BIKE RENTAL ANALYSIS REPORT

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Executive Summary

What this dataset is: This dataset contains hourly bike rental activity in Seoul, along with corresponding weather conditions and calendar information. It includes variables such as date, rental count, temperature, humidity, wind speed, visibility, rainfall, snowfall, season, and holiday status.

Purpose of analysis: The purpose of this analysis is to identify trends, patterns, and key factors that influence bike rental demand throughout the year. By understanding how seasonality, weather, and holidays affect ridership, we can provide insights and recommendations to help optimize bike availability, improve operational planning, and support transportation decision-making in Seoul.

How it was cleaned: The dataset was cleaned by reformatting the date column, which initially used a DD/MM/YYYY structure that caused incorrect interpretation in PostgreSQL. The dates were converted into a proper MM/DD/YYYY format to ensure accurate ingestion and time-based analysis. The dataset was checked for missing values, and none were found. Additionally, temperature was converted from Celsius to Fahrenheit for easier interpretation and consistency across the analysis.

Dataset Overview

Dataset Source: https://archive.ics.uci.edu/dataset/560/seoul+bike+sharing+demand
Number of records: 8,465
Variables/Columns:

- **Date**: The specific calendar date of the recorded observations.
- **Bike Rental Count:** Number of bikes rented during the given hour
- **Hour:** Hour of the day (0-23) when the rental count was measured
- **Temperature:** Outdoor temperature at that hour (Fahrenheit)
- **Humidity %:** Humidity level in percentage
- **Wind Speed (ms):** Wind speed measured in meters per second
- **Visibility (10ms):** Visibility measured in units of 10 meters
- **Dew Point Temperature:** Temperature (fahrenheit) at which air becomes saturated with moisture
- **Solar Radiation (mj):** Solar radiation levels measured in megajoules per square meter
- **Rainfall (mm):** Amount of rainfall during the hour (millimeters)
- **Snowfall (cm):** Amount of snowfall during the hour (centimeters)
- **Seasons:** The season (winter, spring, summer, fall) associated with the date
- **Holiday:** Whether the day is a public holiday (true = holiday, false = non-holiday)

Exploratory Data Analysis

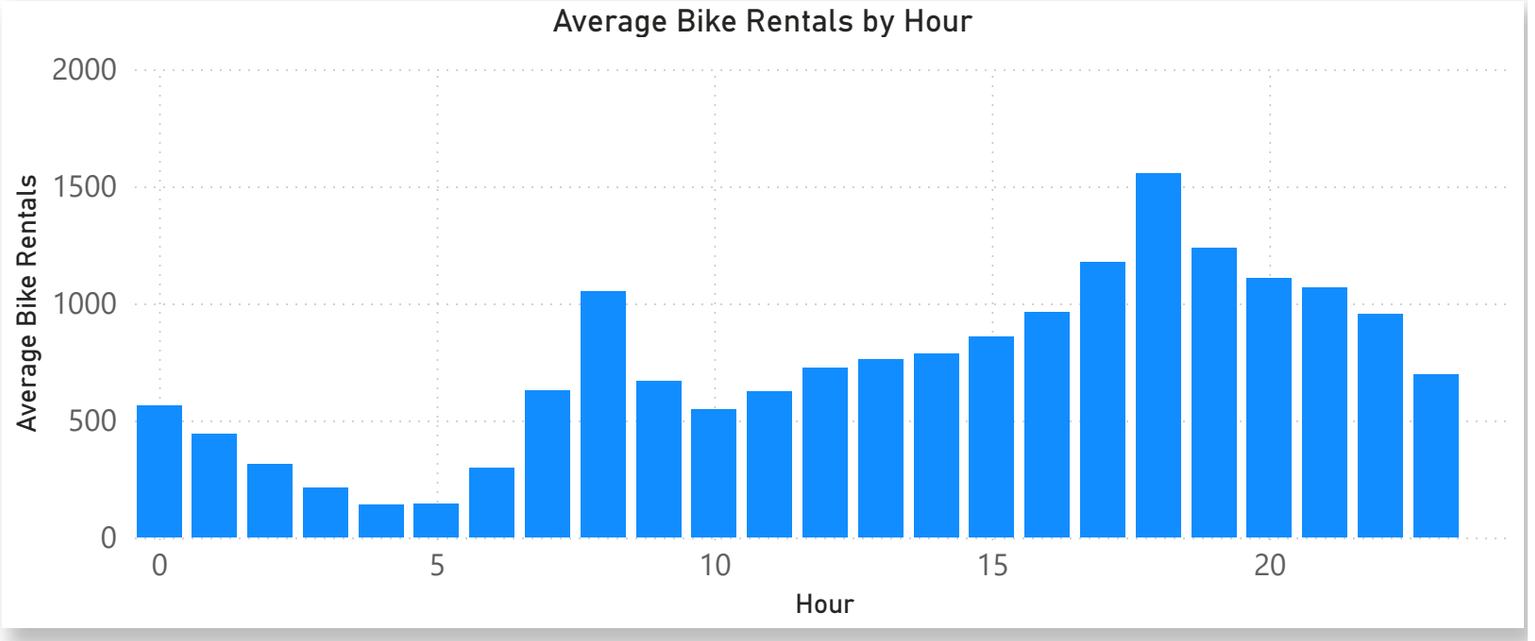
Date range of data: 12/1/2017 - 11/30/2018
Location: Seoul, South Korea

729.16

Average Hourly Bike Rentals

6.17M

Total Bikes Rented



Key Insights

1) 6 million bikes have been rented throughout the year
2) An average of 729 bikes are rented every hour, and ~17,500 daily rentals
3) Biggest peaks of the day are at 8AM and 6PM, which matches commute times for when people leave to, and come back from work

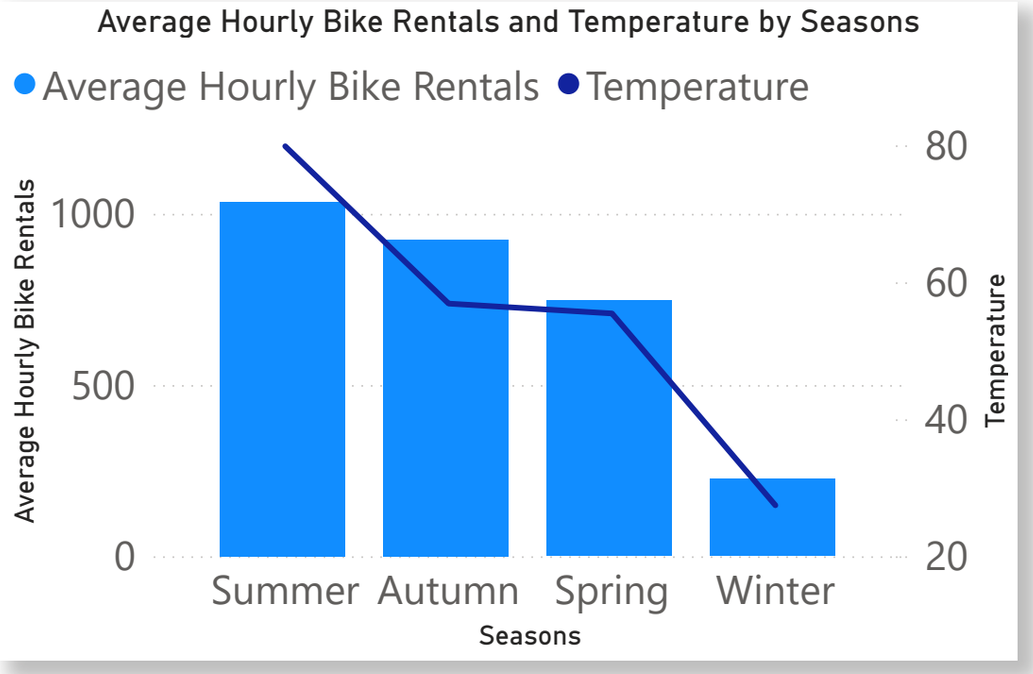
Seasonality Trend

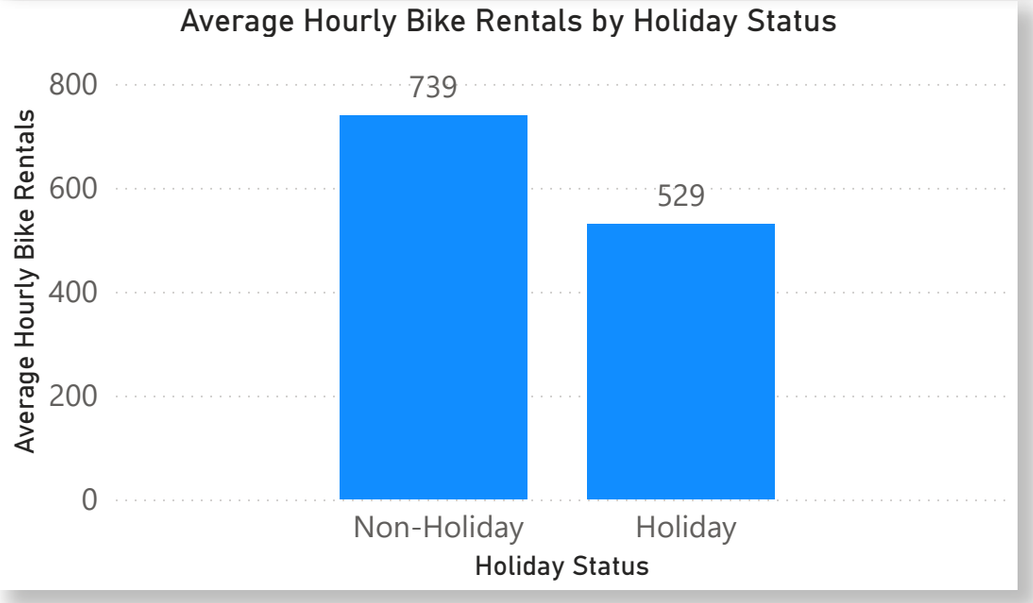
1) Seasonal Demand:

- Bike demand is strongly seasonal, with summer being the clear peak of the year.
- Temperature is one of the biggest predictors of rental volume. The difference between summer and winter is dramatic (over 4.5x higher), highlighting that weather & temperature changes bike ridership significantly

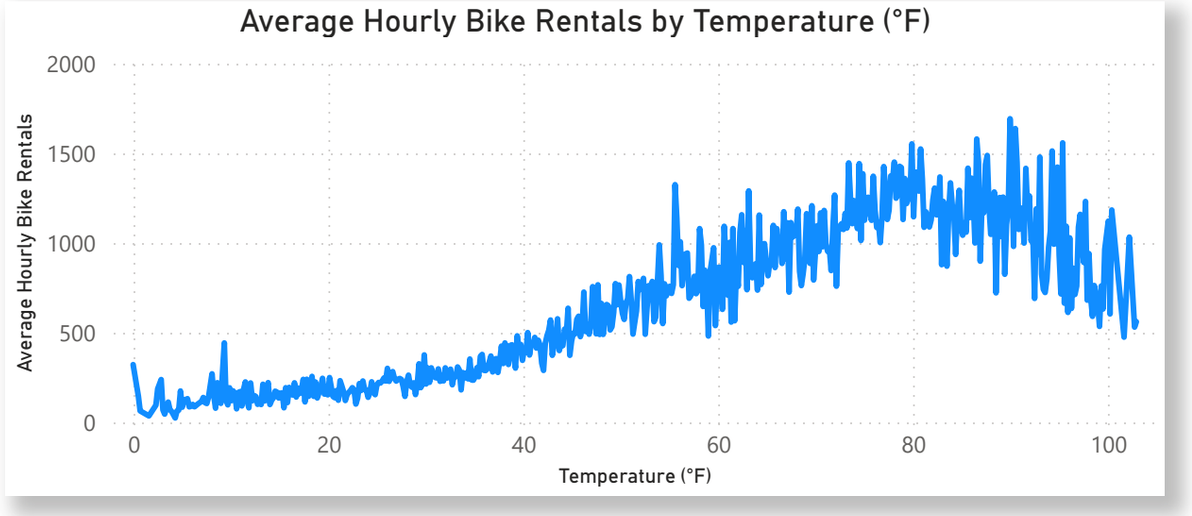
2) Holiday Effects:

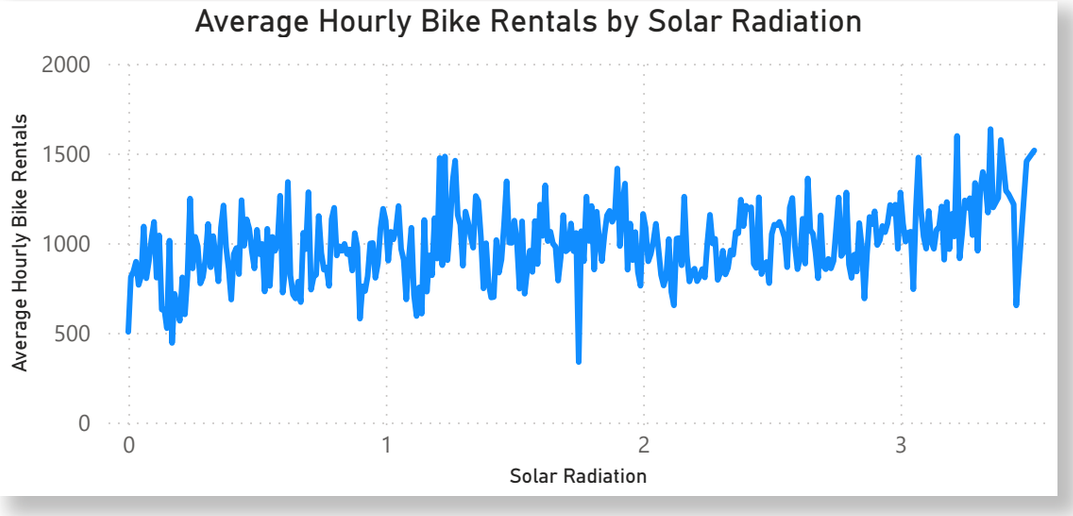
- Rentals decrease on holidays compared to non-holidays
- This shows people primarily use bikes for commuting or routine activities rather than leisure, reinforcing that bikes are more functional than recreational





Weather Impact - Top Indicators





1) Rentals vs Temperature (Correlation = 0.53856):

- The strongest indicator of bike demand. As temperature increases (up to a comfortable range), rentals increase. On the other hand, colder days suppress demand

2) Rentals vs Solar Radiation/Sunlight (Correlation = 0.26184):

- Sunnier conditions are associated with higher rentals. Dark, overcast days tend to see fewer trips. Sunlight matters, but not as much as temperature

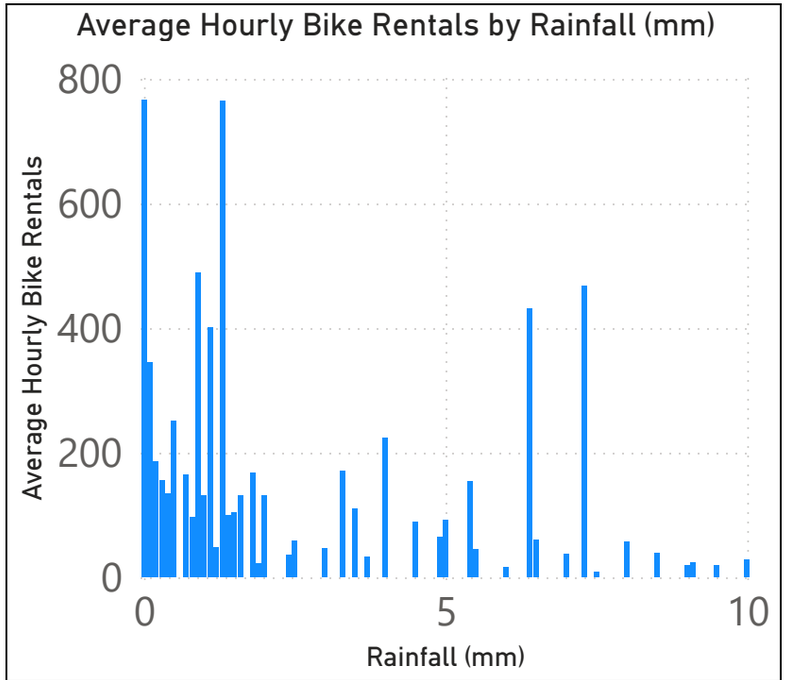
Weather Impact - Top Indicators

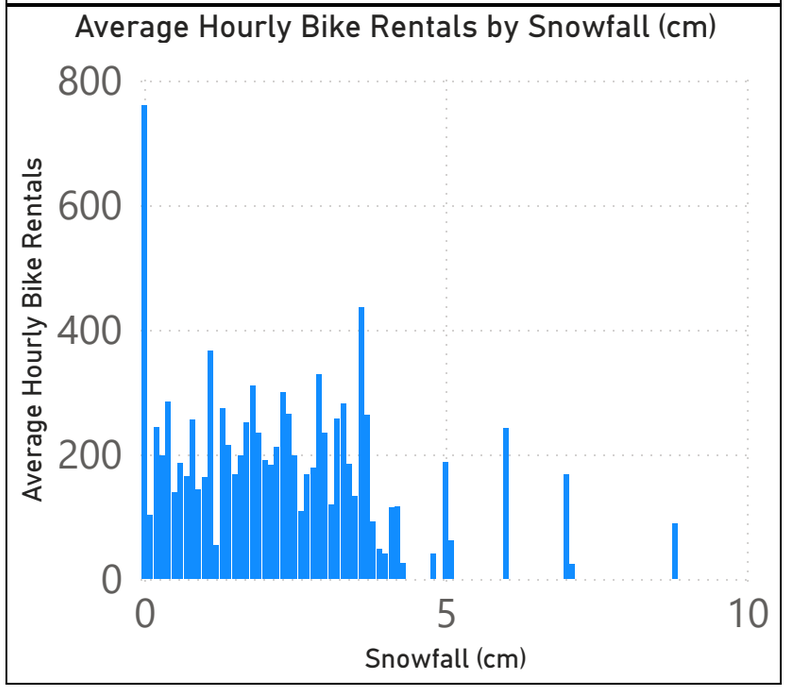
3) Rentals vs Rainfall (Correlation = -0.12307):

- When rainfall is present (beyond a light drizzle), rentals drop
- Most of the time, there is little to no rain so the correlation underestimates the impact but when it rains, people noticeably ride less
- Rain is an important "on/off" suppressor of bike rentals

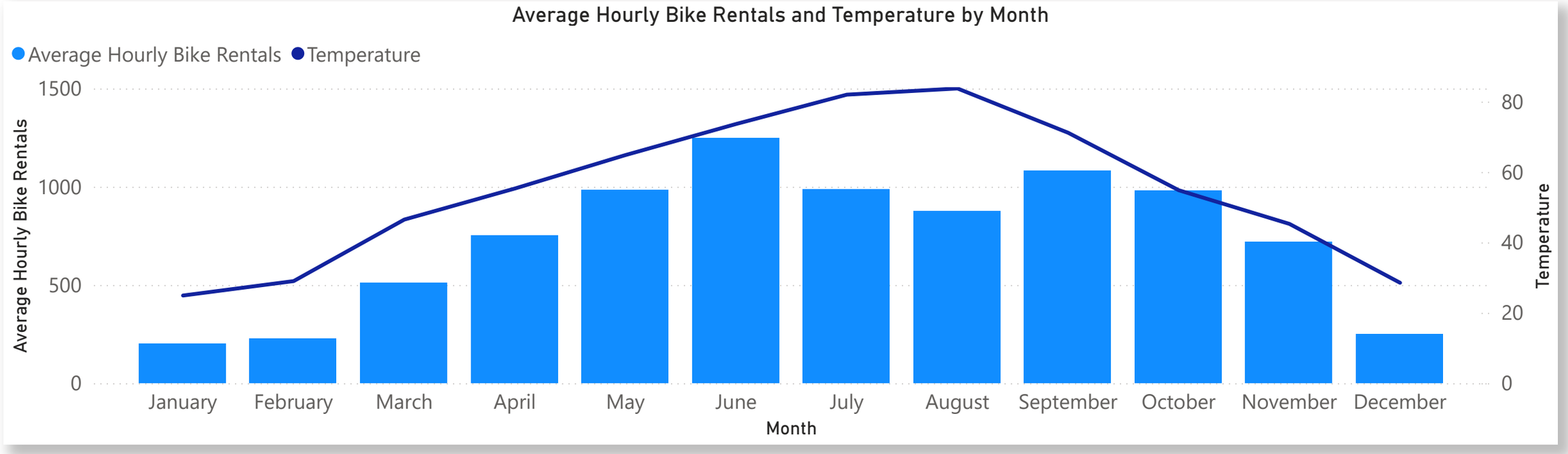
2) Rentals vs Snowfall (Correlation = -0.14181):

- Snowfall shows to have reduced demand. Since snow often coincides with cold temperatures, the effects are stacked
- This is a strong suppressor, but since snow is rare, the overall correlation is modest





Time Trend



Key Insights

1) The strongest month (June: 1,246) is almost 6x the weakest month (January: 202). This highlights the extreme sensitivity of the rider behavior to weather

2) Bike rentals increase with temperature up to a point, but in July and August — when Seoul reaches peak heat and humidity — the trend reverses. Excessive heat appears to create an inverse relationship with ridership, causing usage to decline despite it still being summer

Recommendations Summary

Based on our analysis of bike rentals, weather patterns, and time trends, here are our key recommendations to drive growth and operational efficiency:

1) Align bike availability and operations with peak commuter times:

• Focus on fleet balancing and maintenance outside of morning and evening peaks, especially in the spring and summer

• Ensure docking stations in commuter-heavy areas are well stocked before weekday rush hours (7-9 AM and 5-7 PM). This will ensure there is enough stock to handle the amounts of riders that will need bikes

2) Plan demand based on future weather:

• Since rentals are strongly affected by temperature, rain, and snow, integrate weather forecasting into operational planning. On warm, sunny days:

- Increase available bikes at high-traffic locations
- Adjust maintenance schedules to avoid peak weather days & prep beforehand for them

3) Promote leisure and tourism rides:

• Since weekends and holidays show flatter and more mid-day focused usage, there is an opportunity to grow leisure demand. Actions might include:

- Highlighting suggested scenic routes or "weekend ride ideas"
- Running seasonal campaigns to increase midday and afternoon rides

4) Leverage seasonal patterns for strategic planning:

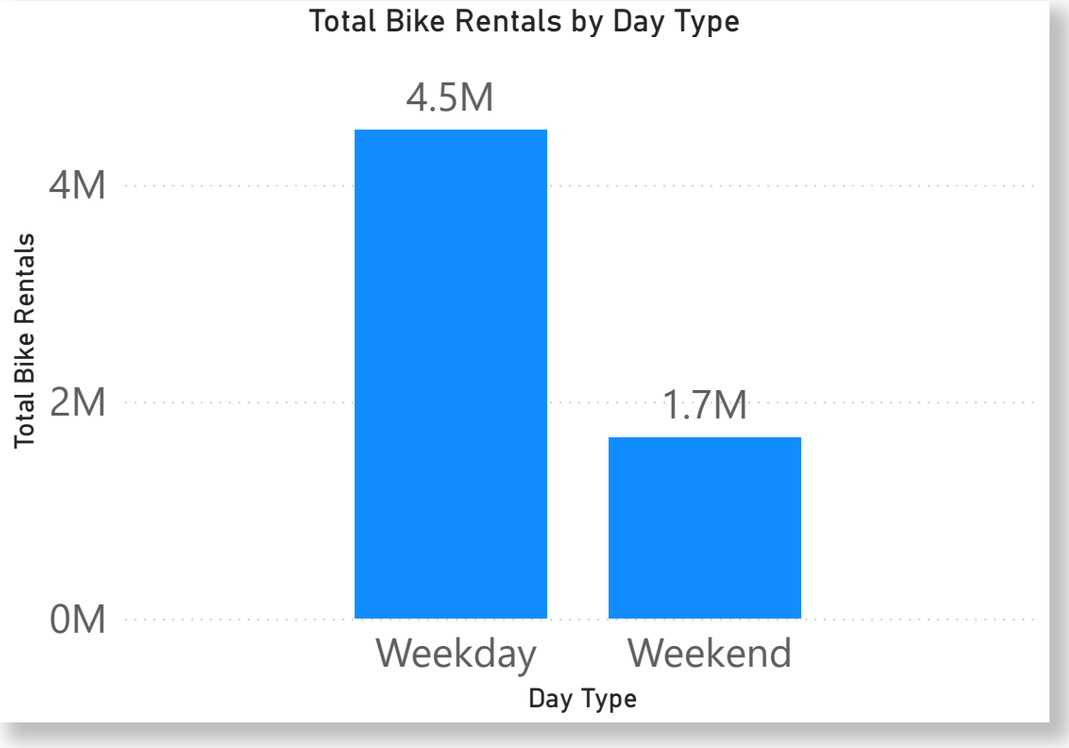
• Use the strong seasonality to:

- Plan larger maintenance or system upgrades in the winter, when demand is lowest
- Increase marketing spend leading into spring and early summer, when people are most likely to adopt biking habits for the upcoming season
- Introduce seasonal passes or promotions that start in spring and run through summer to lock in recurring revenue and users
- Expand bike lanes or seasonal biking zones

Final Takeaways

Overall Insights Summary

- Temperatures are the strongest driver and predictor of bike rentals
- Too high temperatures & humidity can suppress demand in late summer
- Rain/snow are strong suppressors of bike demand
- Commuting is the main usage pattern



Key Metrics

- Peak Month: June (1,246 rentals/hour)
- Lowest Month: January (202 rentals/hour)
- Peak Hour: 6 PM (1,554 rentals/hour)
- Lowest Hour: 4 AM (137 rentals/hour)