

Data Analytics (DA)

Module-End-2 Assignment:

“Data Transformation, Modeling & Visualization with Power BI”

Title: Analyzing Smart City Bike Sharing Data using Power BI

Data Sources:

Source: [Dataset link](#)

Problem Statement:

Public bike-sharing systems generate continuous data from hundreds of stations across different cities. The task is to analyze this real-time bike station dataset to understand station performance, usage efficiency, and operational patterns across cities.

Applying Power BI skills—from data cleaning and modeling to DAX and dashboarding—to turn raw data into actionable urban mobility insights.

Attribute Details:

Attribute Name	Data Type	Description
Number	Integer	Unique identifier for each bike station
Name	Text	Name of the bike station
Address	Text	Physical address of the bike station
Position	Text	Geographic coordinates (latitude and longitude) of the station

Attribute Name	Data Type	Description
Banking	Boolean	Indicates whether the station supports card payment (TRUE/FALSE)
Bonus	Boolean	Indicates whether the station offers bonus features or incentives
Status	Text	Operational status of the station (OPEN / CLOSED)
Contract Name	Text	Name of the city or contract under which the station operates
Bike Stands	Integer	Total number of bike stands available at the station
Available-Bike Stands	Integer	Number of empty bike stands currently available
Available Bikes	Integer	Number of bikes currently available at the station
Last Update	DateTime (Text)	Timestamp of the most recent data update

- Import and explore the dataset in Power BI.

The screenshot shows the Power Query Editor interface. The ribbon at the top has tabs for File, Home, Transform, Add Column, View, Tools, and Help. The Transform tab is selected. Below the ribbon are various icons for data manipulation: Conditional Column, Merge Columns, Index Column, Duplicate Column, Format (with options for Text, Number, Date, Time, Duration), Statistics, Standard, Scientific, Trigonometry, Rounding, Information, and Date & Time.

The main area shows a table with four columns: Number, Name, Address, and Position.1. The table has four rows:

	Number	Name	Address	Position.1
1	2000	2000 - TEST DSI PLAISIR	Not Available	46.5488766782771
2	1297	1297- ST FÉRREOL DAVSO	ST FERREOL DAVSO - RUE FRANCIS DAVSO ANGLE RUE SAINT FERREOL	43.293485736186526
3	8265	8265- NÉGRESKO - PAULET	NEGRESKO PAULET - FACE AU 42 RUE NEGRESKO	43.269318556371154

- Clean and transform data using **Power Query**.

The screenshot shows the 'APPLIED STEPS' pane on the right side of the Power Query Editor. It lists the following steps in chronological order:

- Source
- Navigation
- Promoted Headers
- Changed Type
- Filtered Rows
- Address Blanks values to NA
- Name col removed #infront
- Split Column by Delimiter_Po...
- Split Cols Dat & Time
- Renamed Columns
- Capitalized Each Word
- Renamed Date and time
- Parsed Date
- Extracted Month Name

Query Settings

PROPERTIES

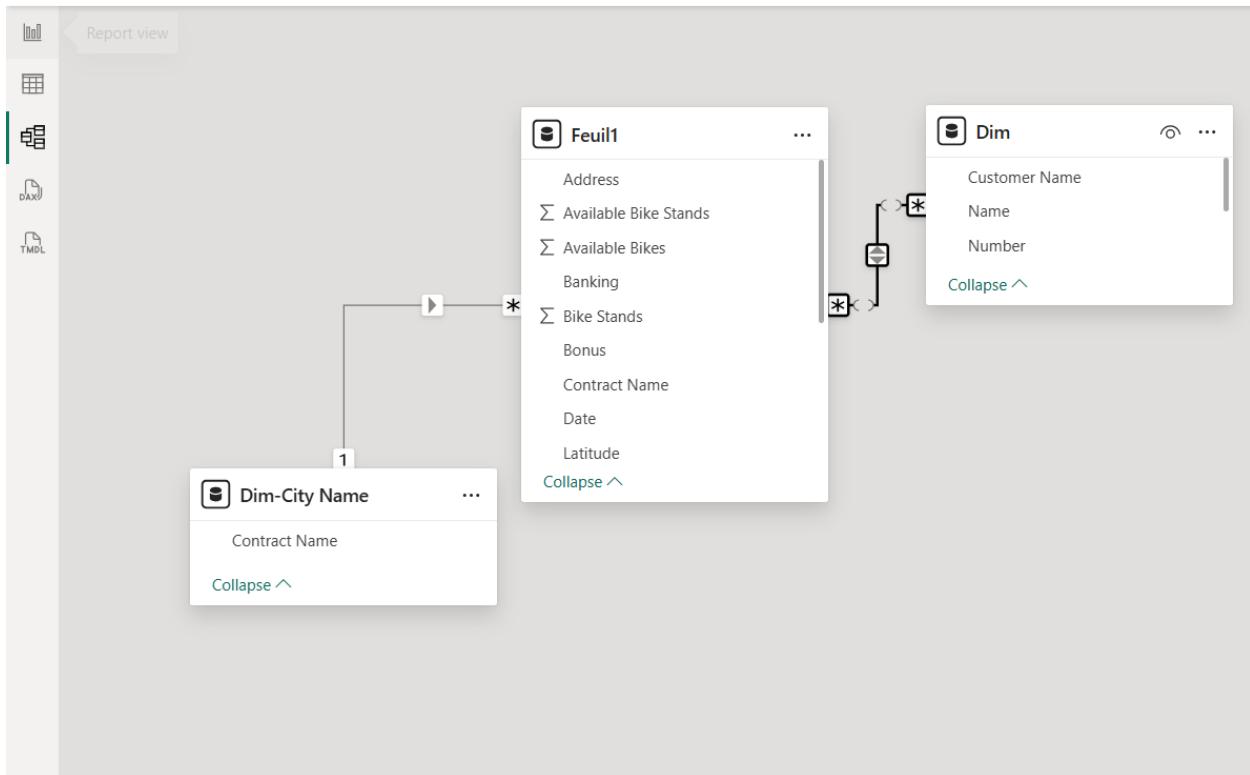
Name: Dim

All Properties

APPLIED STEPS

- Source
- Navigation
- Promoted Headers
- Added Custom**
- Renamed Columns
- Trimmed Text
- Cleaned Text
- Capitalized Each Word

- Build a logical data model.
 - Set up a fact table.
 - Create dimension tables and
 - Defining the relationships between the fact and dimension tables



- Create **DAX measures** and calculated columns (wherever needed).

Station Availability Status = If(Feuil1[Available Bikes]=0,"Empty",IF(Feuil1[Available Bike Stands]=0,"Full","Available"))

1 Station Availability Status = If(Feuill[Available Bikes]=0,"Empty",If(Feuill[Available Bike Stands]=0,"Full","Available"))												
Longitude	Banking	Bonus	Status	Contract Name	Bike Stands	Available Bike Stands	Available Bikes	Date	Last Update.2	Station Availability Status		
4.860219	False	False	OPEN	Lyon	20	16	1	11/12/2025	2:48:58 PM +05:30	Available		
4.865802	False	False	OPEN	Lyon	30	30	0	11/12/2025	2:50:09 PM +05:30	Empty		
4.81961724654947	False	False	OPEN	Lyon	15	14	0	11/12/2025	2:53:07 PM +05:30	Empty		

		Data
30	Available	Sort ascending
30	Empty	Sort descending
30	Empty	Clear sort
30	Empty	Clear filter
30	Available	Clear all filters
30	Available	Text filters
30	Empty	<div style="border: 1px solid #ccc; padding: 5px; display: inline-block;"> 🔍 Search </div>
30	Available	<input checked="" type="checkbox"/> (Select all) <input checked="" type="checkbox"/> Available <input checked="" type="checkbox"/> Empty <input checked="" type="checkbox"/> Full
30	Empty	
30	Available	
30	Available	Bonus
30	Available	Contract Name
30	Available	Date
30	Available	Last Update.2
30	Available	Latitude
30	Available	Longitude

Utilization % per station = DIVIDE(Feuil1[Available Bikes],Feuil1[Available Bike Stands],0)

1 Utilization %_per station = DIVIDE(Feuill[Available Bikes],Feuill[Available Bike Stands],0)											
Bonus	Status	Contract Name	Bike Stands	Available Bike Stands	Available Bikes	Date	Last Update.2	Station Availability Status	Utilization %_per station		
False	OPEN	lyon	20	16	1	11/12/2025	2:48:58 PM +05:30	Available	0		
False	OPEN	lyon	30	30	0	11/12/2025	2:50:09 PM +05:30	Empty	0		
False	OPEN	lyon	15	14	0	11/12/2025	2:53:07 PM +05:30	Empty	0		
False	OPEN	lyon	15	15	0	11/12/2025	2:52:16 PM +05:30	Empty	0		

Utilization %_per station

- Sort ascending
- Sort descending
- Clear sort
- Clear filter
- Clear all filters
- Number filters >

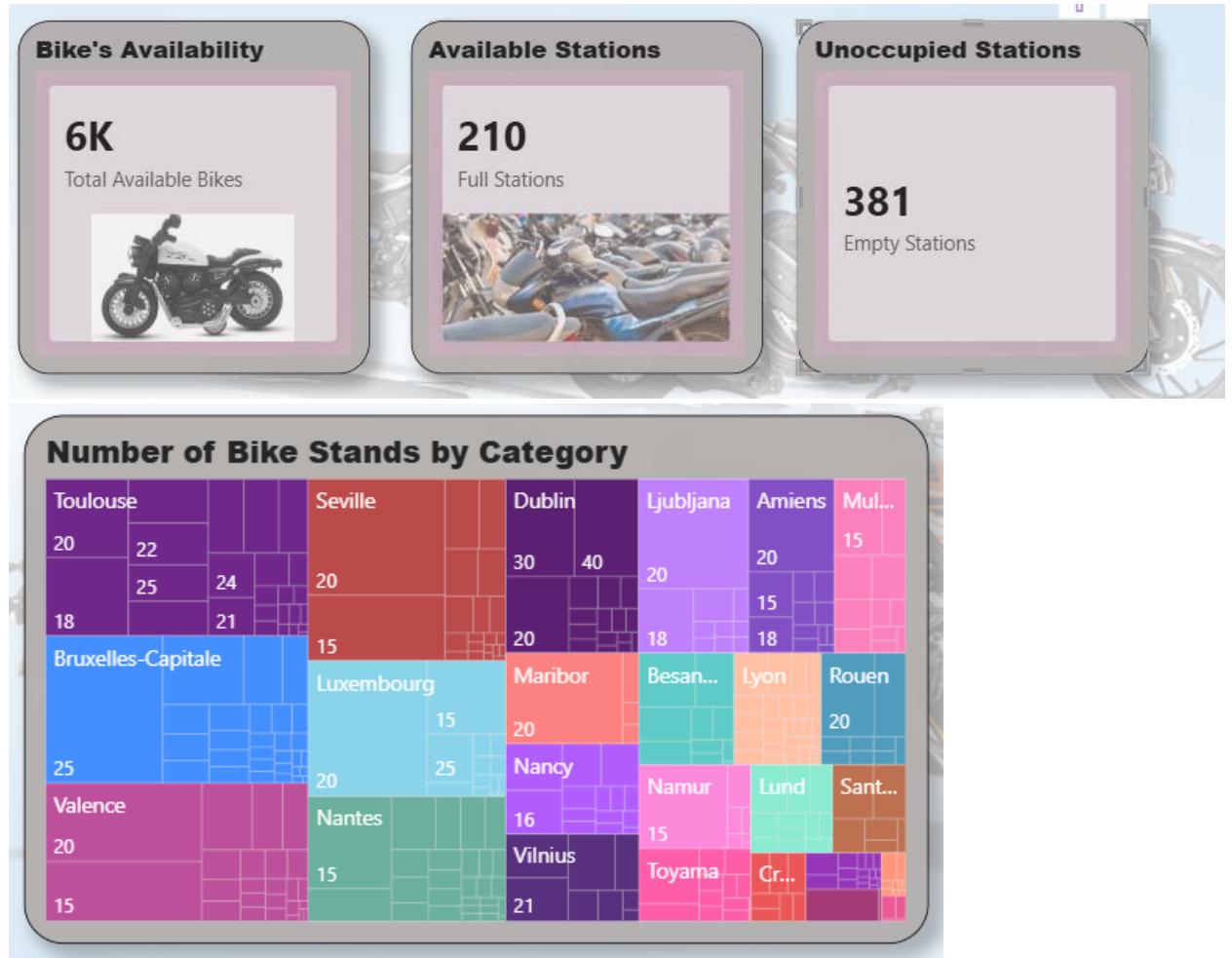
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Status-Wise Station Table = SUMMARIZE(Feuil1,Feuil1[Status],"Station Count",COUNT(Feuil1[Number]),"Total Bikes",SUM(Feuil1[Available Bikes]))

Status	Station Count	Total Bikes
OPEN	973	5943
CLOSED	115	18

- Design **interactive visuals and dashboards**.

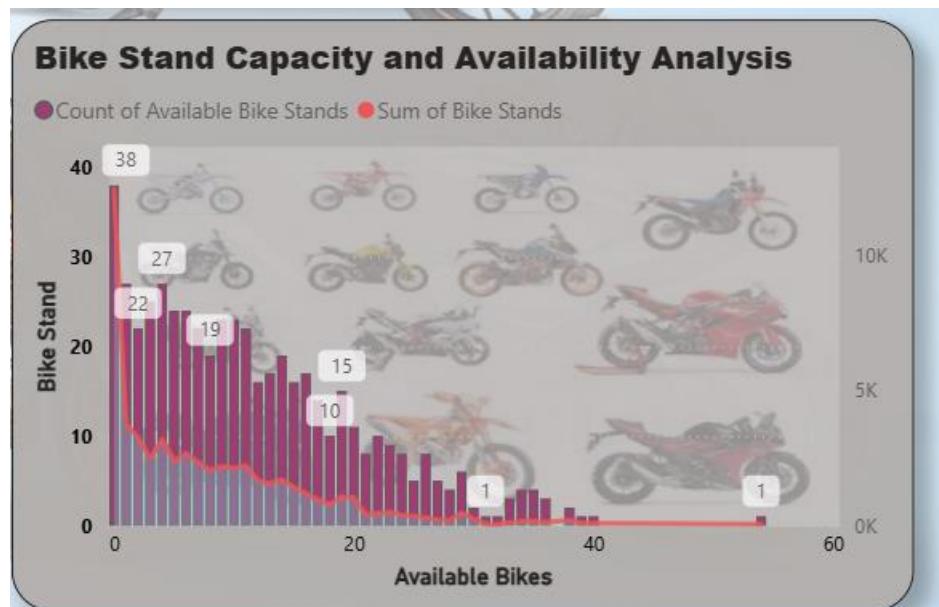


Question Analysis:

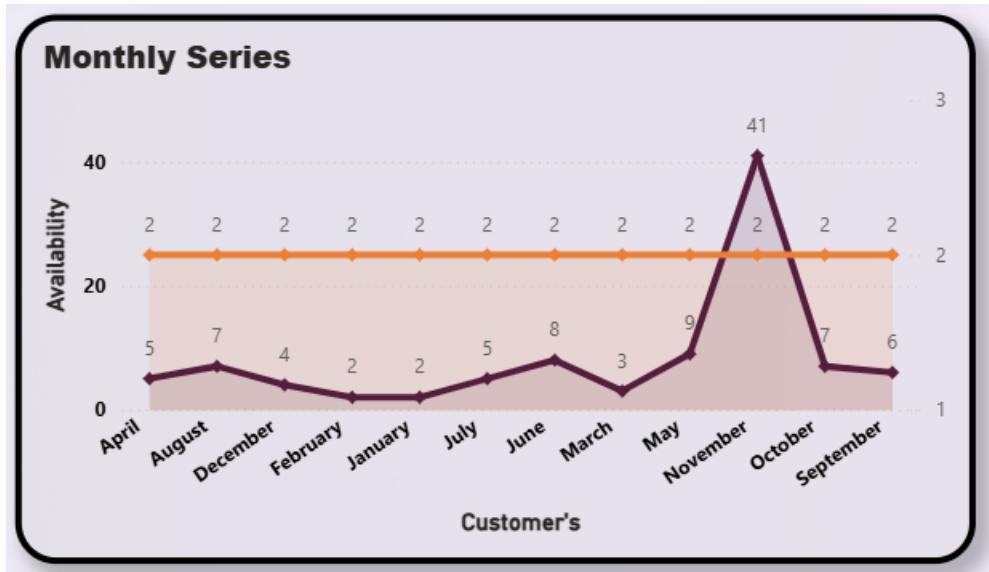
- How does **station availability status** (Available / Empty / Full) vary across cities?

Station Status Overview			
Contract Name	Date	Status	Station Availability
Valence	11/12/2025	OPEN	★ Available
Luxembourg	11/12/2025	OPEN	★ Available
Nantes	11/12/2025	OPEN	★ Available
Dublin	11/12/2025	OPEN	★ Available
Ljubljana	11/12/2025	OPEN	★ Available
Toulouse	11/12/2025	OPEN	☆ Empty
Lyon	11/12/2025	OPEN	☆ Empty
Valence	11/12/2025	OPEN	☆ Empty
Lyon	11/12/2025	OPEN	★ Full
Marseille	12/19/2022	CLOSED	☆ Empty
Amiens	11/12/2025	OPEN	★ Available
Maribor	11/12/2025	OPEN	★ Available
Toulouse	11/12/2025	OPEN	★ Full
Vilnius	11/12/2025	CLOSED	☆ Empty
Besancon	11/12/2025	OPEN	★ Available
Nancy	11/12/2025	OPEN	★ Available
Luxembourg	11/12/2025	OPEN	☆ Empty
Namur	11/12/2025	OPEN	★ Available
Total			

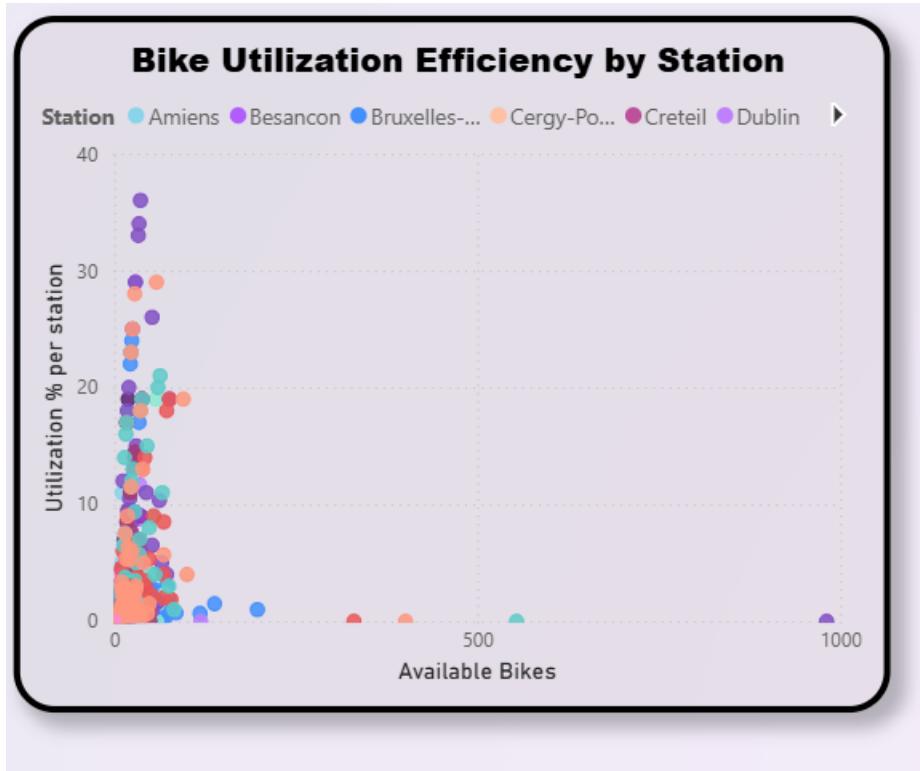
- How is **bike availability distributed** across all stations?



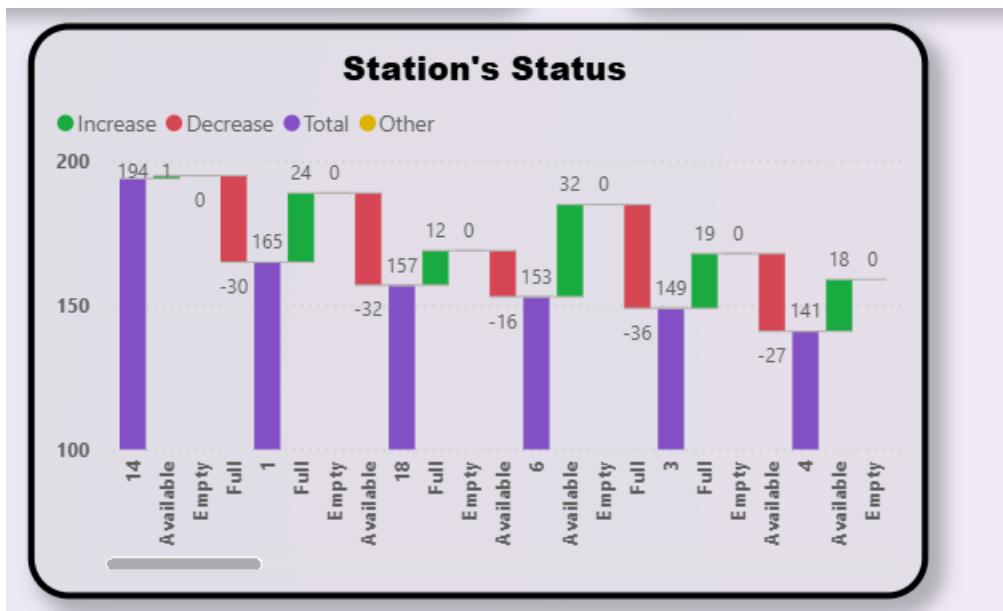
- On which month does bike availability **peak or spike significantly**?



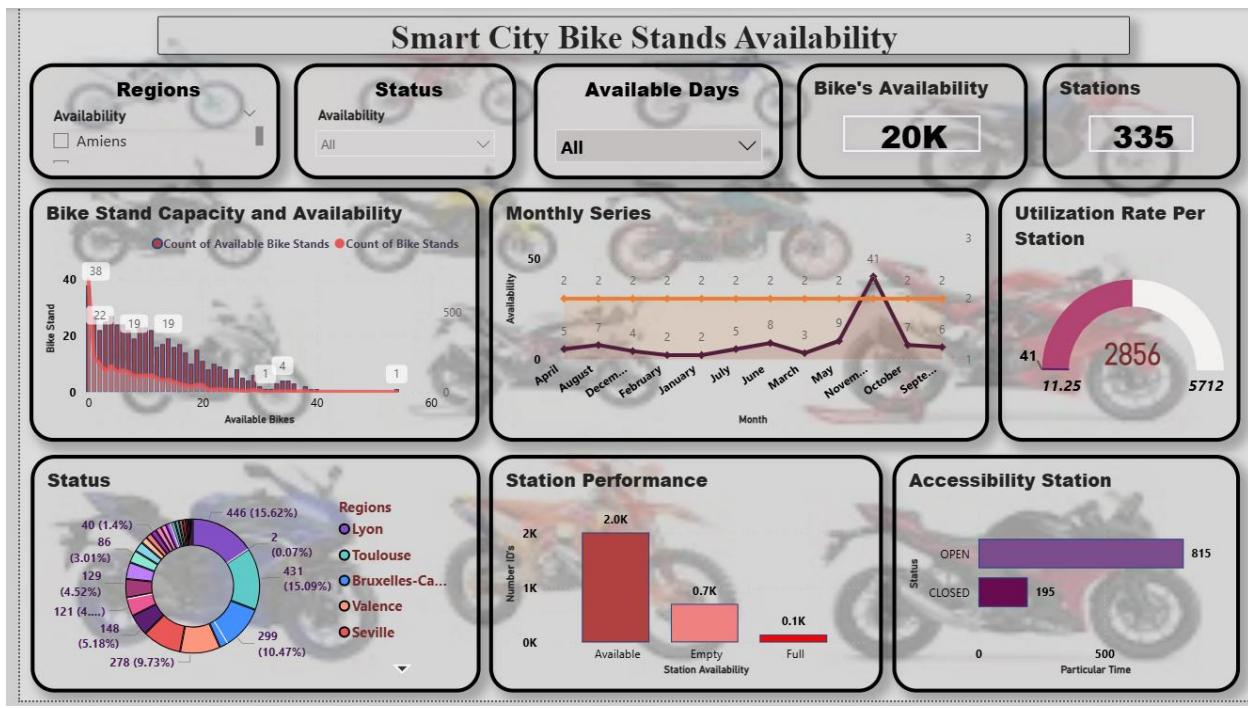
- What is the **average utilization rate per station**?



- How does the **balance between increases and decreases** vary by station?

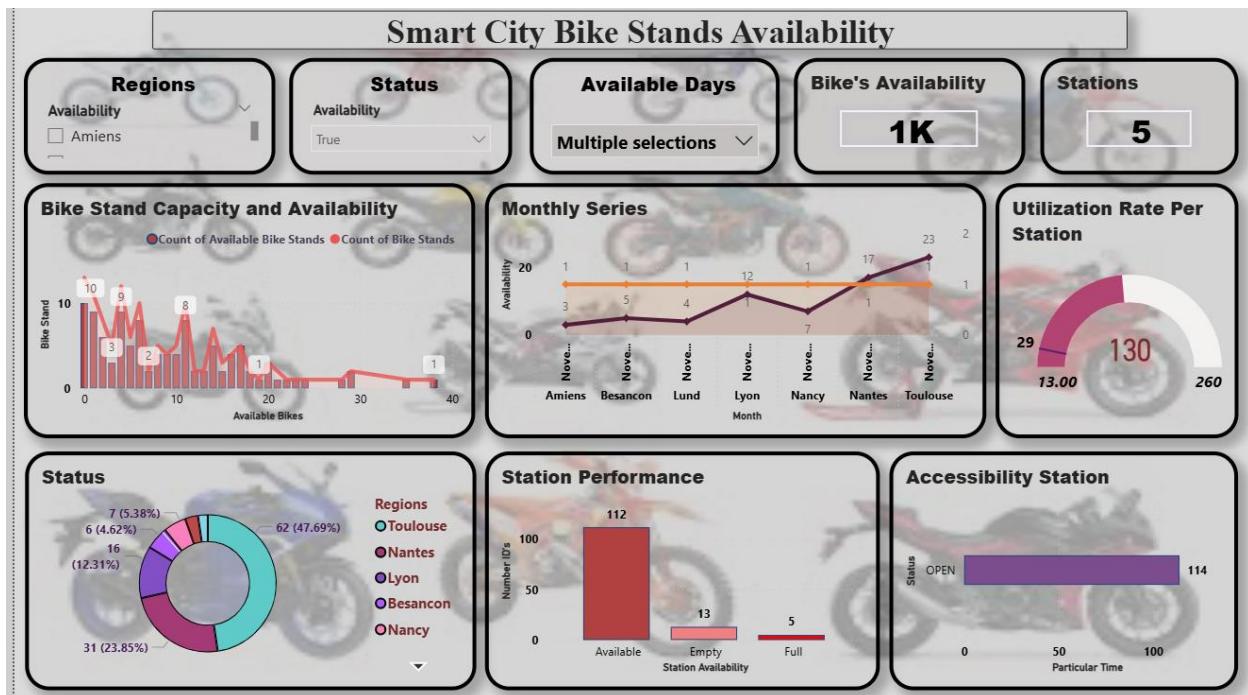


Dashboard Overview:

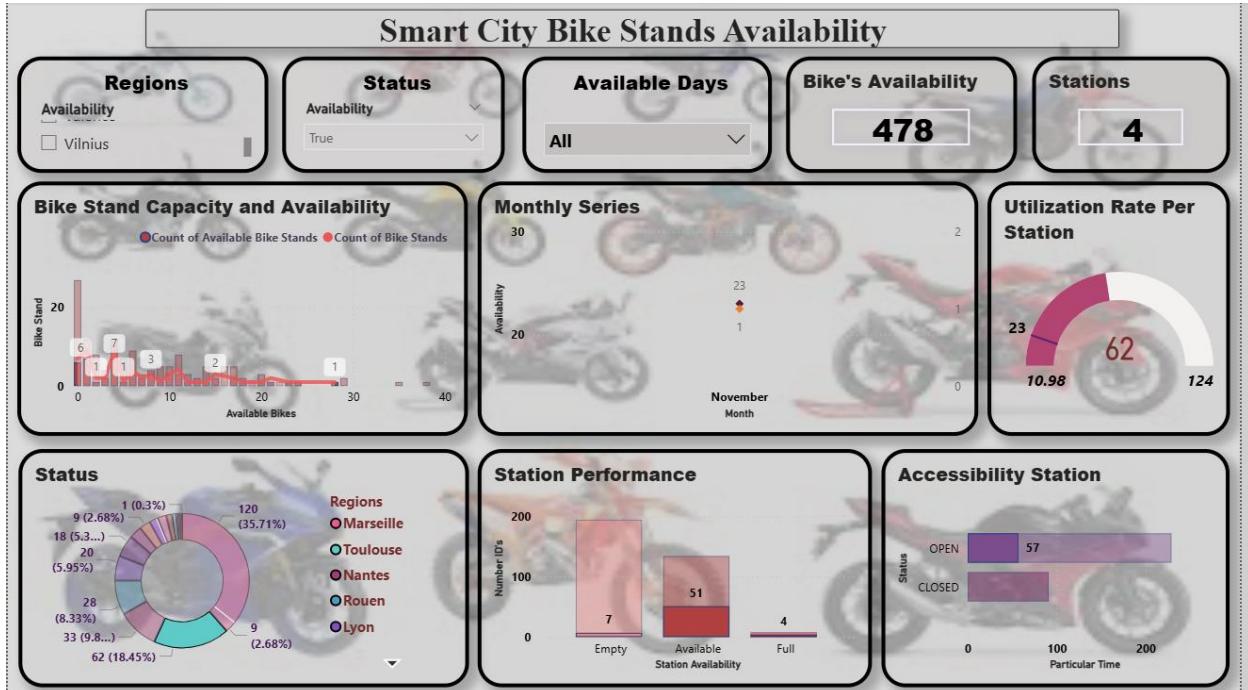


Dashboard Analysis:

Top dates by total available bikes - **11/12/2025**



- ⊕ **Station Performance Status:** A higher count of **available bikes compared to full stations** suggests supply exists, but not always where demand is highest.



Report Summary:

- ✓ **Overall Availability:** The system shows moderate bike availability (~20K bikes), but distribution is uneven across stations, indicating localized shortages and surpluses.
- ✓ **Utilization Rate Insights:** Stations show **uneven utilization**, with some being heavily used and others underused—pointing to optimization potential in station placement and bike redistribution.
- ✓ **Time-Based Fluctuations:** Bike availability varies significantly across **time and customer usage patterns**, suggesting strong peak-hour demand and underutilization during off-peak periods.

This report analyzes smart city bike-sharing station data to evaluate **station performance, bike availability, usage, and operational efficiency** across cities. Using Power BI, raw station data was transformed into interactive dashboards highlighting high-demand and underutilized stations. These insights support better bike redistribution, infrastructure planning, and improved mobility services.

Conclusion:

The bike-sharing system has adequate overall availability, but bikes are not evenly distributed across stations. Usage varies by time and region, leading to peak-hour shortages and off-peak underuse. Some stations are highly utilized while others remain underutilized, indicating imbalance. Regional performance differences highlight areas needing focused improvement. Better rebalancing and demand planning can improve efficiency and user satisfaction.