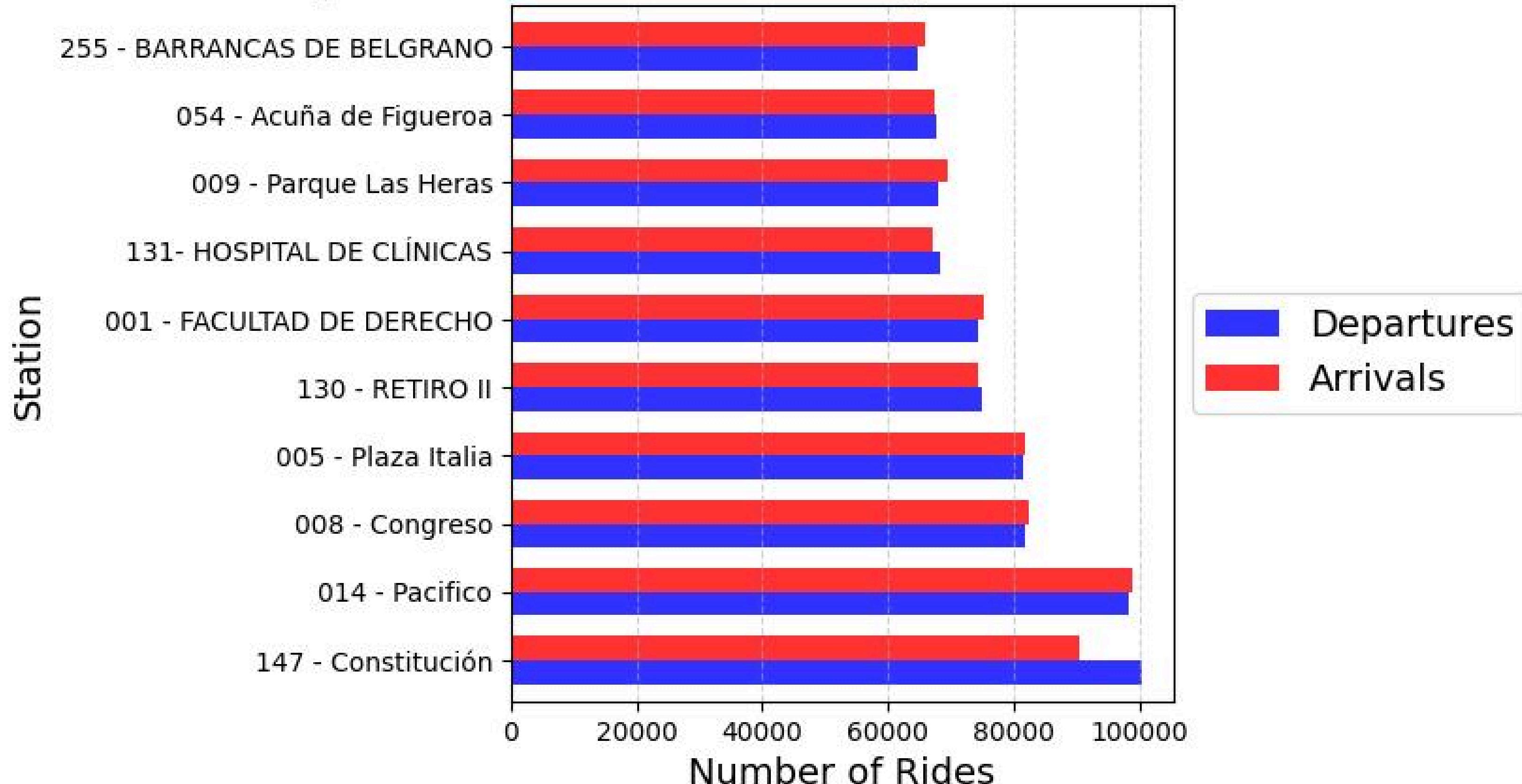
- Departure/Arrival Balance

Most stations show a relatively close balance between departures and arrivals, suggesting bikes are being redistributed effectively.

- High-Traffic Hubs

The high demand stations are probably correlated to high traffic subway and train stations that connect suburban areas with Buenos Aires City.

### Top 10 Stations: Bike Departures vs Arrivals

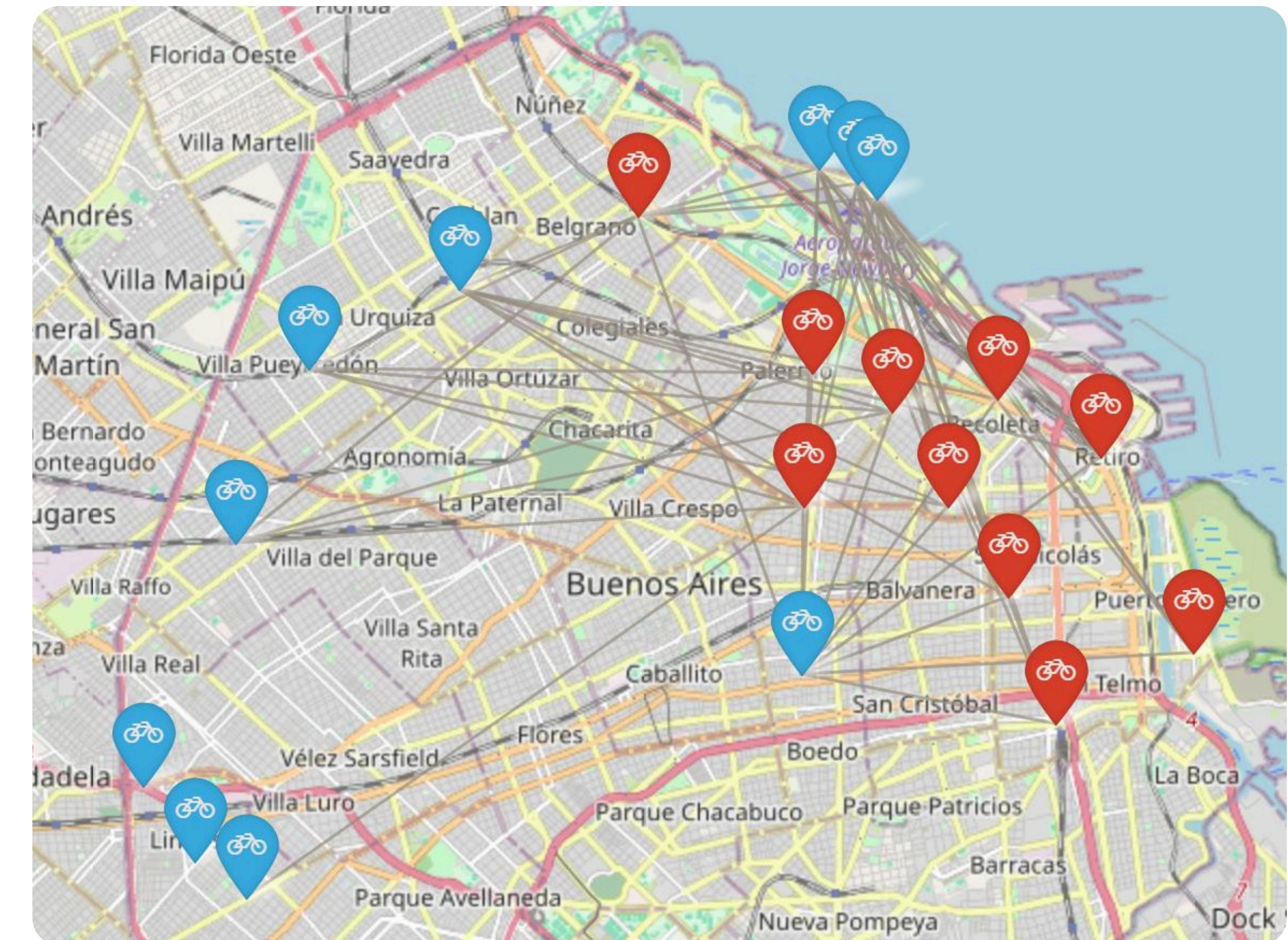


# Bike Distribution Analysis > Low Traffic vs. High Traffic

**Should the government distribute bikes to avoid shortage on high traffic stations?**

**The short answer is Yes, but Why? and How?**

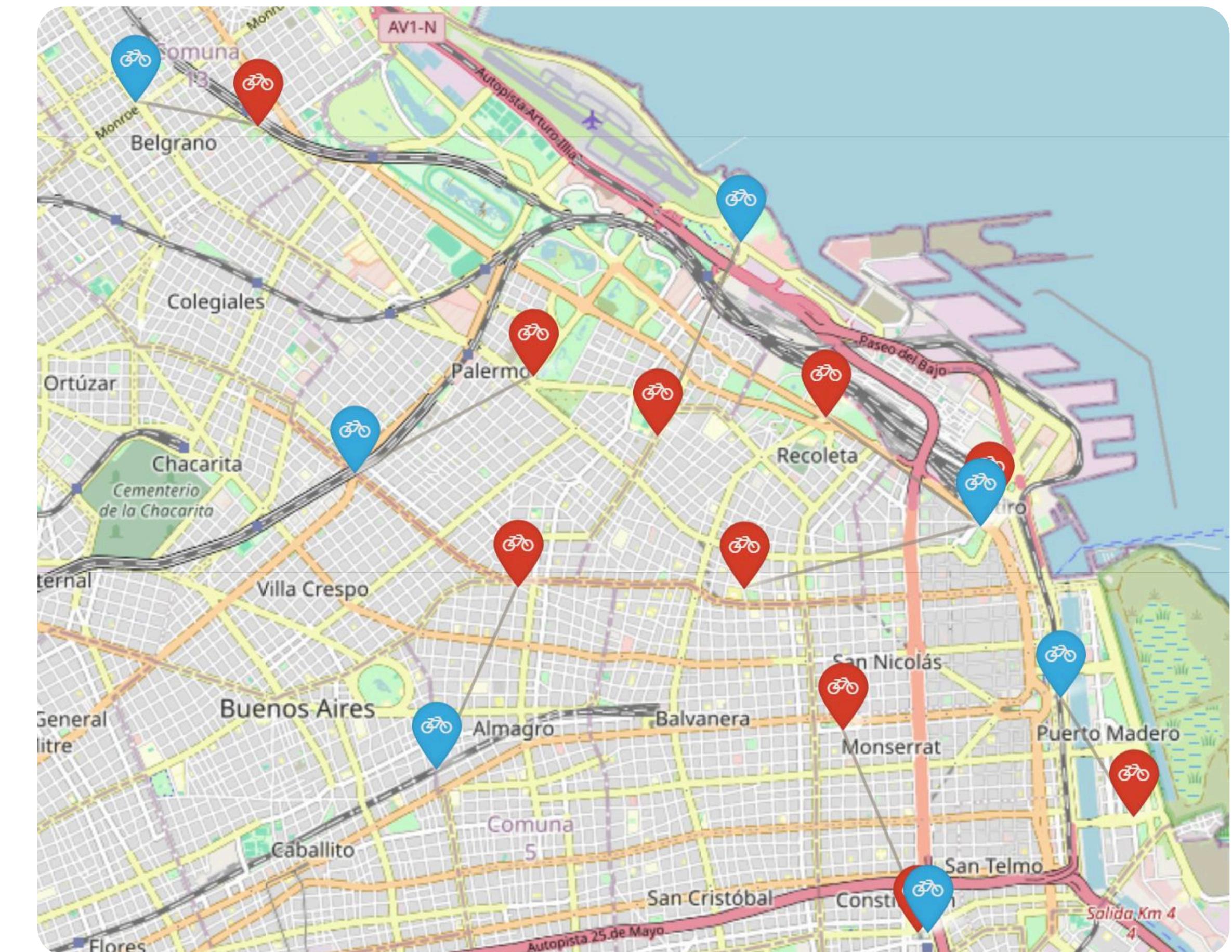
- High-traffic stations cluster in the city center, indicating strong demand for bike-sharing in this activity hub.
- Low-traffic stations are scattered in outer areas, suggesting lower usage in less dense or less accessible zones.
- The concentration of bikes in the center may lead to shortages, while underutilized stations in the periphery may have excess bikes.



# Bike Distribution Analysis > Low Traffic vs. High Traffic

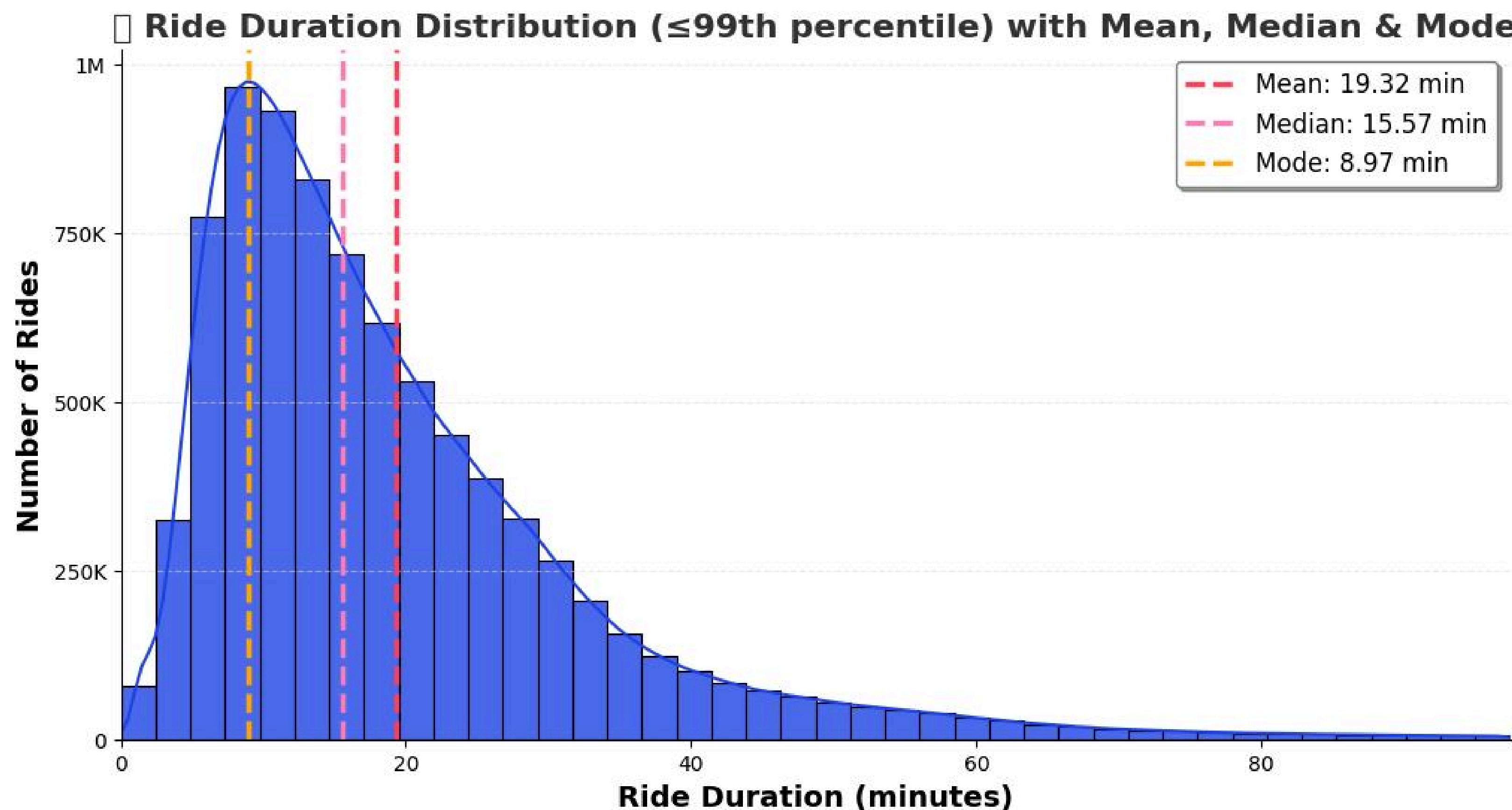
The analysis reveals a clear pattern: the top 10 most trafficked bike stations consistently experience shortages, particularly during peak hours. To address this, we propose a targeted redistribution strategy based on data insights.

For each of the top 10 high-traffic stations (represented by red markers), we've identified the nearest low-traffic station (represented by blue markers). By implementing a dynamic redistribution system, we can proactively move bikes from these underutilized stations to the high-demand locations.



# Average Ride Duration

Despite an average ride duration of 19.32 minutes, this chart shows that most rides are significantly shorter. The mode of 8.97 minutes and median of 15.57 minutes reveal a right-skewed distribution, suggesting a common pattern of short trips with occasional longer outliers.



# Mechanical Service Investment

While the concentration of service stations in high-traffic zones is commendable, this map also reveals a critical insight: there are pockets of intense cycling activity that remain underserved.

These 'hotspots' represent an opportunity – a chance to expand our reach, provide essential support to cyclists, and foster an even more vibrant cycling culture in Buenos Aires.



# Service Improvement Proposals

Currently, users can only see real-time bike availability at stations, but they don't know:

- How likely they are to find a bike at peak hours
- If a station will be empty when they arrive

## Predictive Bike Availability System

- Uses historical ride data & real-time station updates to forecast bike availability.
- Alerts users if a station is likely to be empty or full in the next 15–30 minutes.
- Provides alternative nearby stations with available bikes.

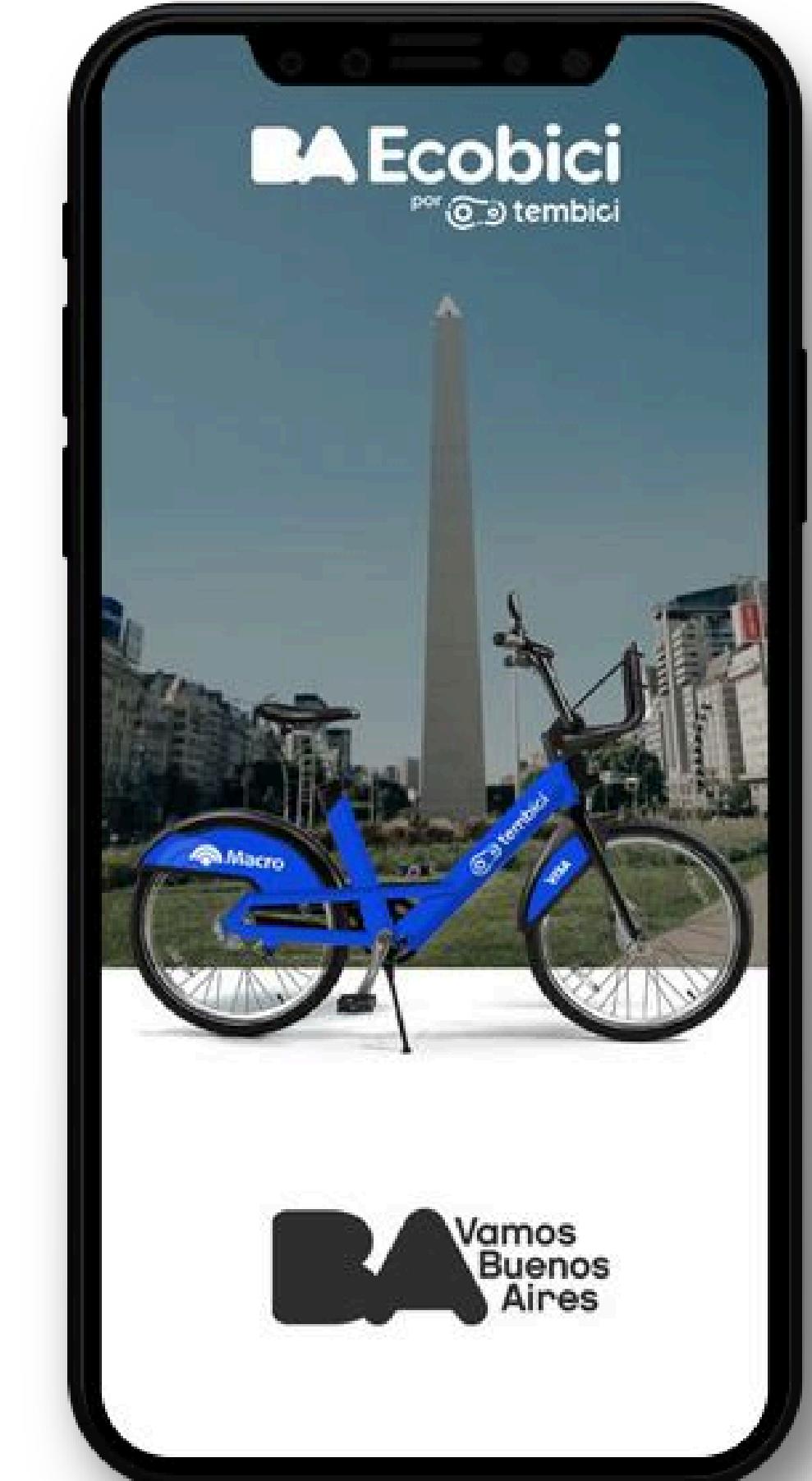
## ◆ Smart Bike Reservations

- Users can reserve a bike for a short window during high demand periods.
- Helps reduce uncertainty and improves the overall experience.

# Improving Bike Adoption

To achieve the goal of increasing bike adoption by 18% this year, we must focus on converting casual users into loyal riders. By implementing loyalty programs with rewards for frequent use and tiered memberships offering benefits, we can incentivize consistent ridership.

Simultaneously, enhancing the predictability of bike availability through real-time data integration in our app, predictive modeling, and proactive bike redistribution will ensure a seamless and reliable experience for users. Addressing the needs of casual users by simplifying registration, offering flexible payment options, and emphasizing safety and convenience will further encourage adoption.



## Additional insights > User\_ID

- **User\_ID: Knowing Customers**

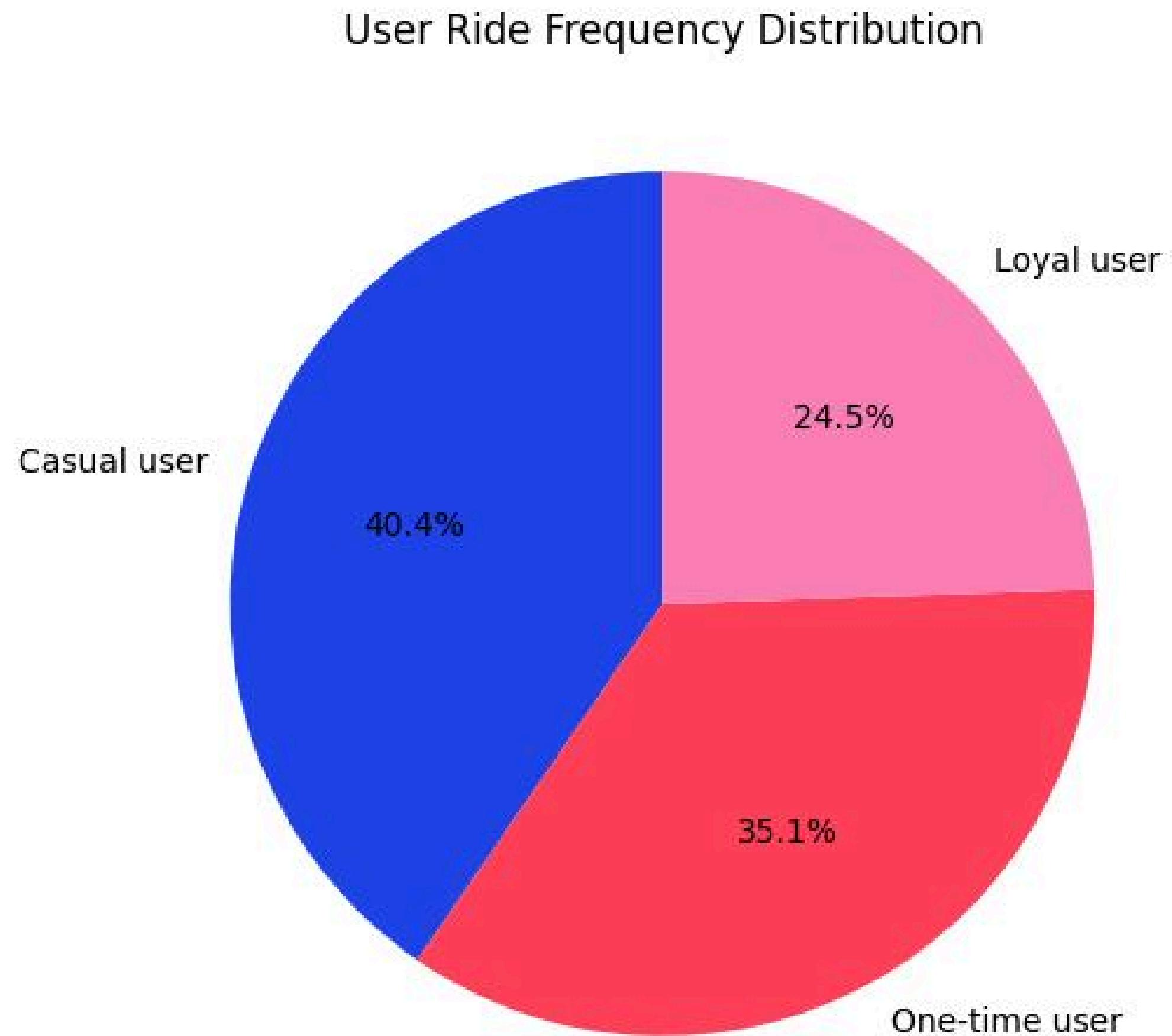
Based on previous analysis the user\_id field was included in the database. This allowed to get to know better which users are heavy users and which of them are casual riders.

Based on monthly ride count, 3 categories were defined.

1 Rides = One-time user

2-5 Rides = Casual user

5< Rides = Loyal user

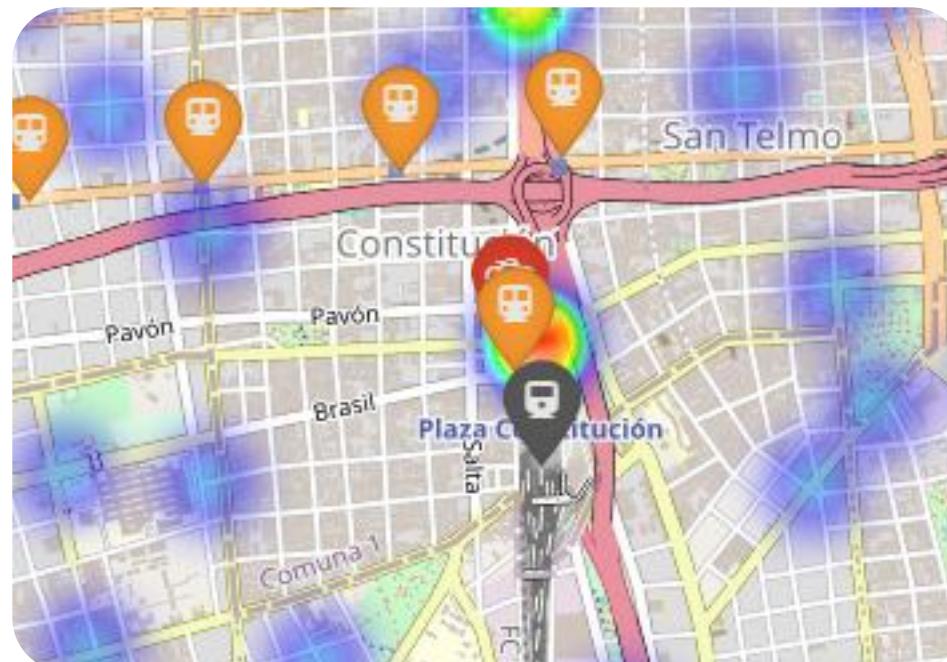


# Additional insights > Train and Subway

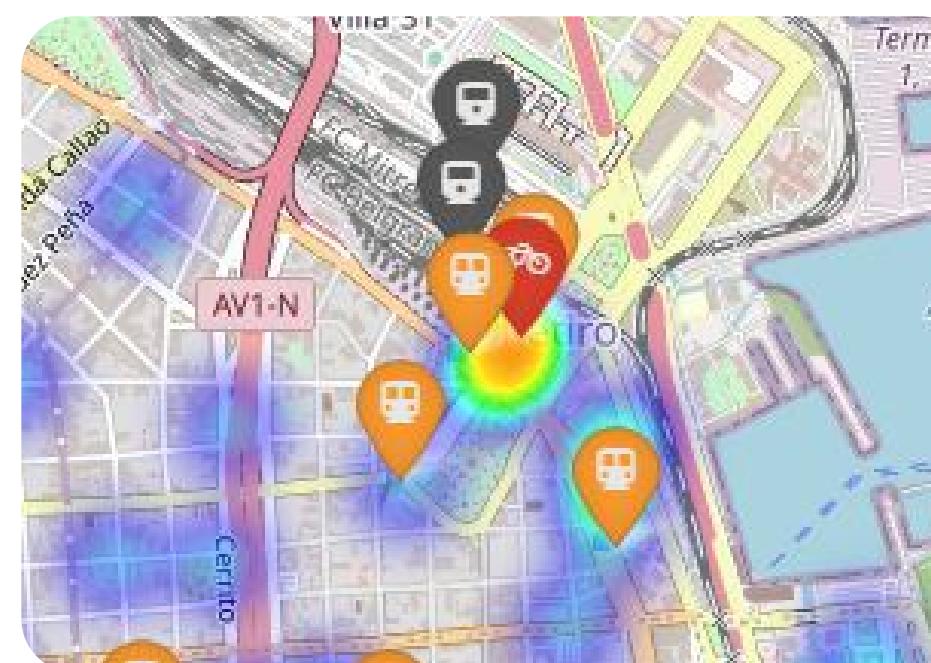
- Correlation between Top Stations and Popular train and subway stations.

Based on previous analysis the user\_id field was included in the database. This allowed to get to know better which users are heavy users and which of them are casual riders.

Constitución Train Station



Retiro Train Station



Congreso Subway Station



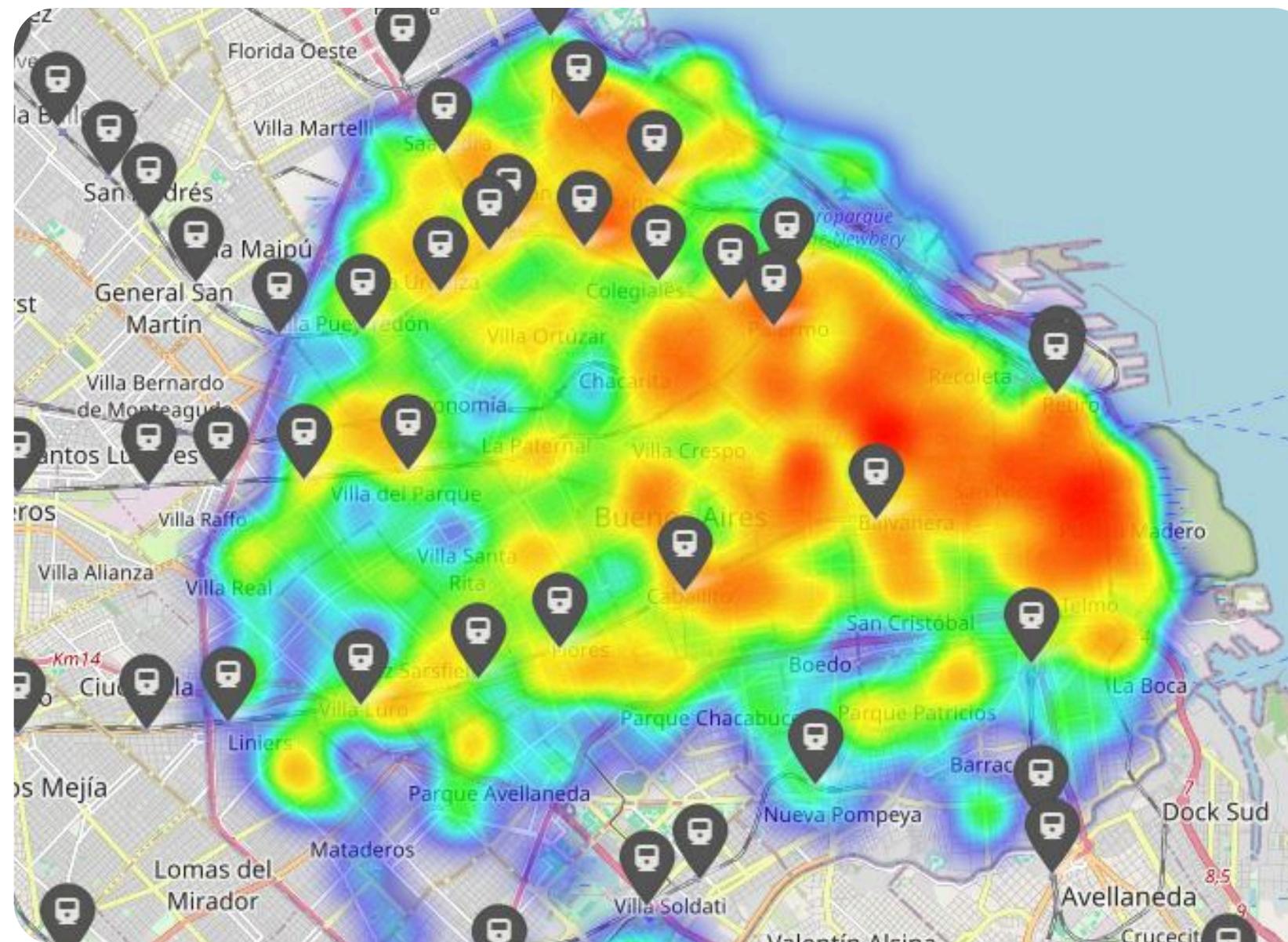
Law School Subway Station



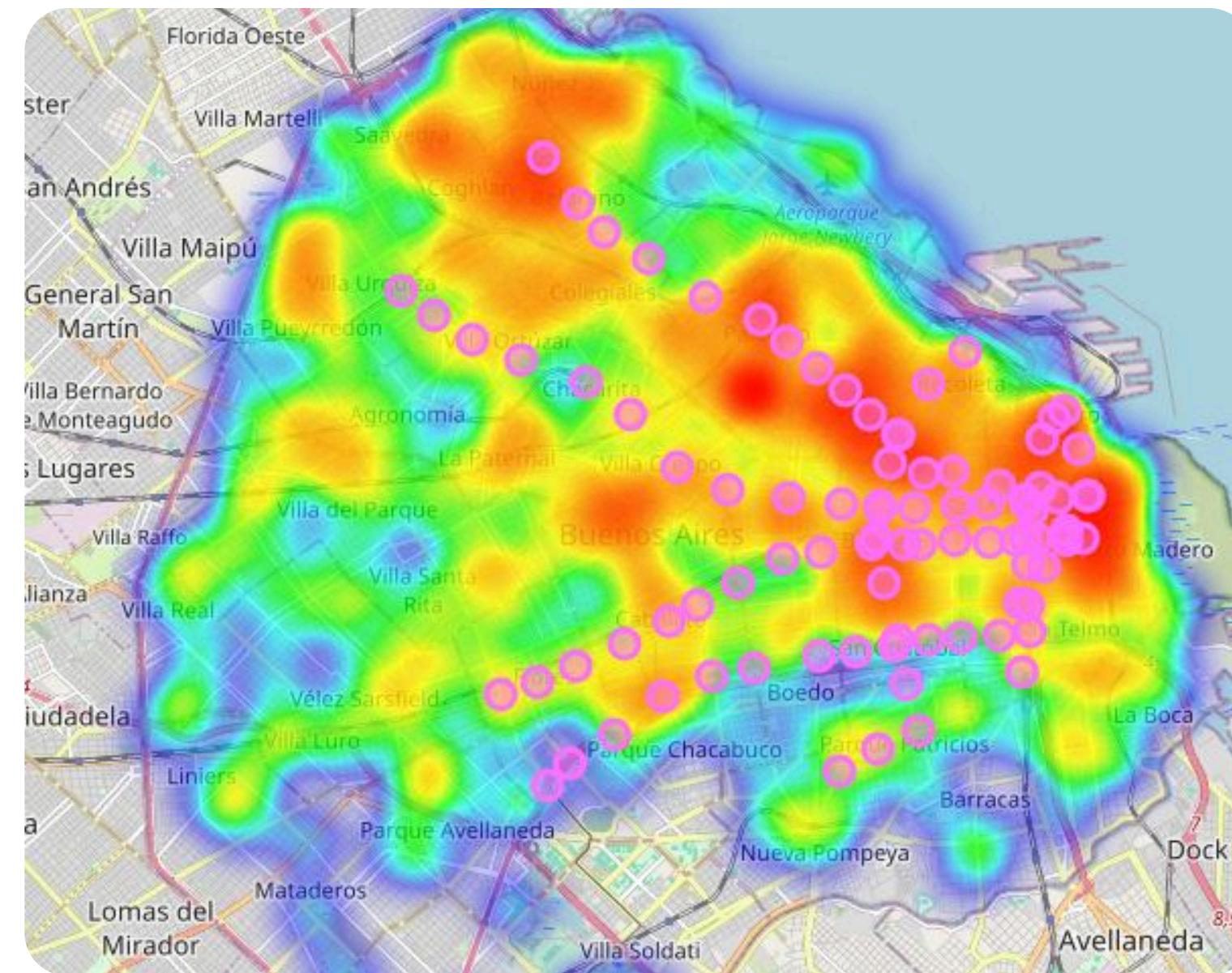
# Additional insights > Train and Subway

- Correlation between Top Stations and Popular train and subway stations.

These visualizations suggest a possible relationship between traffic density and the proximity of train and subway stations. Further analysis is needed to confirm this relationship definitively. Maybe blending public transport user\_ids.



Traffic vs. Train Stations



Traffic vs. Subway Stations



Traffic vs. Subway Stations  
(Zoomed In)

Thank you!