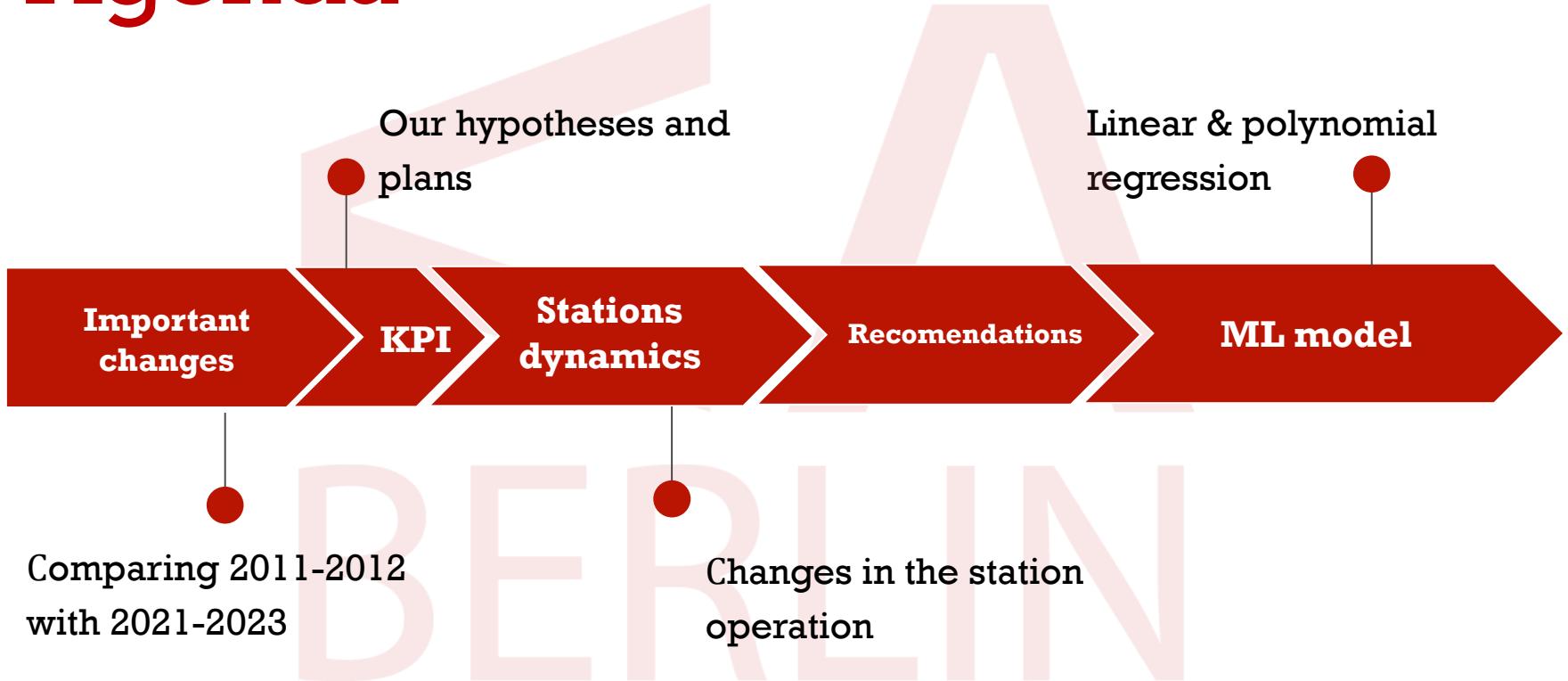


# **Capital Bike Share: a decade of changes and growth**

Yurii Novachynskyi • 09.11.2023



# Agenda



# 2011-2023 Important Changes



MORE bikes

Classic

(2011)



Classic  
+Electro\*

(2019)

\*Not included in the analysis

MORE stations

144  
(2011)

697  
(2021)

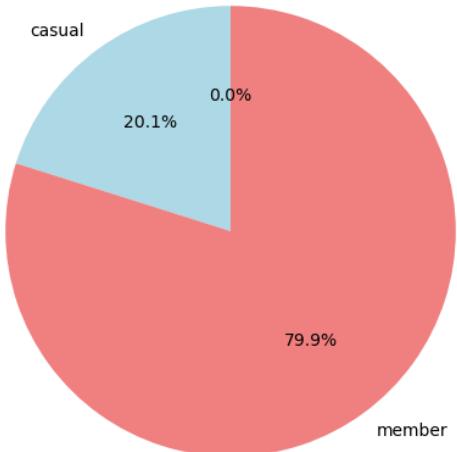
749  
(2023)



**MORE members**

**2011**

Member Type Distribution for 2011



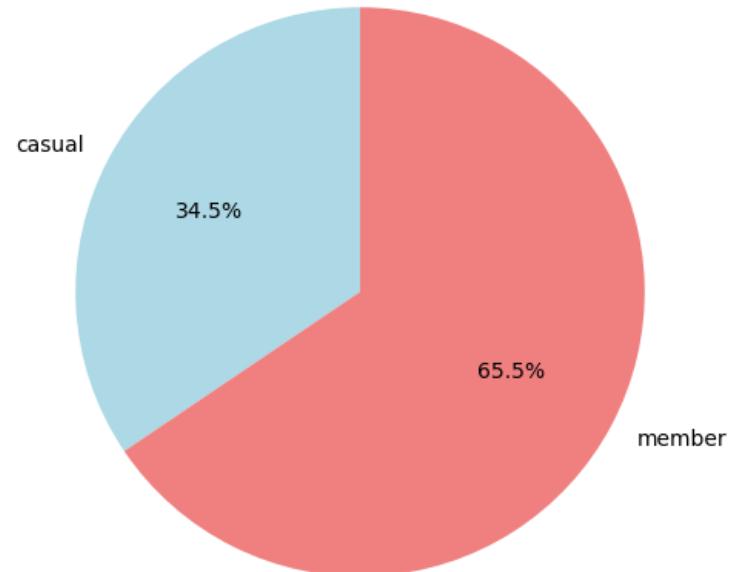
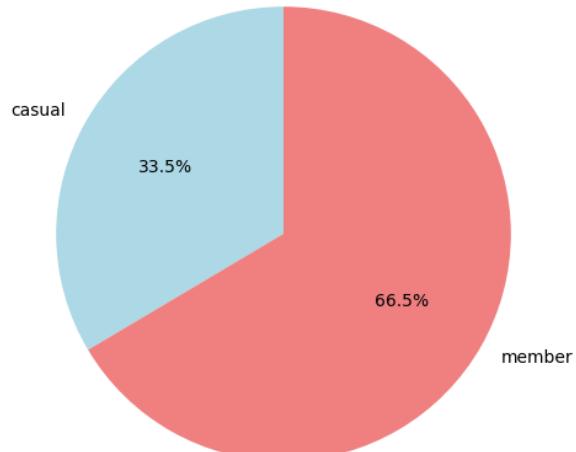
**Member Type Distribution**

**2023**

Member Type Distribution for 2023

**2021**

Member Type Distribution for 2021



MORE free time for members

30 min  
(2011)

45 min  
(2023)

60 min  
(2023 for qualified residents)





## Total amount of rides

**1.4m**

( 01-06/2023)

$\approx$ 2-3%

**2.7m**

(2022)

**+34,81%**

**2.0m**

(2021)

**-0,15%**

**2.0m**

(2012)

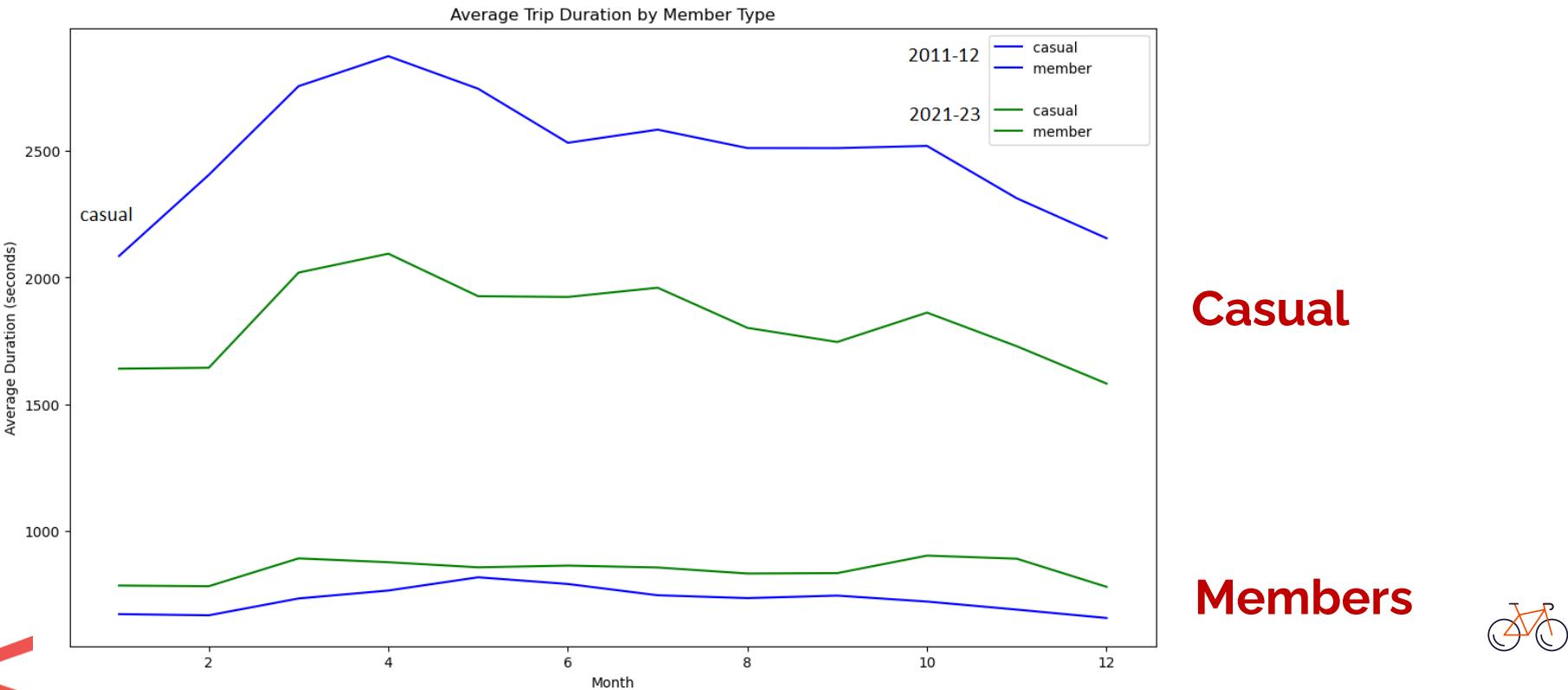
**+65,39%**

**1.2m**

(2011)

# Average Ride Duration

Duration of member rides is getting longer while of casual participants is shrinking.



% of mistake  
unlocks (up to 2 min)

**21,7%** casual **2,95%**  
( 01-06/2023)

**23,5%** casual **2,63%**  
(2022)

**22,7%** casual **2,55%**  
(2021)

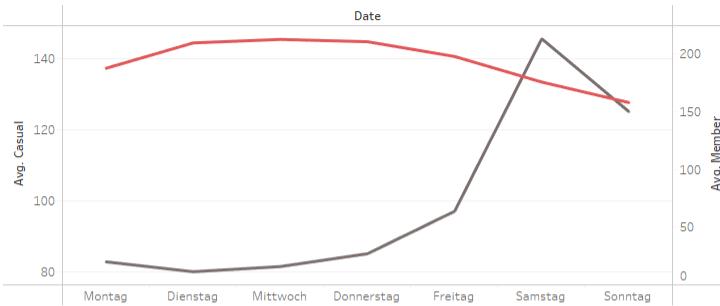
**1,3%** casual **0,68%**  
(2012)

**2% were casual rides** **0,5%**  
(2011)

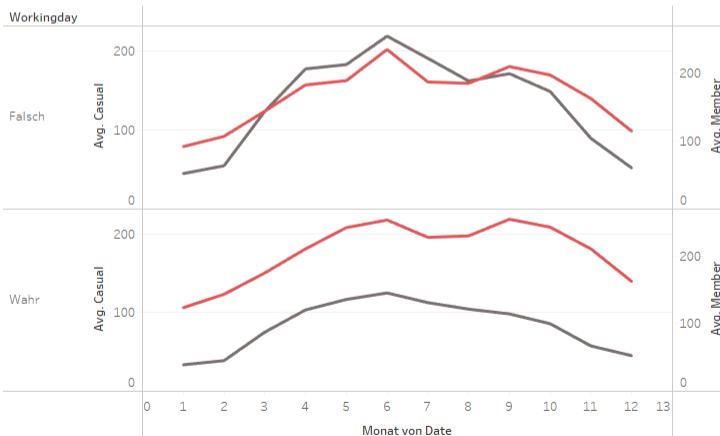


# Summary

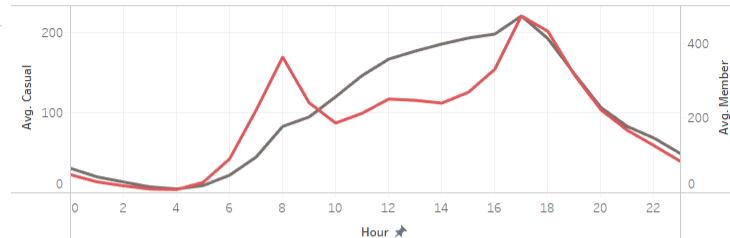
Weekday



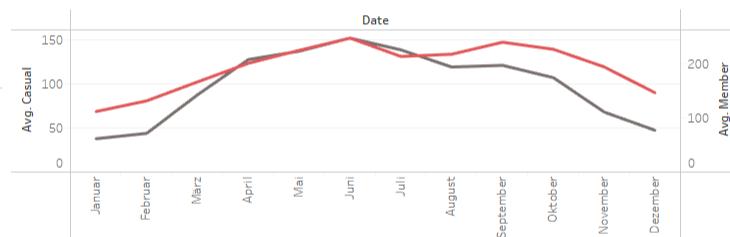
Workingday



Hours



Month\_AVG



Years



Measure Names

Casual  
Member

Year of Date

- (All)
- 2011
- 2012
- 2021
- 2022
- 2023

Month of Date

- (All)
- Januar
- Februar
- März
- April
- Mai
- Juni
- Juli
- August
- September
- Oktober
- November
- Dezember

Weekday of Date

- (All)
- Montag
- Dienstag
- Mittwoch
- Donnerstag
- Freitag
- Samstag
- Sonntag

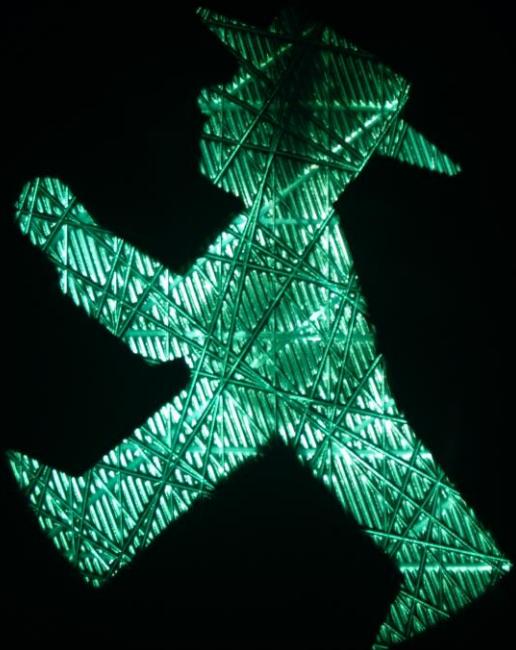
Workingday

- (All)
- Falsch
- Wahr



# Night “wrong rides”\*

\*duration >2h and ended on next day



**3.8k**

**7.5k**

(01-06/2023)

**5.2k**

(2021)

**1.2k**

(2012)

**1.7k**

(2011)

# Key Performance Indicators



# KPI

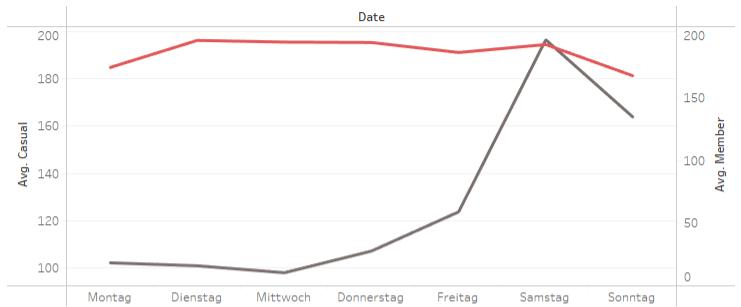


Implement 3 marketing activities  
to achieve a 10% increase in the  
use of bicycles by regular users  
on weekends by the end of 2024

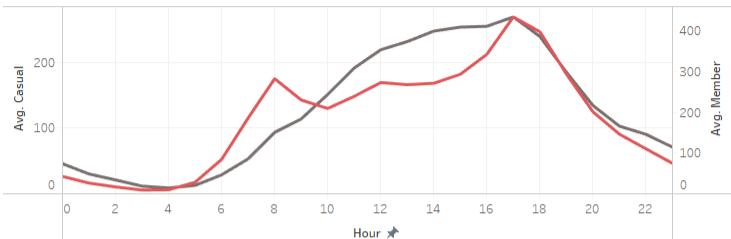
Specific Measurable Attainable Relevant Time-bound

# 2021

Weekday



Hours



Measure Names  
 Casual  
 Member

Year of Date

(All)  
 2011  
 2012  
 2021  
 2022  
 2023

Month of Date

(All)  
 Januar  
 Februar  
 März  
 April  
 Mai  
 Juni  
 Juli  
 August  
 September  
 Oktober  
 November  
 Dezember

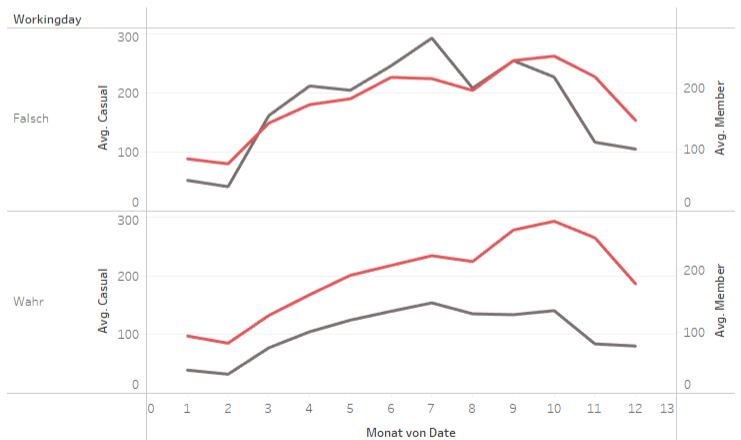
Weekday of Date

(All)  
 Montag  
 Dienstag  
 Mittwoch  
 Donnerstag  
 Freitag  
 Samstag  
 Sonntag

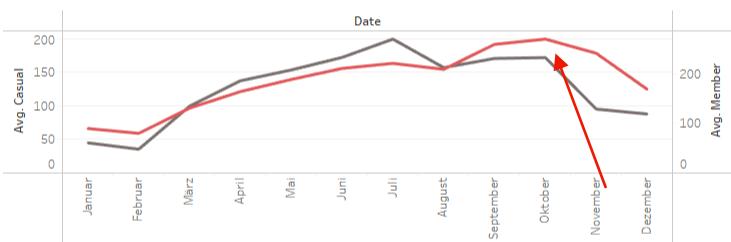
Workingday

- (All)
- Falsch
- Wahr

Workingday

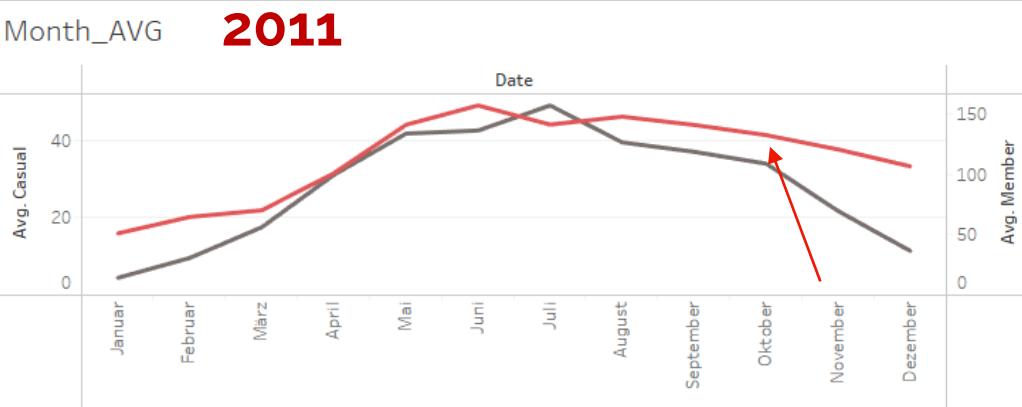
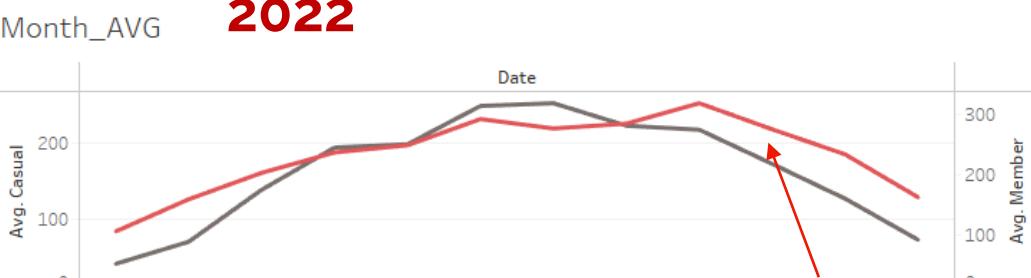
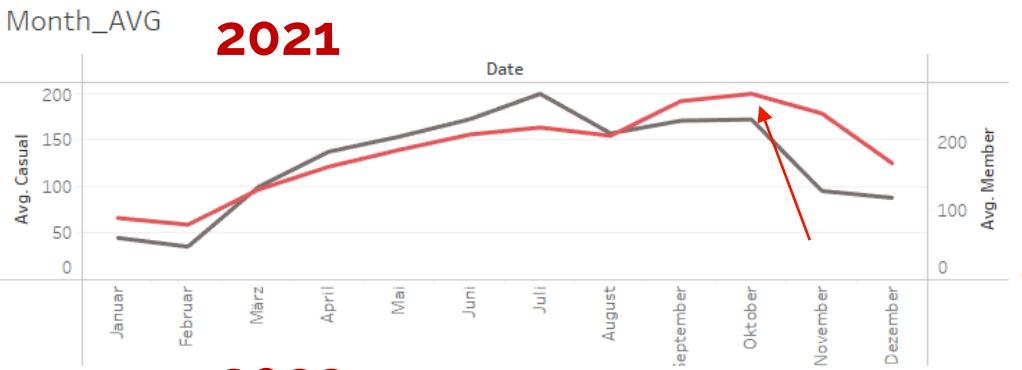


Month\_AVG



Years







## DC Residents Can Get a Free 30-Day Membership to Capital Bikeshare

The offer is meant to help alleviate some travel issues caused by reductions in Metro service

WRITTEN BY JANE RECKER [Twitter](#) [Email](#) | PUBLISHED ON OCTOBER 25, 2021

[Tweet](#) [Share](#)



Photograph by ablokhin/via iStock.

In light of significant reductions in Metro service, DC has partnered with Lyft to offer a free 30-day Capital Bikeshare membership to all DC residents. To sign up, residents should go to the "Ride Plans" section of the Capital Bikeshare or Lyft apps, or the "Pricing" section of the [Capital Bikeshare website](#).

Those who take advantage of the membership will get unlimited free 45-minute rides

Source: <https://www.washingtonian.com/2021/10/25/dc-residents-can-get-a-free-30-day-membership-to-capital-bikeshare/>

### Most Popular in News & Politics

- 1  Best of Washington 2023: Things to Eat, Drink, Do, and Know Right Now

- 2  "Shattered Glass": An Oral History of the Media-Movie Cult Classic

### Washingtonian Magazine

November 2023: Top Doctors



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WE'LL HELP YOU LIVE YOUR BEST #DCLIFE EVERY DAY





Increase by 3% the use of bicycles by regular users on Mondays and Tuesdays in May by increasing notifications in the App.

BERLIN

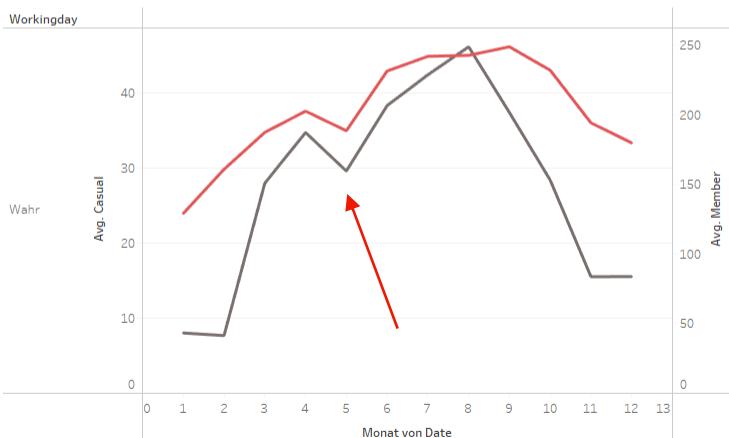
Specific Measurable Attainable Relevant Time-bound

# May Weekdays

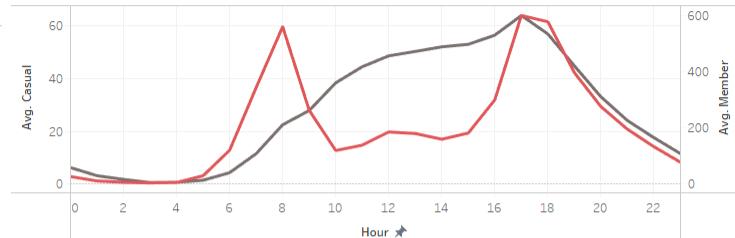
Weekday



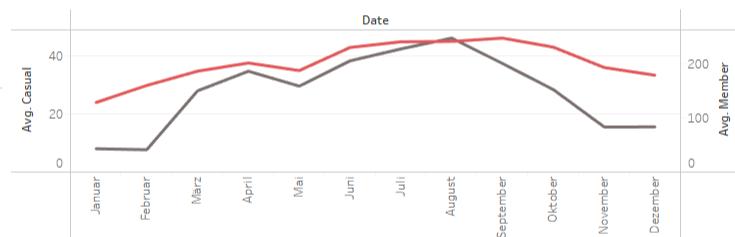
Workingday



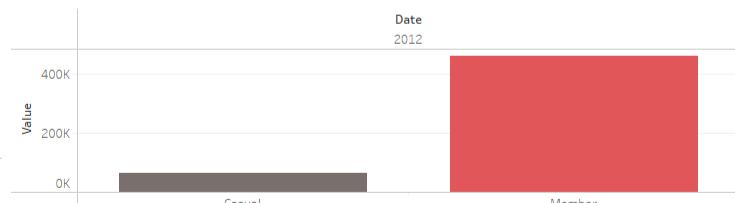
Hours



Month\_AVG



Years



Measure Names

- Casual
- Member

Year of Date

- (All)
- 2011
- 2012
- 2021
- 2022
- 2023

Month of Date

- (All)
- Januar
- Februar
- März
- April
- Mai
- Juni
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- August
- September
- Oktober
- November
- Dezember

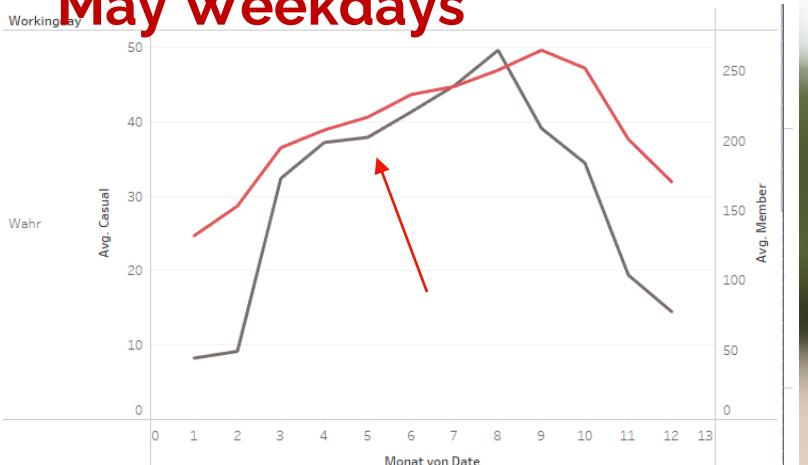
Weekday of Date

- (All)
- Montag
- Dienstag
- Mittwoch
- Donnerstag
- Freitag
- Samstag
- Sonntag

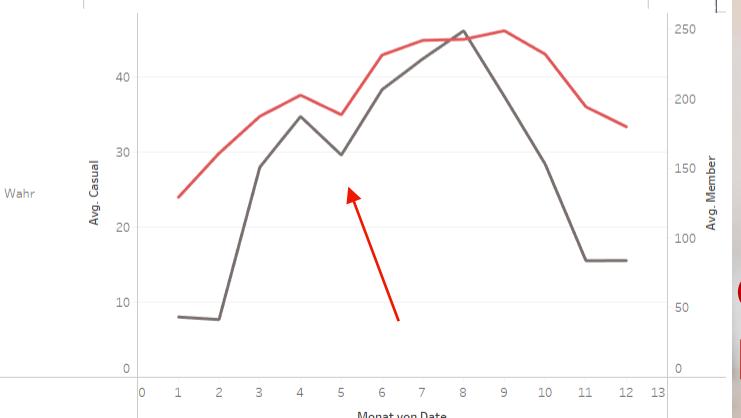
Workingday

- (All)
- Falsch
- Wahr

# May Weekdays



All weekdays



Only  
Mondays&Tuesdays



# Stations' Dynamics



# Approximate stations distribution



2011 (194)

91	21
51	18

13 not identified\*  
(mostly from SE)

2021 (697)

234	90
147	45

181 not identified

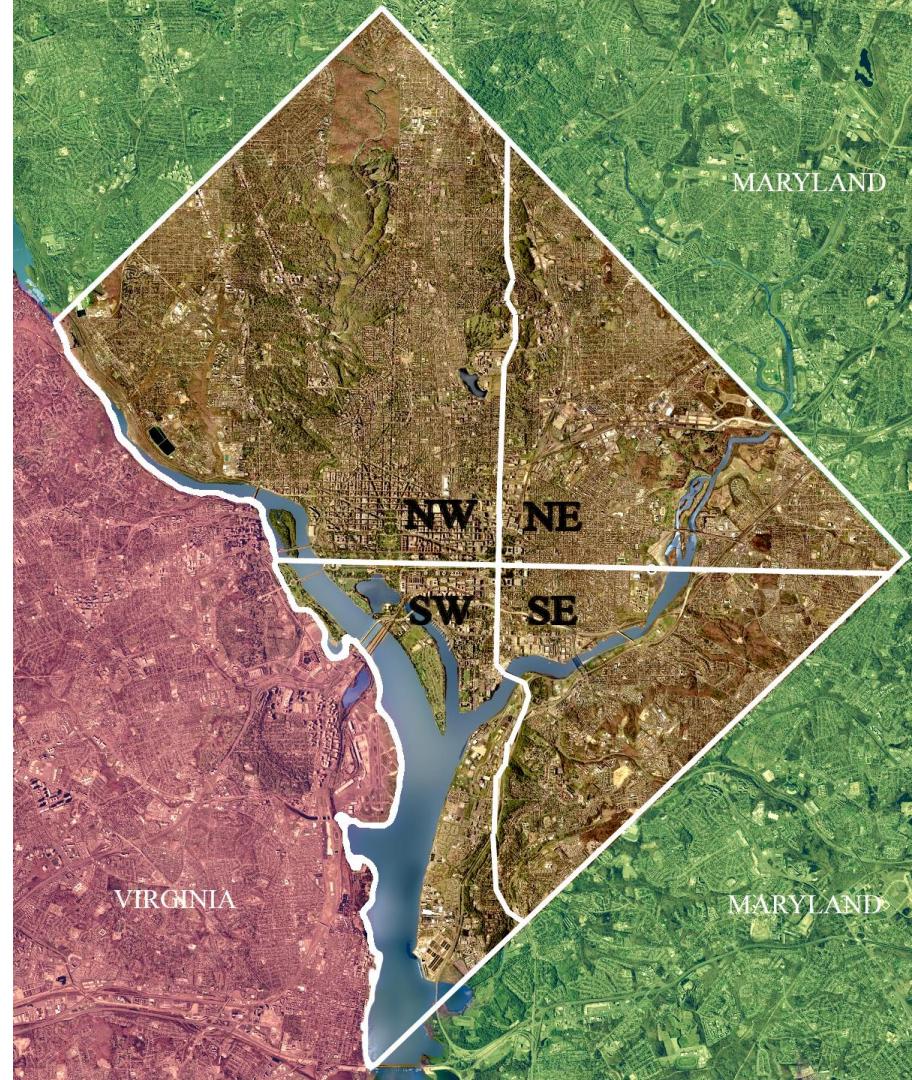
2023 (749)

240	103
154	49

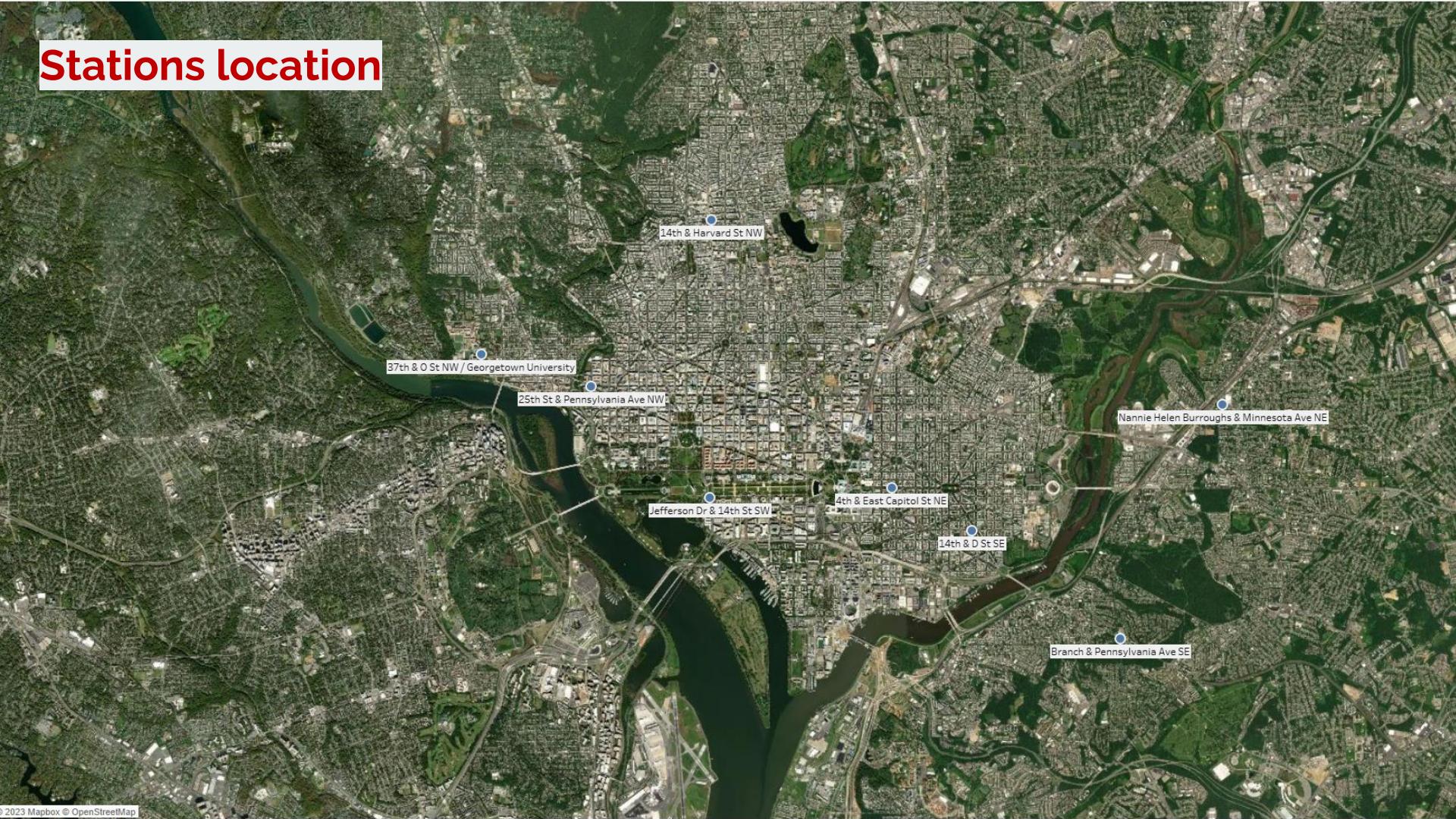
202 not identified



\*Identification was automated in Python using 2 algorithms:  
station name analysis and coordinate analysis



# Stations location



4th & East Capitol St NE

14th & D St SE

14th & Harvard St NW

25th St & Pennsylvania Ave NW

37th & O St NW / Georgetown University

Jefferson Dr & 14th St SW

Branch & Pennsylvania Ave SE

Nannie Helen Burroughs & Minnesota Ave NE

touristic spot

center

residential area

between residential area and center

Students

touristic spot

residential area

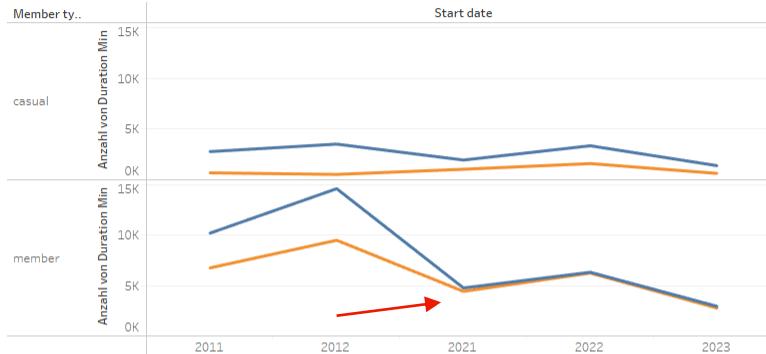
transport hub



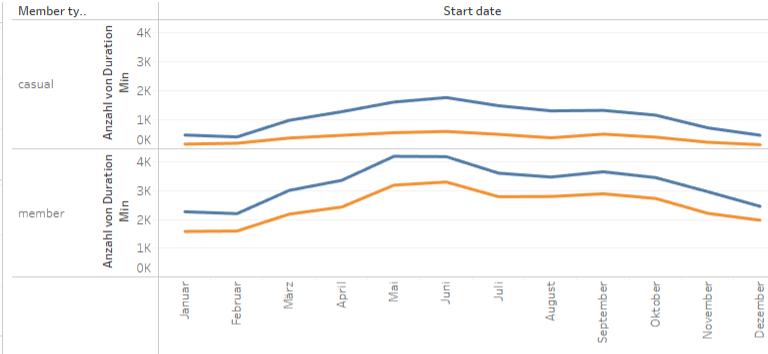
# 4th & East Capitol St NE

Start stati.. 4th & East Capi.. 14th & D St SE

## Year changes



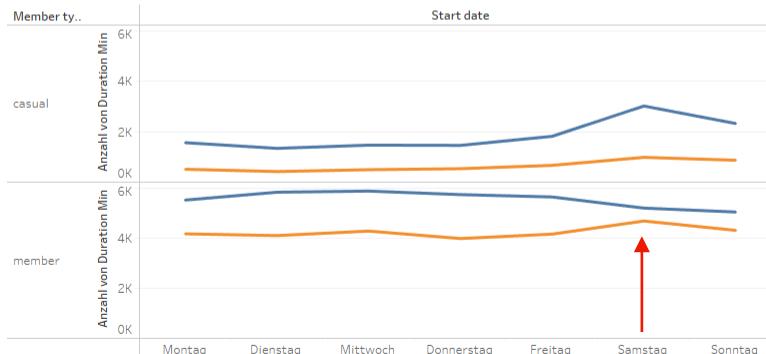
## Months



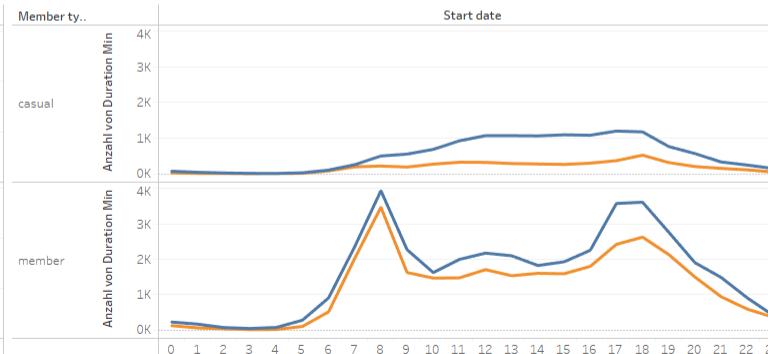
## Start station

- (All)
- 4th & East Capi..
- 14th & D St SE
- 14th & Harvard ...
- 25th St & Penns...
- 37th & O St NW ...
- Branch & Penns...
- Jefferson Dr & 1...
- Nannie Helen B...

## Week dynamic



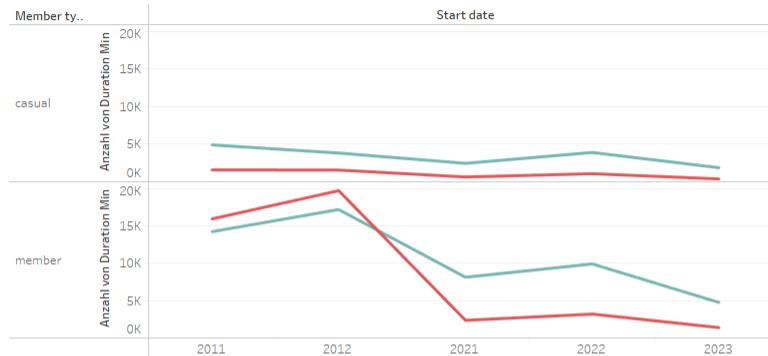
## Daily dynamic



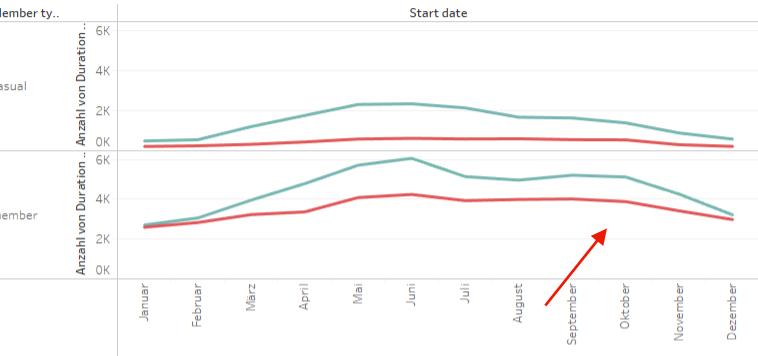
# 14th & Harvard St NW

Start stati.. ■ 14th & Harvard .. ■ 25th St & Penn..

## Year changes



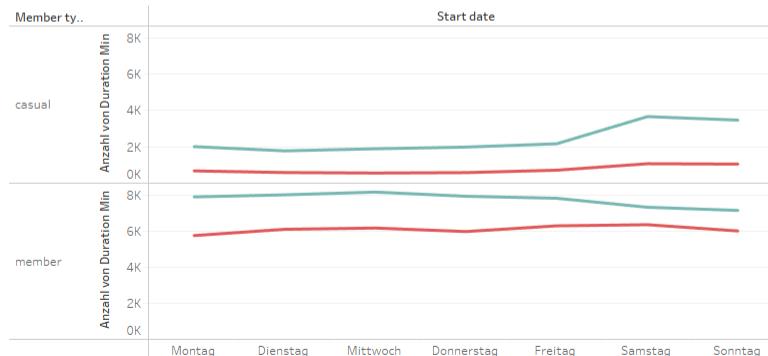
## Months



## Start station

- (All)
- 4th & East Capi...
- 14th & D St SE
- 14th & Harvard ...
- 25th St & Penns...
- 37th & O St NW ...
- Branch & Penns...
- Jefferson Dr & 1...
- Nannie Helen B...

## Week dynamic



## Daily dynamic

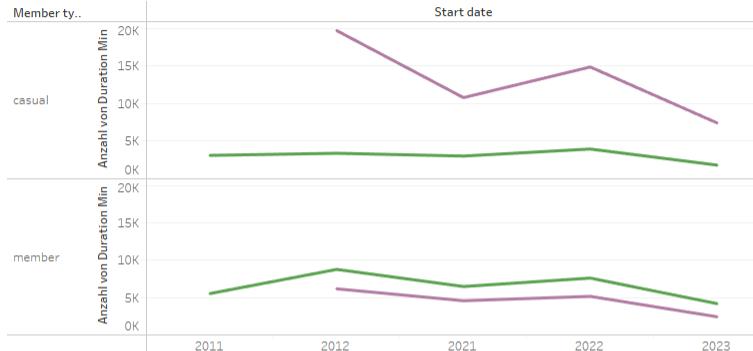


RB

# 37th & O St NW / Georgetown University

Start stati.. 37th & O St NW.. Jefferson Dr & ..

## Year changes



## Months

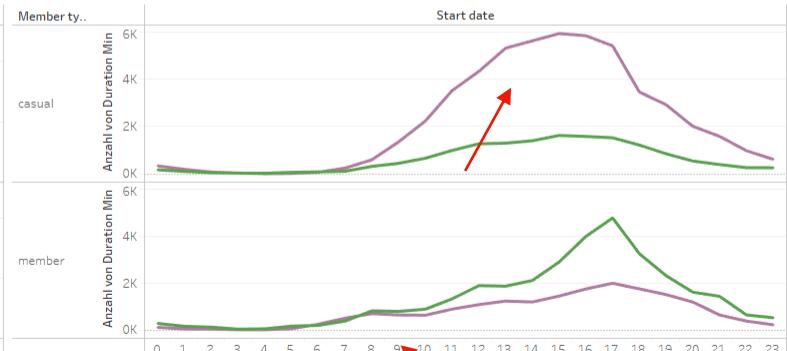


ST

## Week dynamic



## Daily dynamic

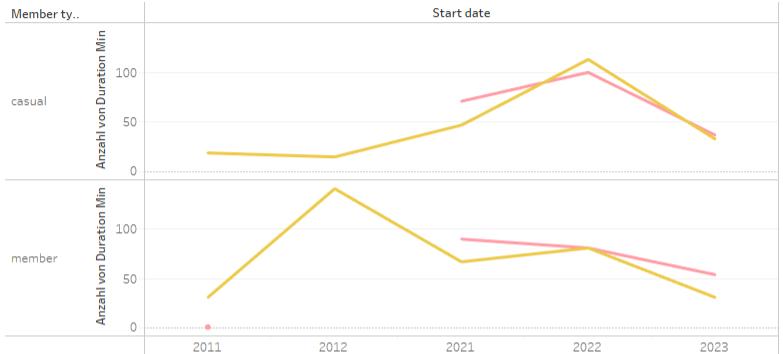


# Branch & Pennsylvania Ave SE

# Nannie Helen Burroughs & Minnesota Ave NE

Start stati.. █ Branch & Penns.. █ Nannie Helen B..

## Year changes



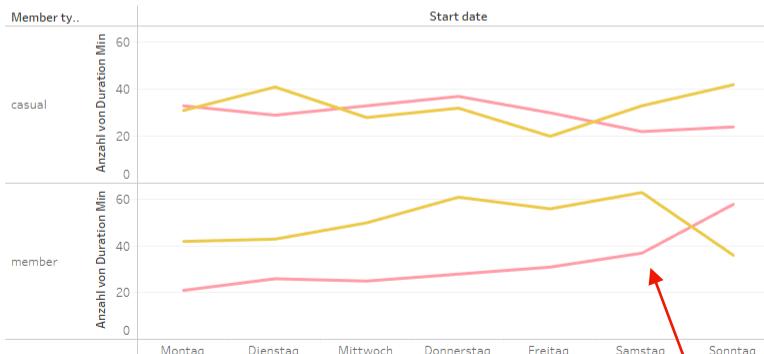
## Months



- Start station
- (All)
  - 4th & East Capi...
  - 14th & D St SE
  - 14th & Harvard ...
  - 25th St & Penns...
  - 37th & O St NW ...
  - Branch & Penns...
  - Jefferson Dr & 1...
  - Nannie Helen B...

RH

## Week dynamic



## Daily dynamic



# Recommendations

Changing the formats of user interaction with the service (**through the application**) creates opportunities for personalising offers for regular users.

Increasing the number of **regular users** has the potential to improve service quality monitoring.



## Recommendations

Taking into account not only general seasonal fluctuations in demand, but also individual station data offers the potential to optimise bicycle services.



## Recommendations

The blocking system needs to be improved.

The statistics of false unlocks and incorrect locks are growing faster than overall growth.

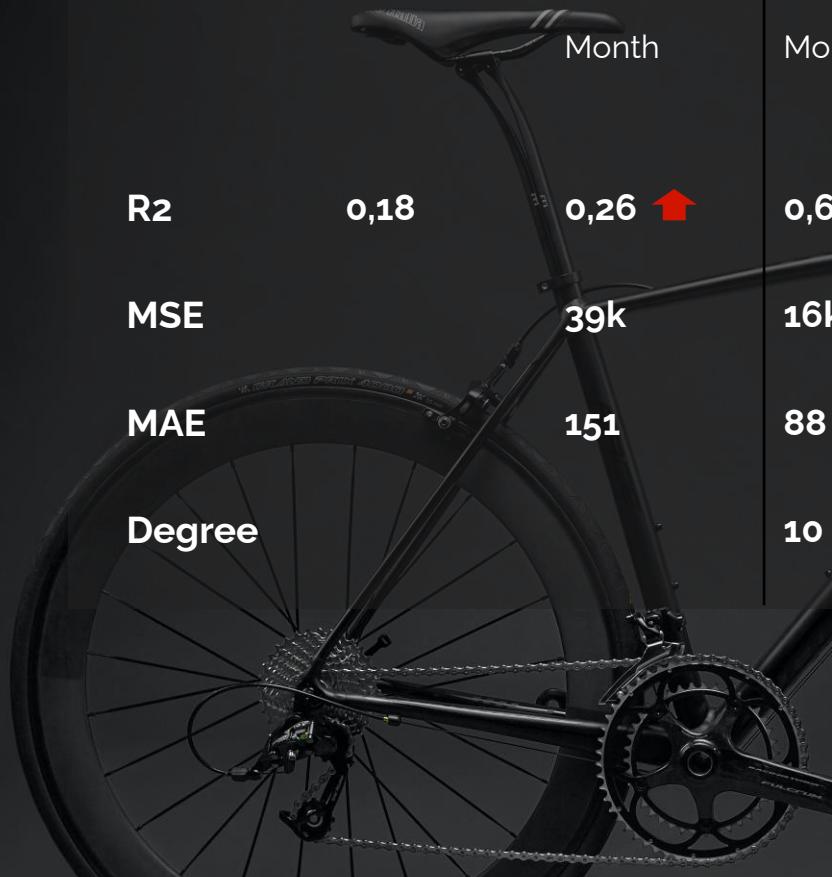


# Maschine Learning model

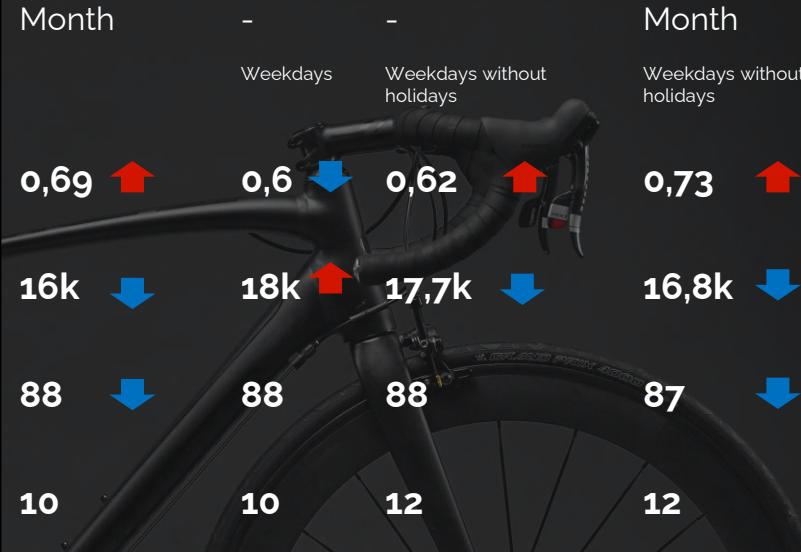


# Comparison of results

Linear Regression



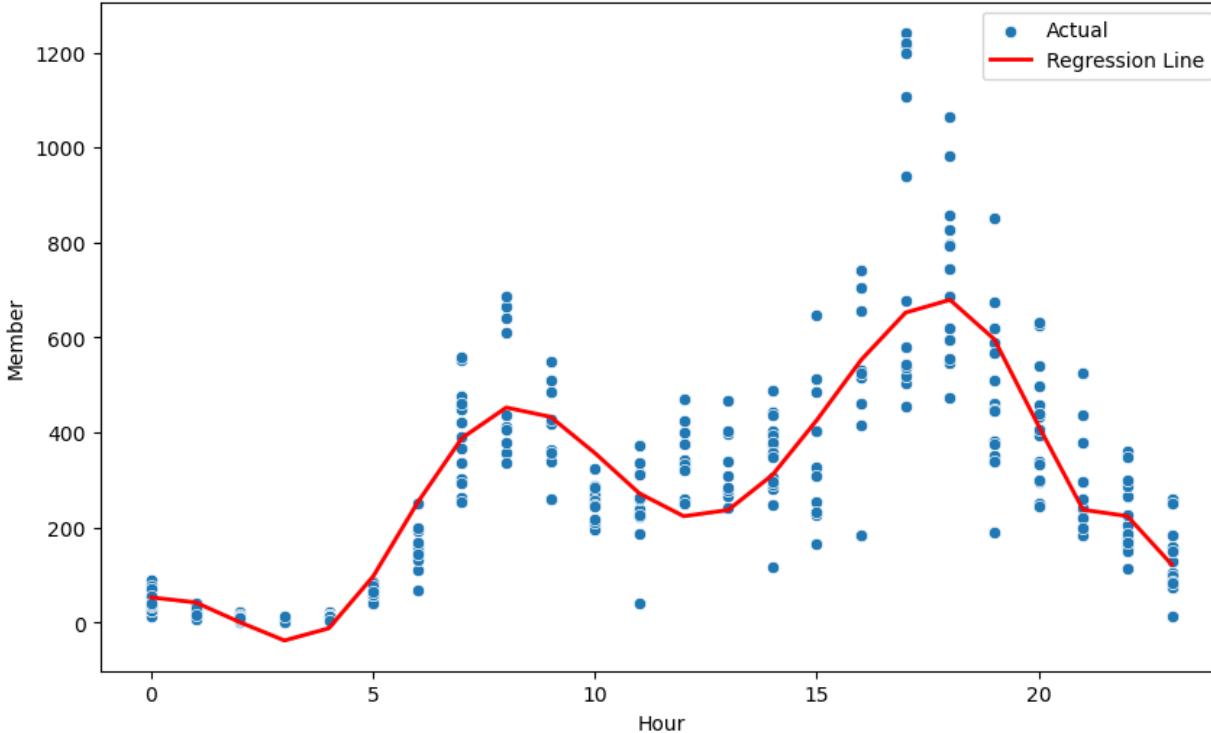
Polynomial Regression



# Polynomial Regression

## forecasting member rides demand by hours and weekdays (without holidays) for June

Actual vs Predicted Member (Polynomial Regression) for Weekdays (Excluding Holidays) - Month 6



R<sup>2</sup>

0,73

MSE

16,8k

MAE

87

Degree

12

A close-up photograph of a bicycle's rear wheel and drivetrain. The red frame of the bike is visible on the left and right. The central focus is the silver-colored multi-speed cassette and the black chain. The background is blurred.

Thank you for your attention

BERLIN

The project was implemented as part of the Datanalysis & Machine Learning Bootcamp at Code Academy Berlin  
10/21 week of the program

Pictures source: <https://unsplash.com/> <https://www.wikipedia.org/>