

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.

Untitled - Power Query Editor

File Home Transform Add Column View Tools Help

Column From Custom Invoke Custom Examples Column Function Duplicate Column

General

Conditional Column Index Column

Format Parse

From Text

Statistics Standard Scientific

From Number

Trigonometry Rounding Information

Date Time Duration

From Date & Time

Queries [2]

Feuil1

Dim

= Table.SplitColumn(Table.TransformColumnTypes(#"Split Column by Delimiter_Position", {"Last Update", type text})

	Number	Name	Address	Position.1
1	2000	2000 - TEST DSI PLAISIR	Not Available	46.5488766782771
2	1297	1297- ST FÉRRÉOL 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**.

PROPERTIES

Name

Feuil1

[All Properties](#)

APPLIED STEPS

- 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 Editor interface showing a Power Query formula bar and a data table.

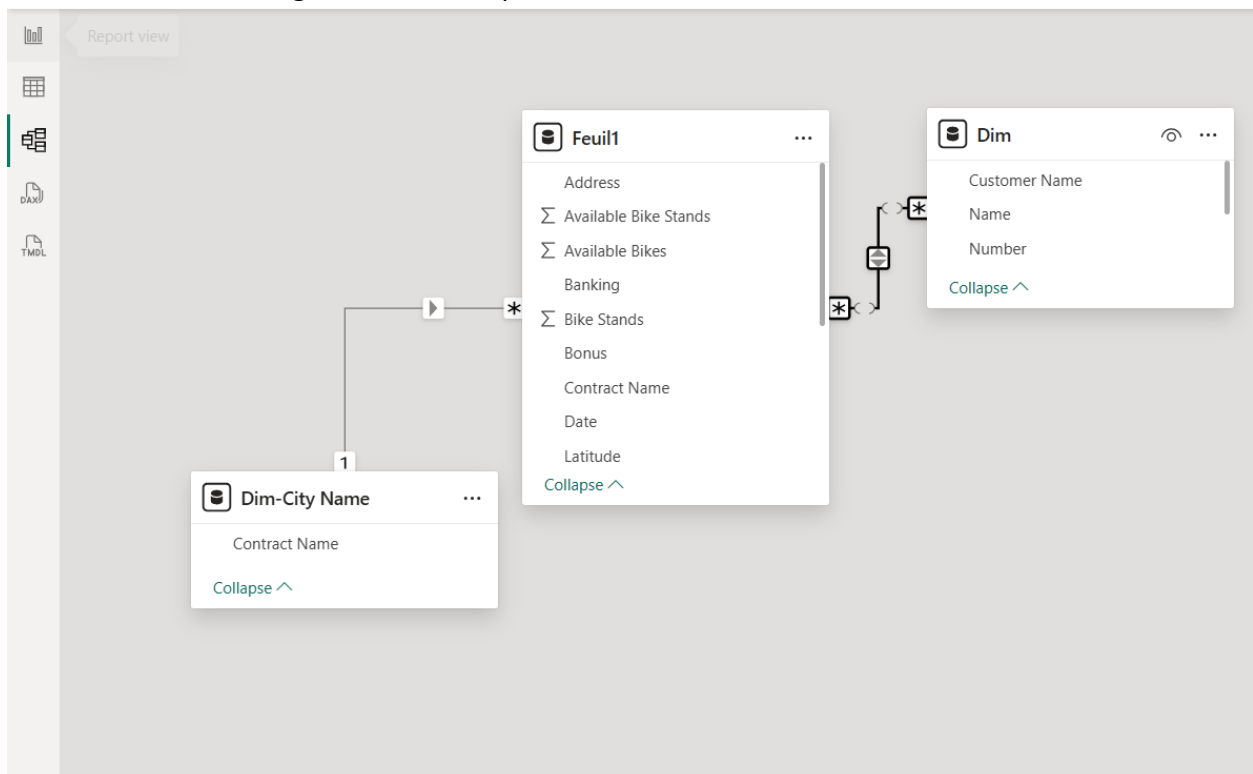
Formula Bar: `= Table.AddColumn(#"Promoted Headers", "Custom", each Text.Select([Name],{" ", "a".."z", "A".."Z"}))`

ABC 123	Number	ABC 123	Name	ABC 123	Custom
1	2000	2000	TEST DSI PLAISIR	TEST DSI PLAISIR	TEST DSI PLAISIR
2	1297	1297	ST FÉRRÉOL DAVSO	ST FÉRRÉOL DAVSO	ST FÉRRÉOL DAVSO
3	8265	8265	NÉGRESKO - PAULET	NÉGRESKO - PAULET	NÉGRESKO - PAULET
4	8065	8065	PROMENADE POMPIDOU PALM ...	PROMENADE POMPIDOU PALM ...	PROMENADE POMPIDOU PALM ...
5	1011	1011	BORNE TEST NANTES 1	BORNE TEST NANTES 1	BORNE TEST NANTES 1
6	4342	4342	FLAMMARION MONTRICHET	FLAMMARION MONTRICHET	FLAMMARION MONTRICHET
7	6176	6176	CANTINI ROUET	CANTINI ROUET	CANTINI ROUET
8	3322	3322	ARENCE CHANTERAC	ARENCE CHANTERAC	ARENCE CHANTERAC
9	1264	1264	CANEBIRE DUGOMMIER	CANEBIRE DUGOMMIER	CANEBIRE DUGOMMIER

Query Settings Panel:

- PROPERTIES**
 - Name: Dim
- 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"))

$$1 \text{ Station Availability Status} = \text{IF}(\text{Feuil1}[\text{Available Bikes}]=0, \text{"Empty"}, \text{IF}(\text{Feuil1}[\text{Available Bike Stands}]=0, \text{"Full"}, \text{"Available"}))$$

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

Station Availability Status

30 Available

30 Empty

30 Empty

30 Empty

30 Available

30 Available

30 Available

30 Empty

30 Available

30 Available

30 Available

30 Empty

30 Empty

30 Available

30 Available

30 Available

30 Available

30 Available

30 Available

Data

Sort ascending

Sort descending

Clear sort

Clear filter

Clear all filters

Text filters

Search

(Select all)

Available

Empty

Full

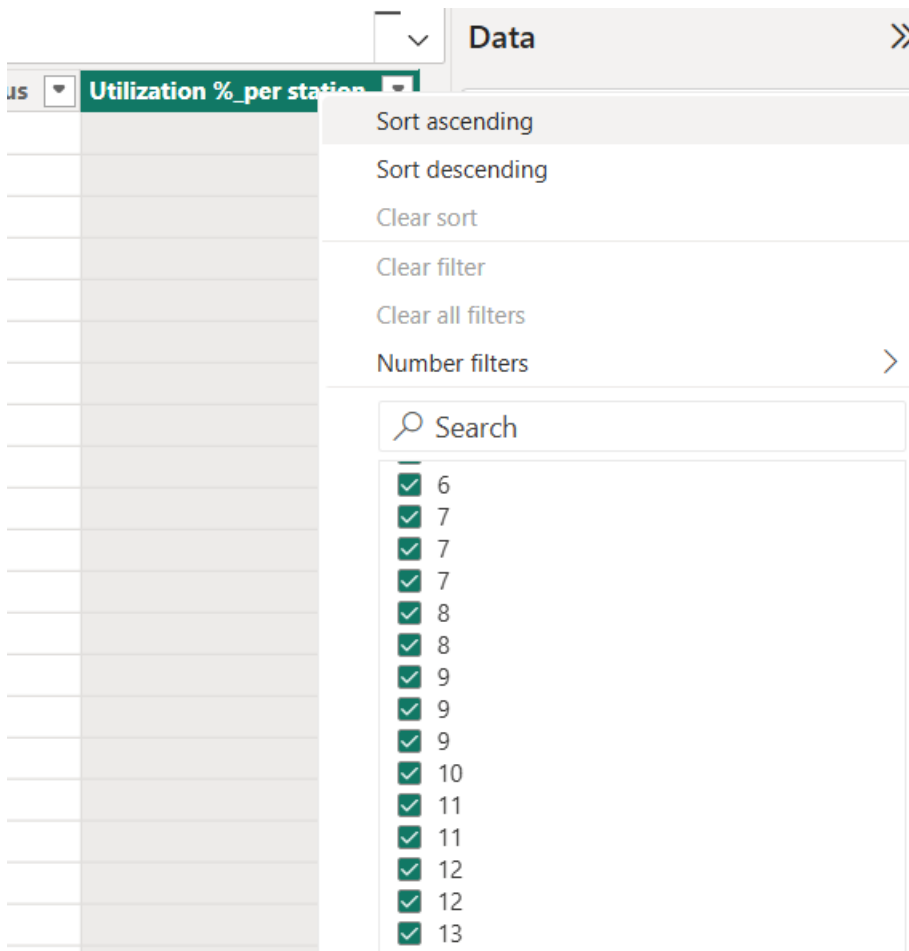
OK

Cancel

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

$$1 \text{ Utilization \%_per station} = \text{DIVIDE}(\text{Feuil1}[\text{Available Bikes}], \text{Feuil1}[\text{Available Bike Stands}], 0)$$

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



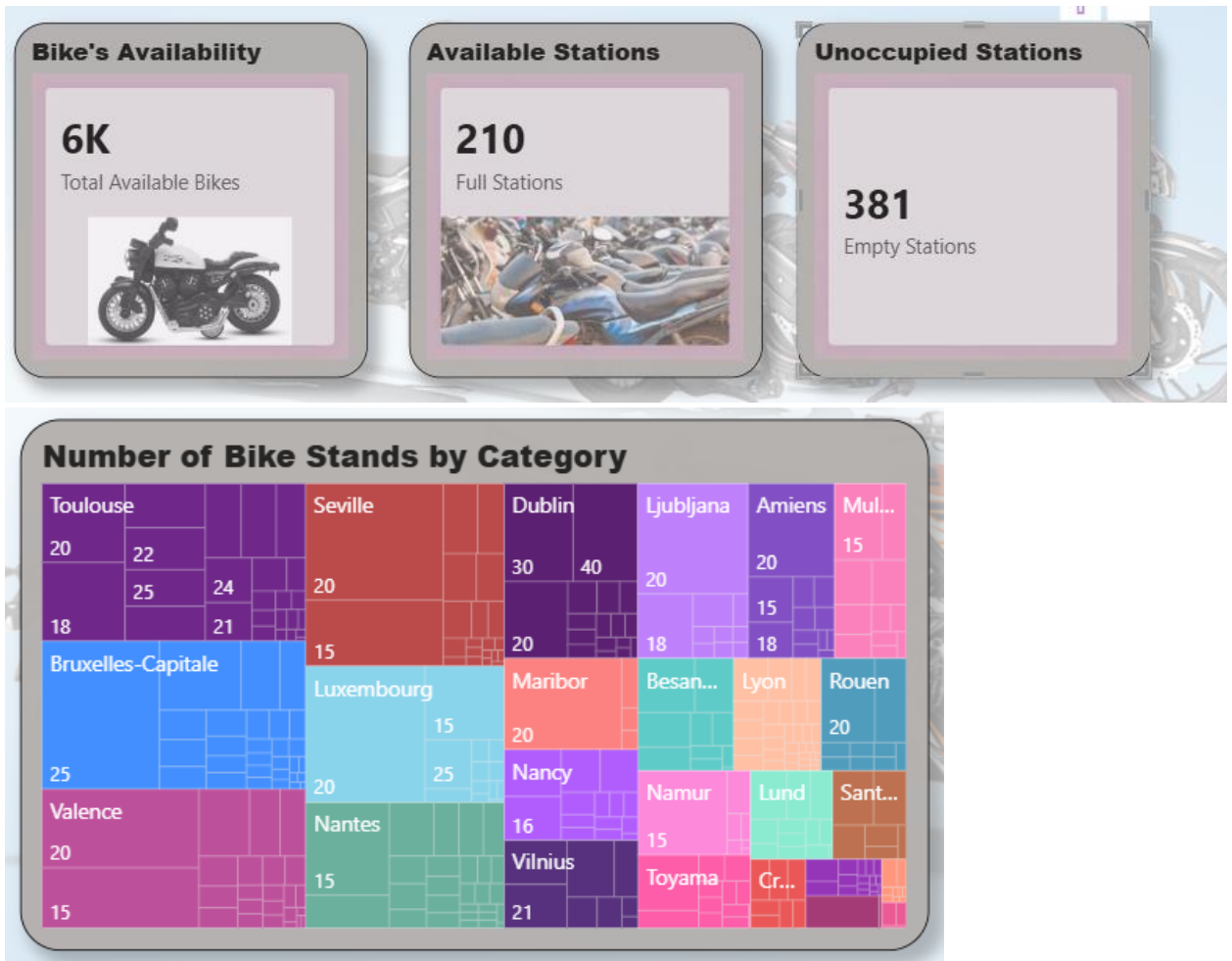
Status-Wise Station Table = SUMMARIZE(Feuil1,Feuil1[Status],"Station Count",COUNT(Feuil1[Number]),"Total Bikes",SUM(Feuil1[Available Bikes]))

structure | relationships | Calculations | Calendars

1 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	913	5943
CLOSED	115	18

- Design interactive visuals and dashboards.

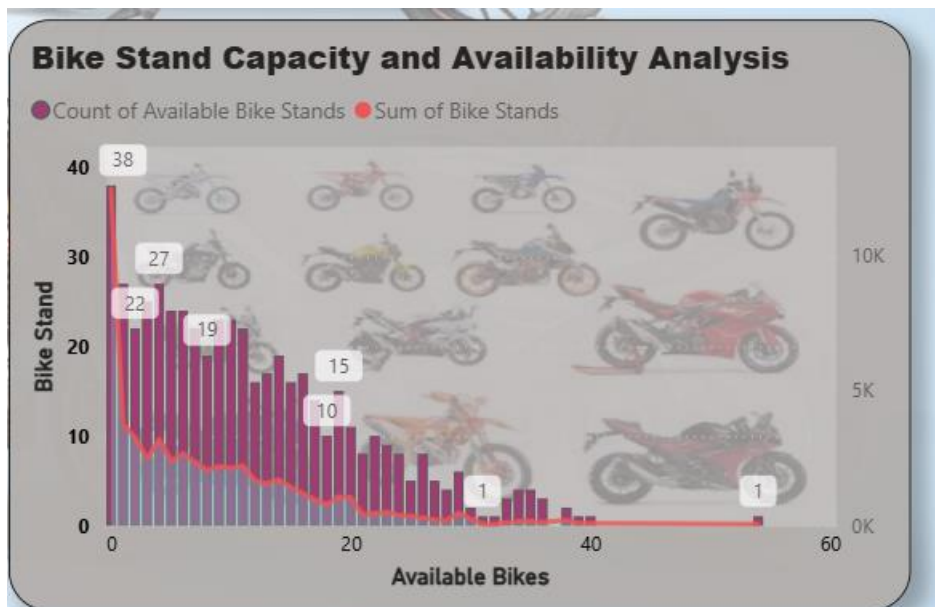


Question Analysis:

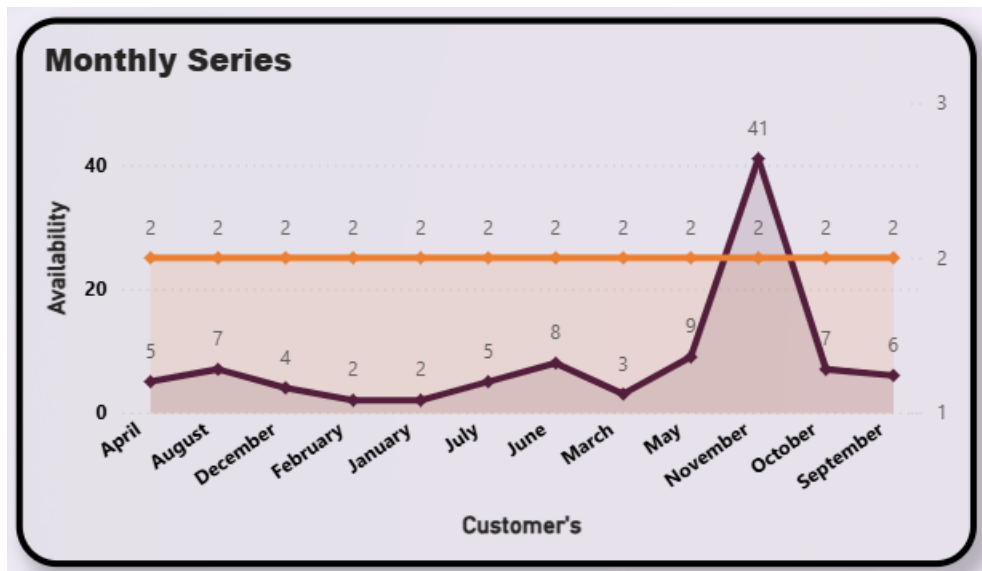
- How does **station availability status** (Available / Empty / Full) vary across cities?

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			

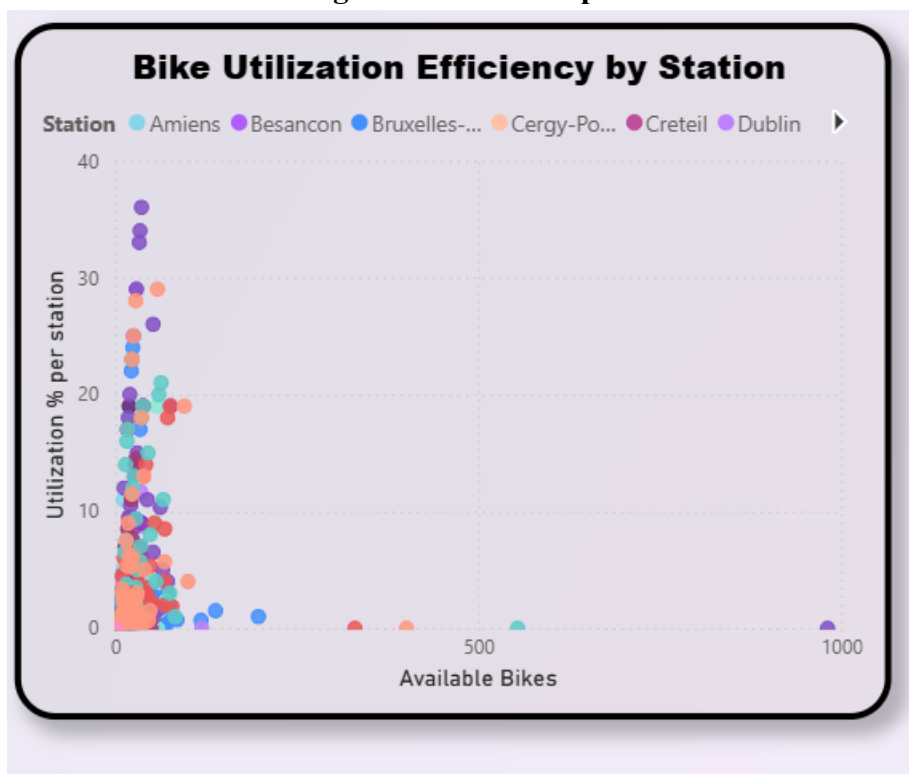
- How is **bike availability distributed** across all stations?



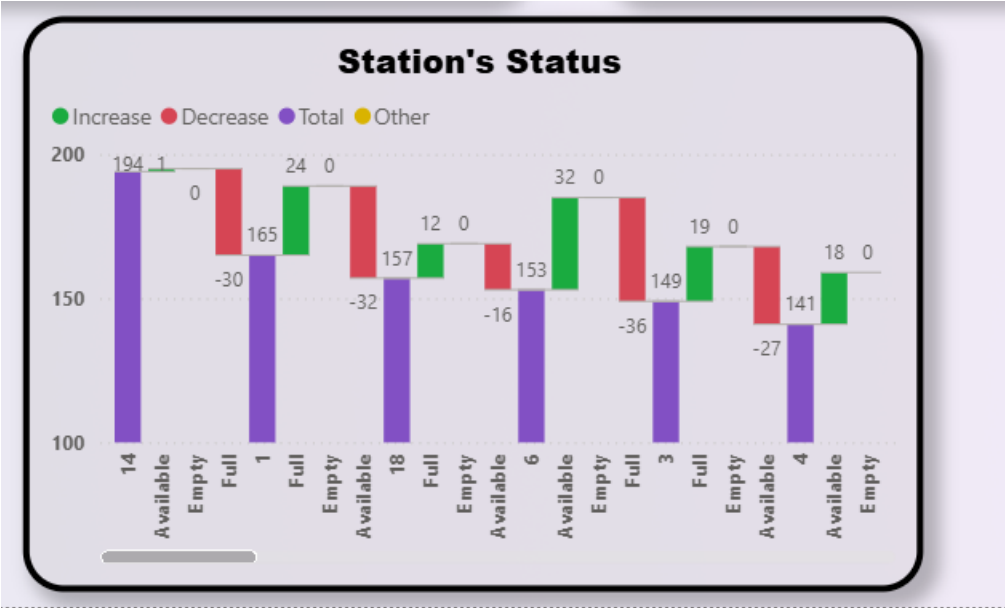
- On which month does bike availability **peak or spike significantly**?



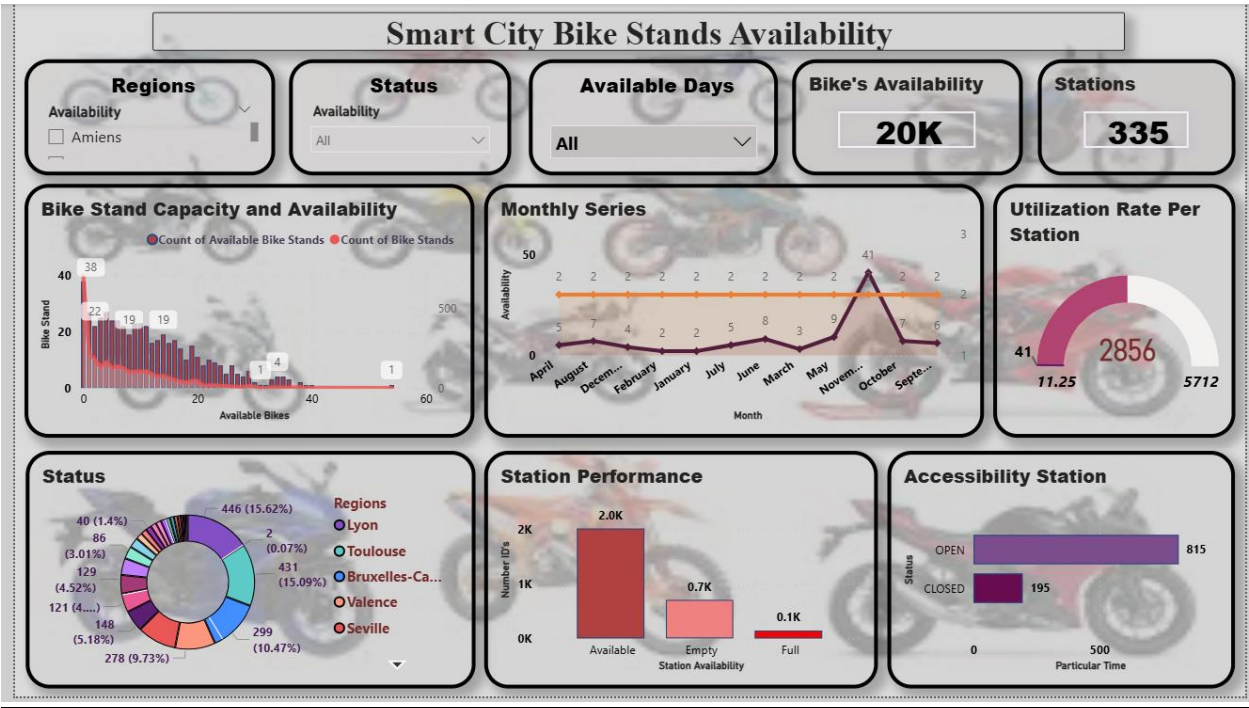
- What is the **average utilization rate per station**?



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

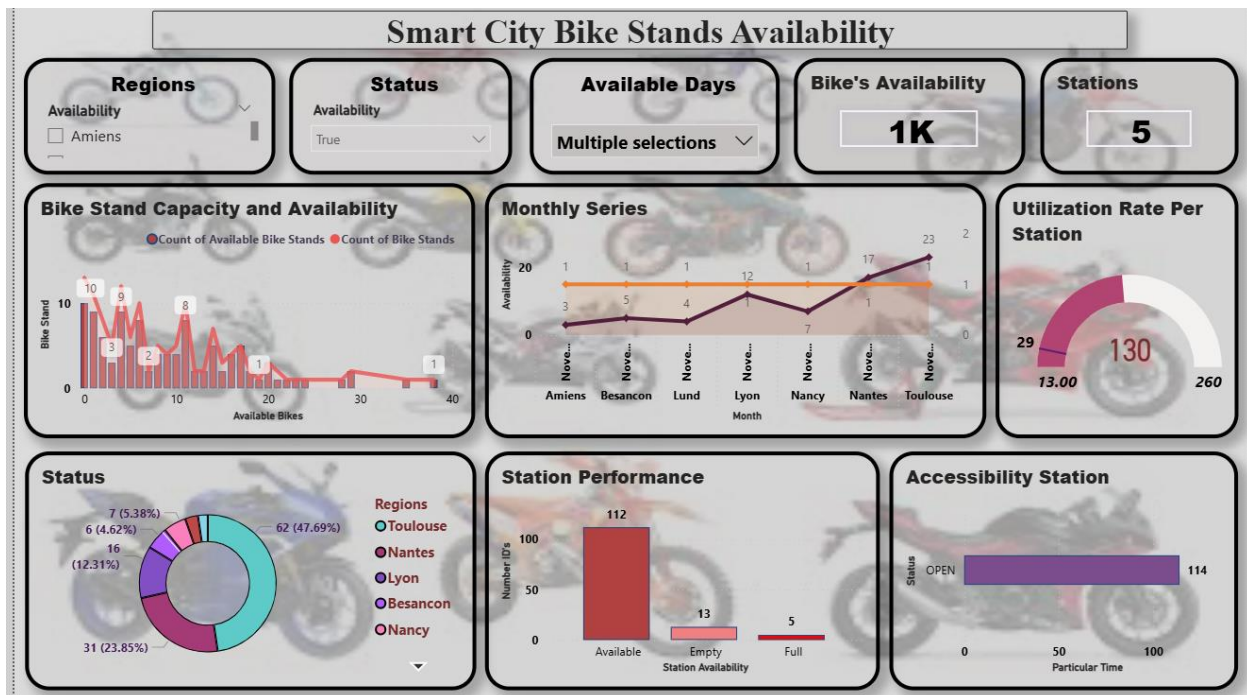


Dashboard Overview:

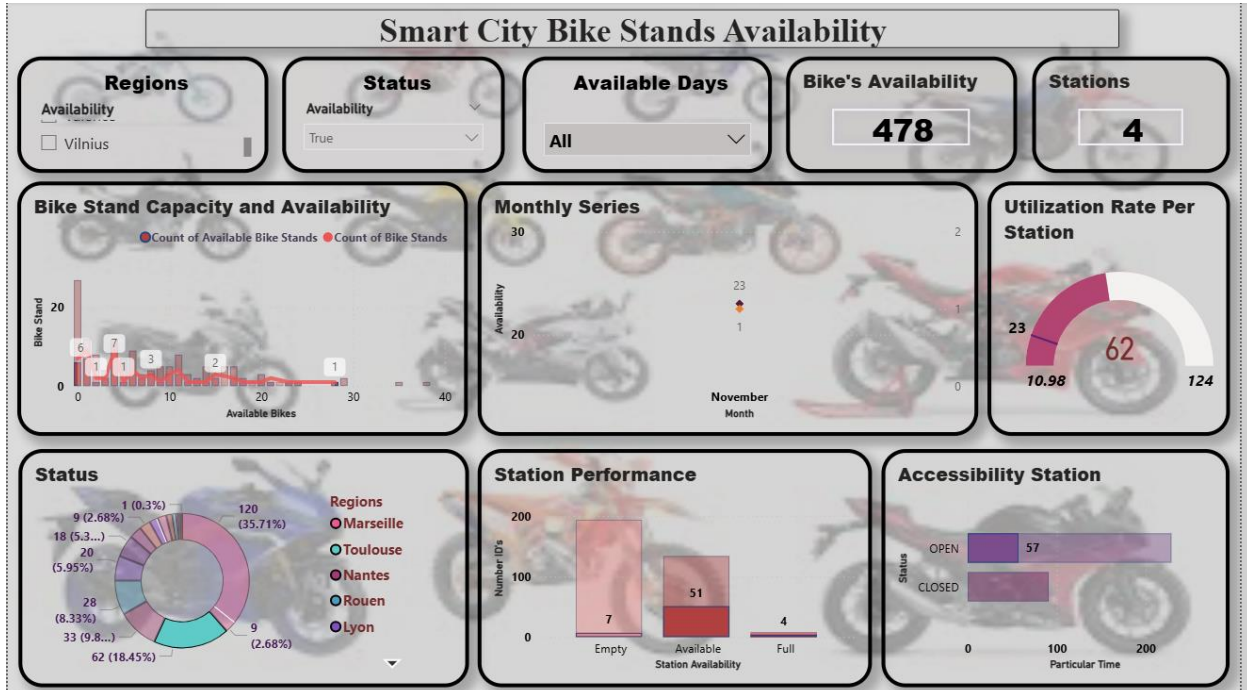


Dashboard Analysis:

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.