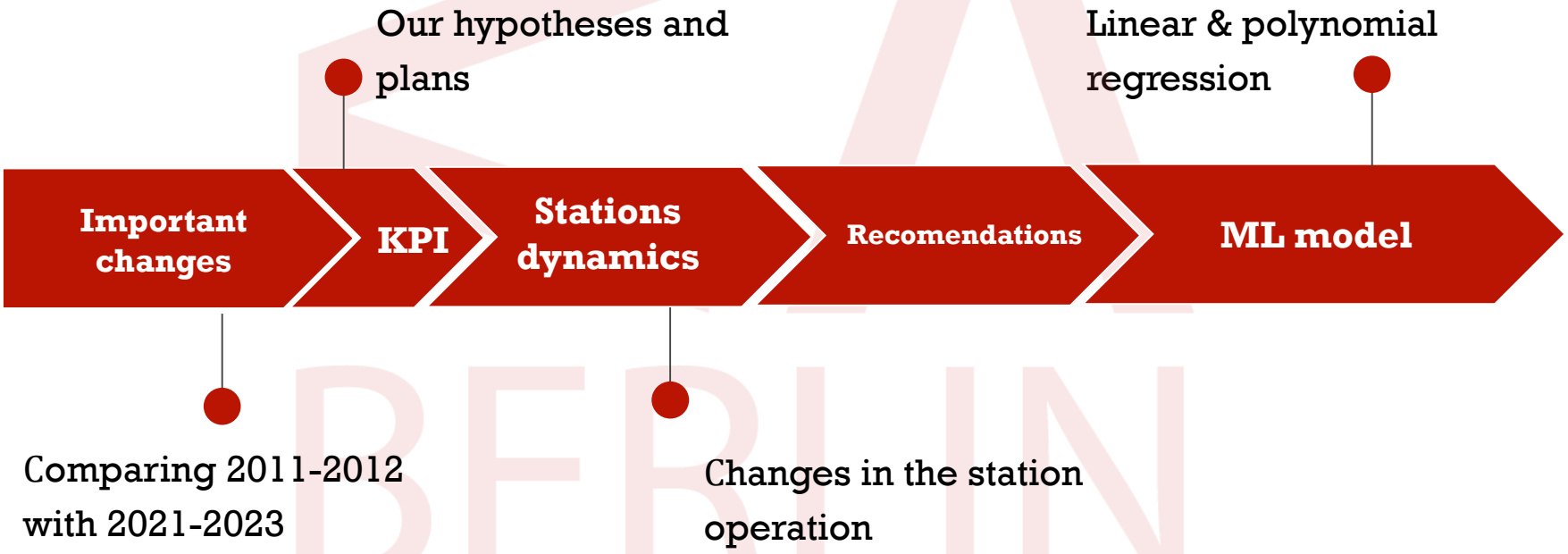
Capital Bike Share: a decade of changes and growth

Yurii Novachynskyi • 09.11.2023

Agenda


Our hypotheses and plans
Linear & polynomial regression
Important changes
KPI
Stations dynamics
Recomendations
ML model
Comparing 2011-2012 with 2021-2023
Changes in the station operation

2011-2023 Important Changes

MORE bikes

Classic

(2011)

Classic +Electro*

(2019)

*Not included in the analysis

MORE stations

749
(2023)

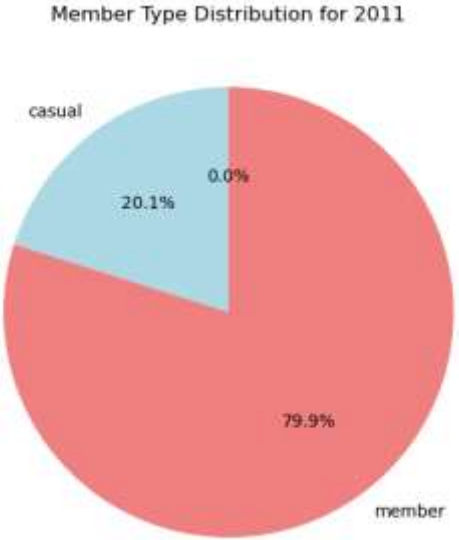
697
(2021)

144
(2011)

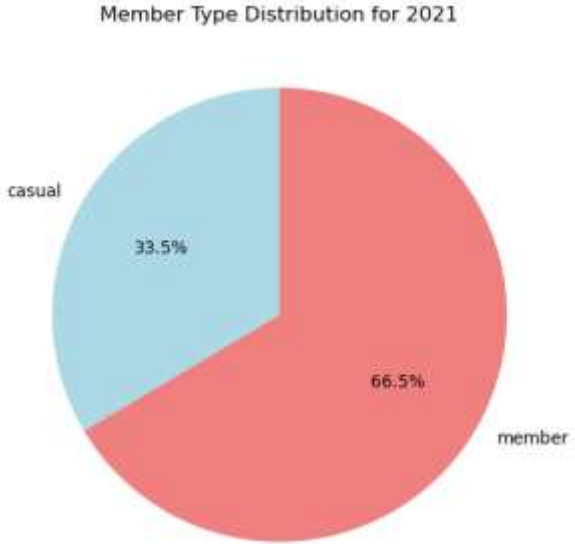
MORE members

Member Type Distribution

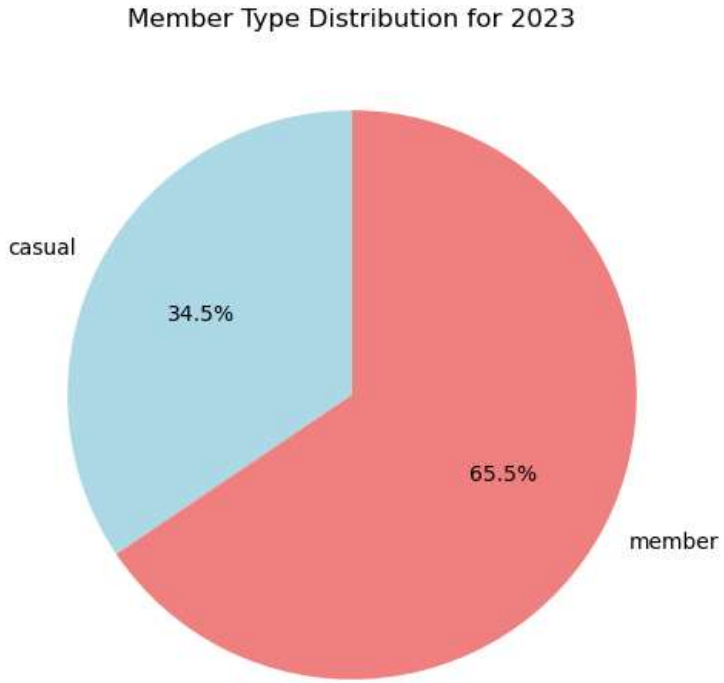
2011



2021



2023



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)

≈2-3%

2.7m
(2022)

+34,81%

2.0m
(2021)

-0,15%

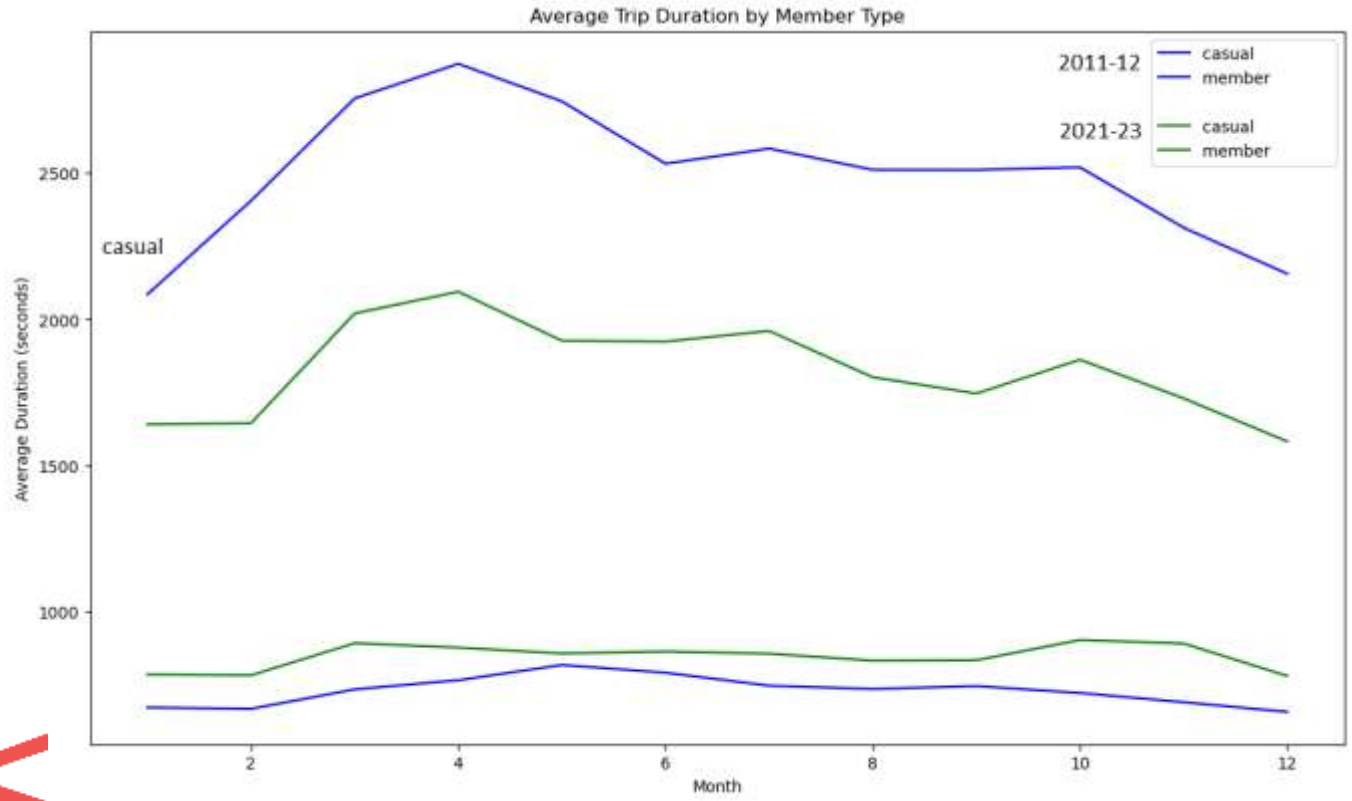
2.0m
(2012)

+65,39%

1.2m
(2011)

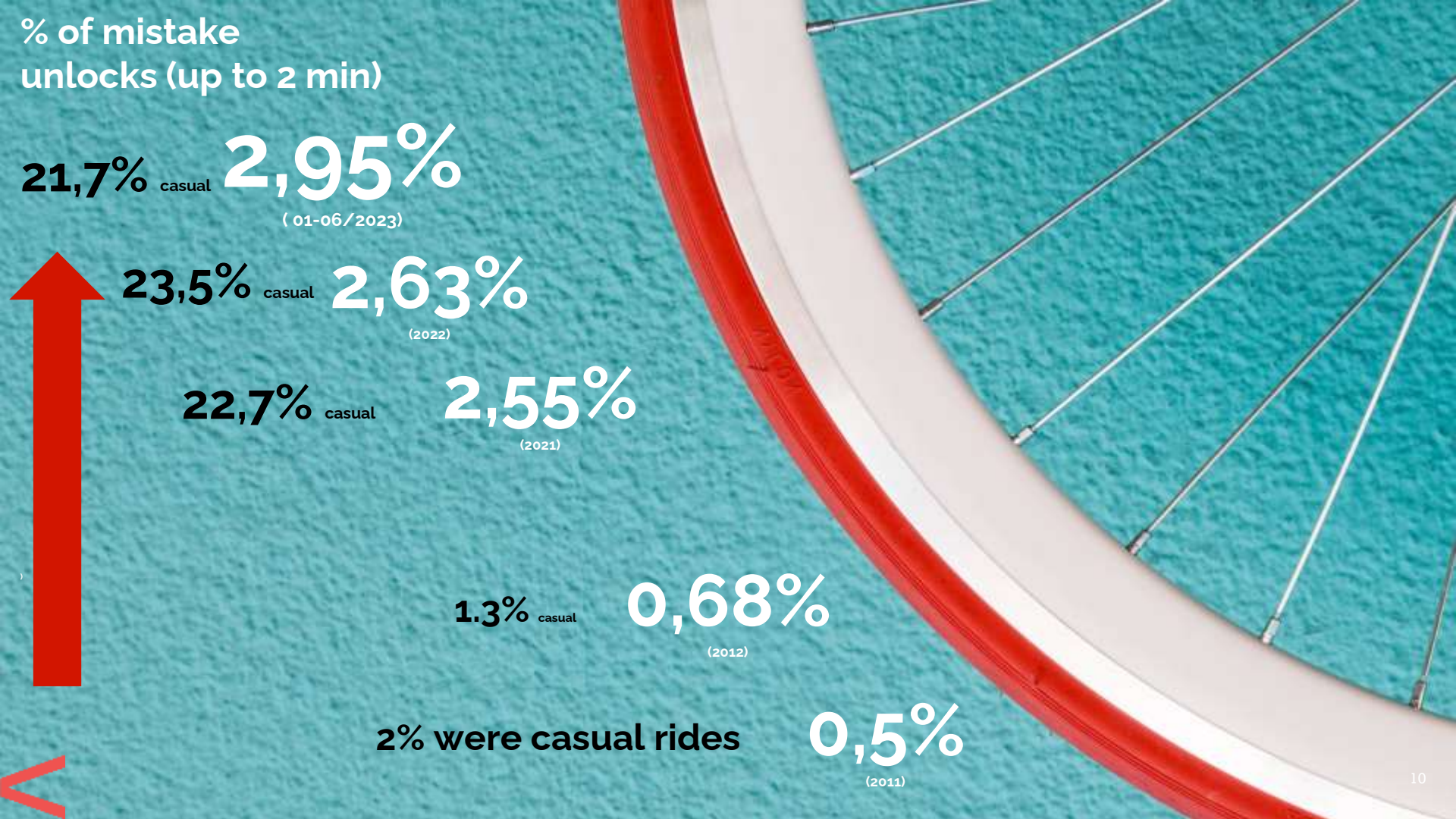
Average Ride Duration

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

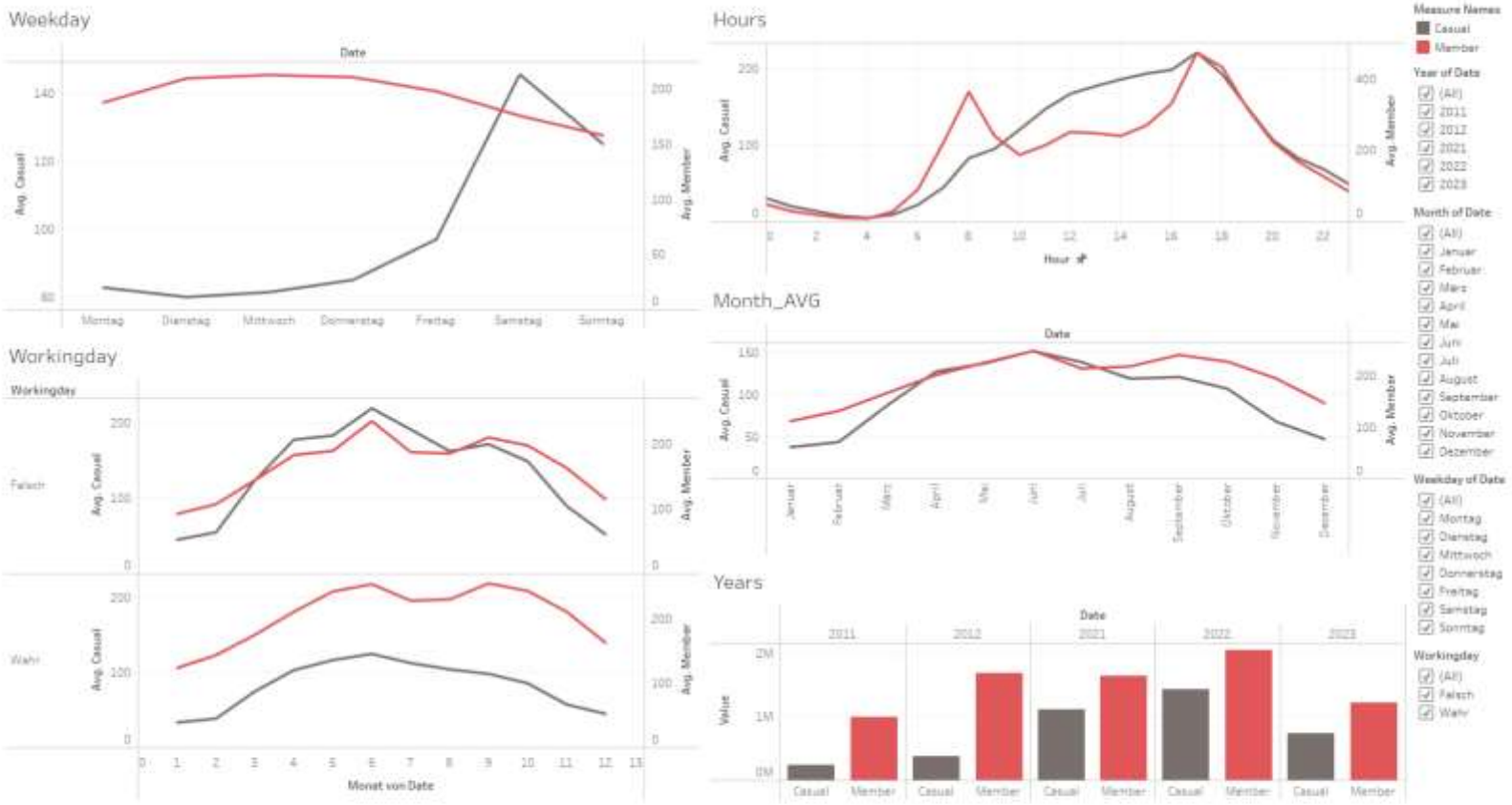


Casual

Members


% 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
Date
Avg. Casual
Avg. Member
Montag
Dienstag
Mittwoch
Donnerstag
Freitag
Samstag
Sonntag
Workingday
Workingday
Falsch
Wahr
Monat von Date
Hours
Hour
Month_AVG
Date
Jänner
Februar
März
April
Mai
Juni
Juli
August
September
Oktober
November
Dezember
Years
Date
2011
2012
2021
2022
2023
Value
Casual
Member
Measure Names
Casual
Member
Year of Date
(All)
2011
2012
2021
2022
2023
Month of Date
(All)
Jänner
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

1.7k
(2011)

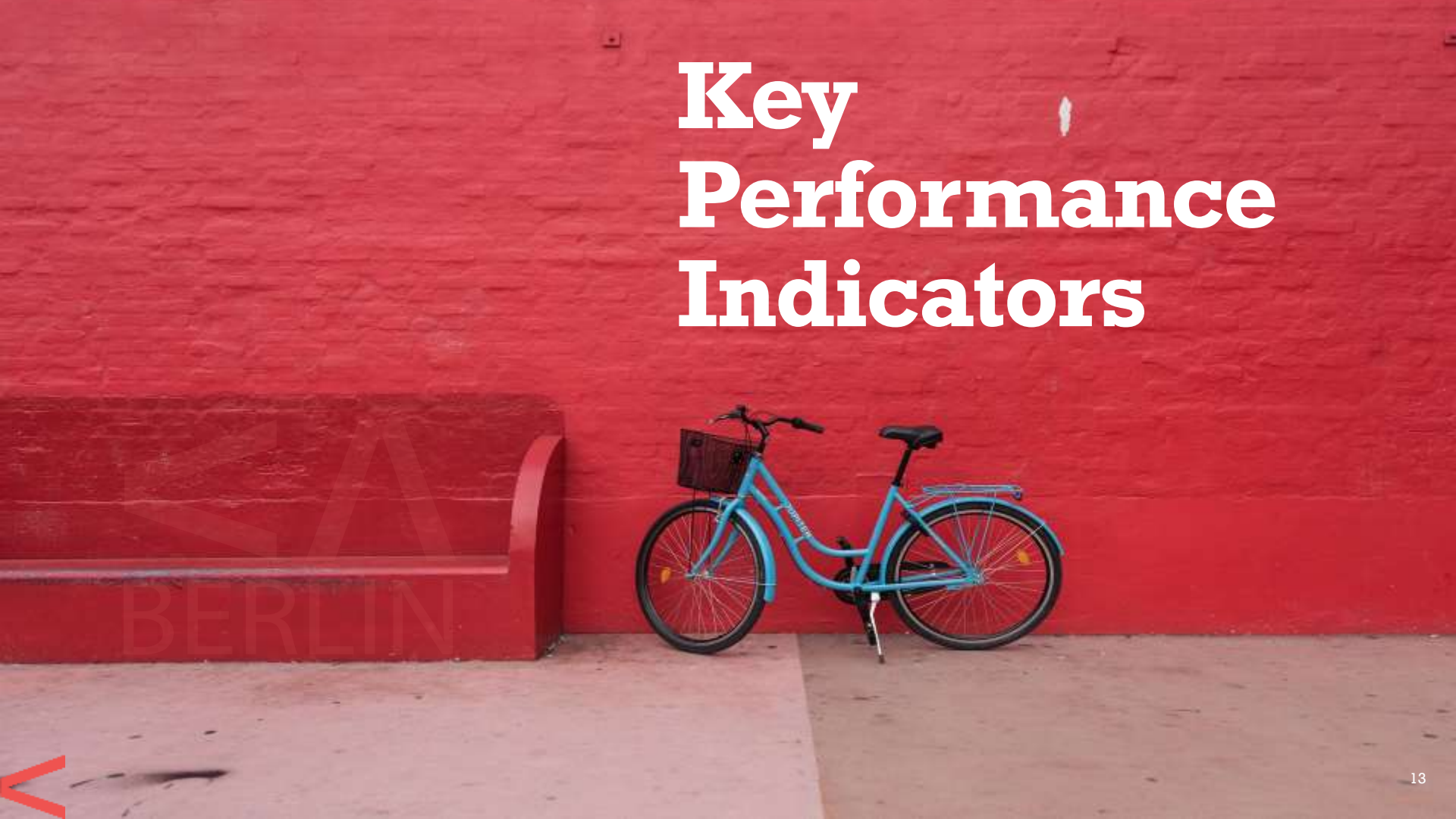
1.2k
(2012)

5.2k
(2021)

7.5k
(2022)

3.8k
(01-06/2023)

Key Performance Indicators

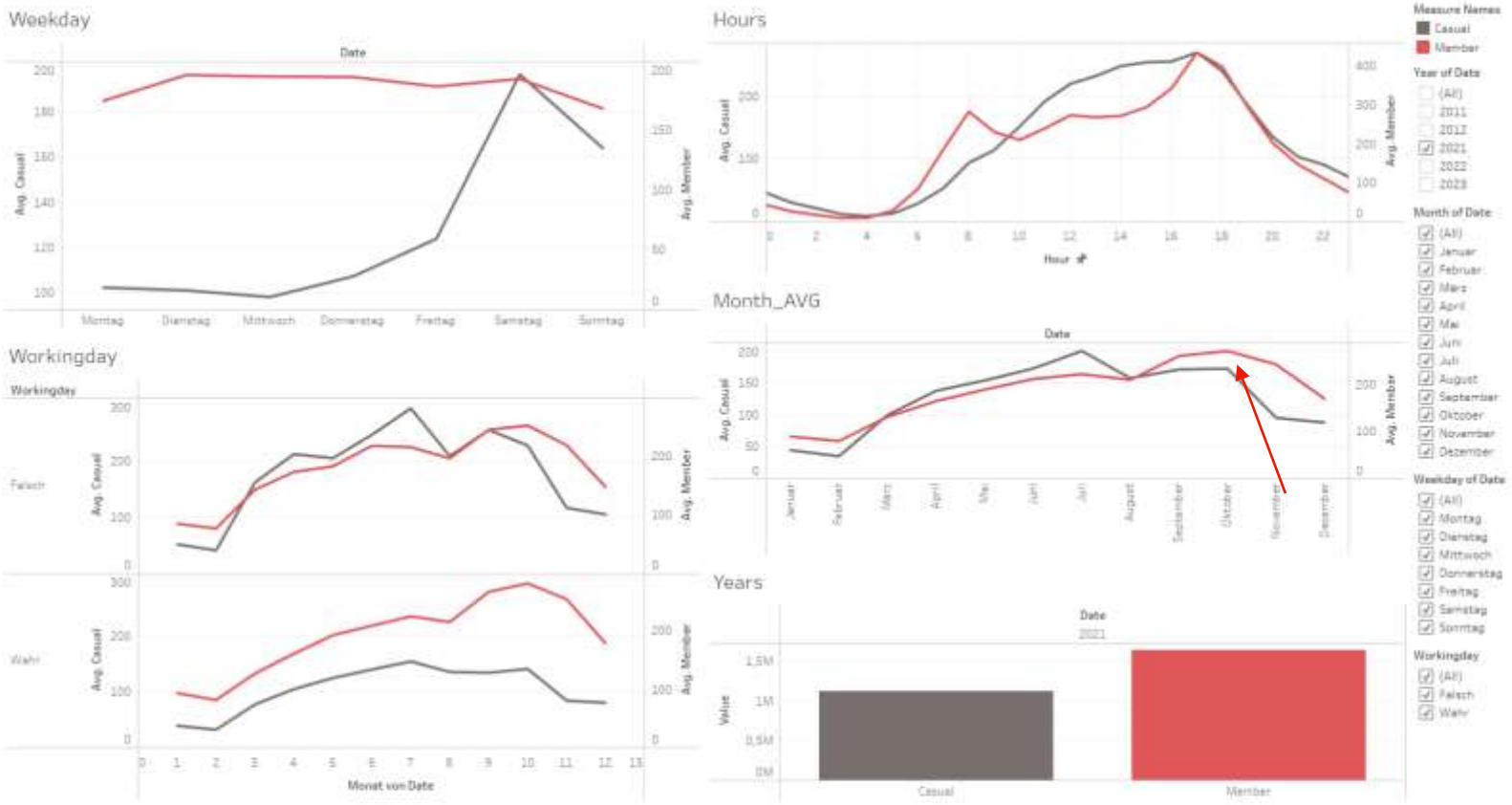


KPI

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
Date
Avg. Casual
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Freitag
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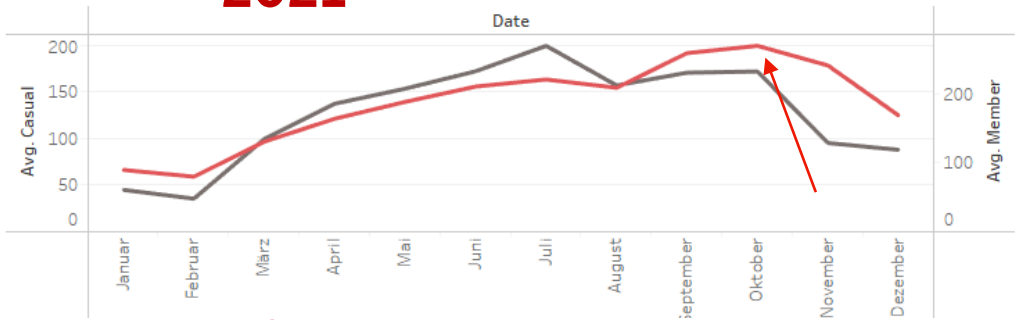
Sonntag
Workingday
Workingday
Falsch
Wahr
Monat von Date
Hours
Hour
Month_AVG
Januar
Februar
März
April
Mai
Juni
Juli
August
September
Oktober
November
Dezember
Years
2021
Value
1,5M
1M
0,5M
0M
Casual
Member
Measure Names
Casual
Member
Year of Date
(All)
2011
2012
2021
2022
2023
Month of Date
(All)
Januar
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

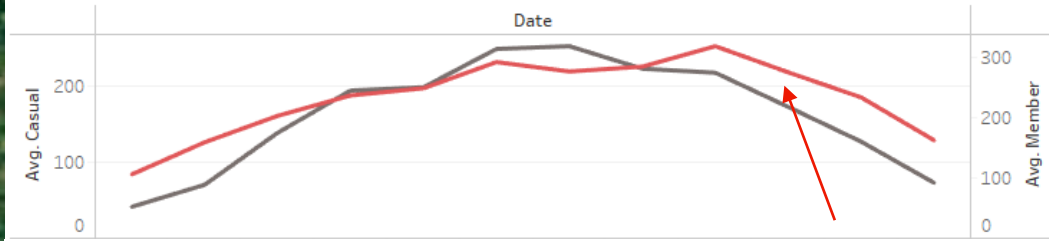
Month_AVG

2021



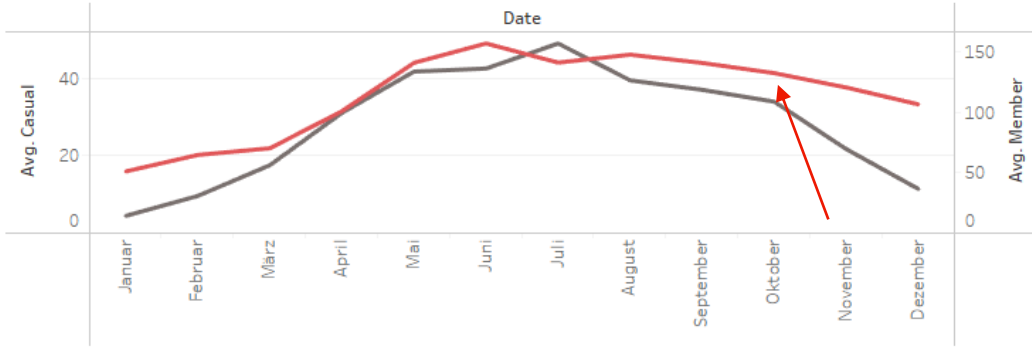
Month_AVG

2022



Month_AVG

2011



NEWS & POLITICS

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 | PUBLISHED ON OCTOBER 25, 2021

TWEET SHARE

Photograph by adokshelvia 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

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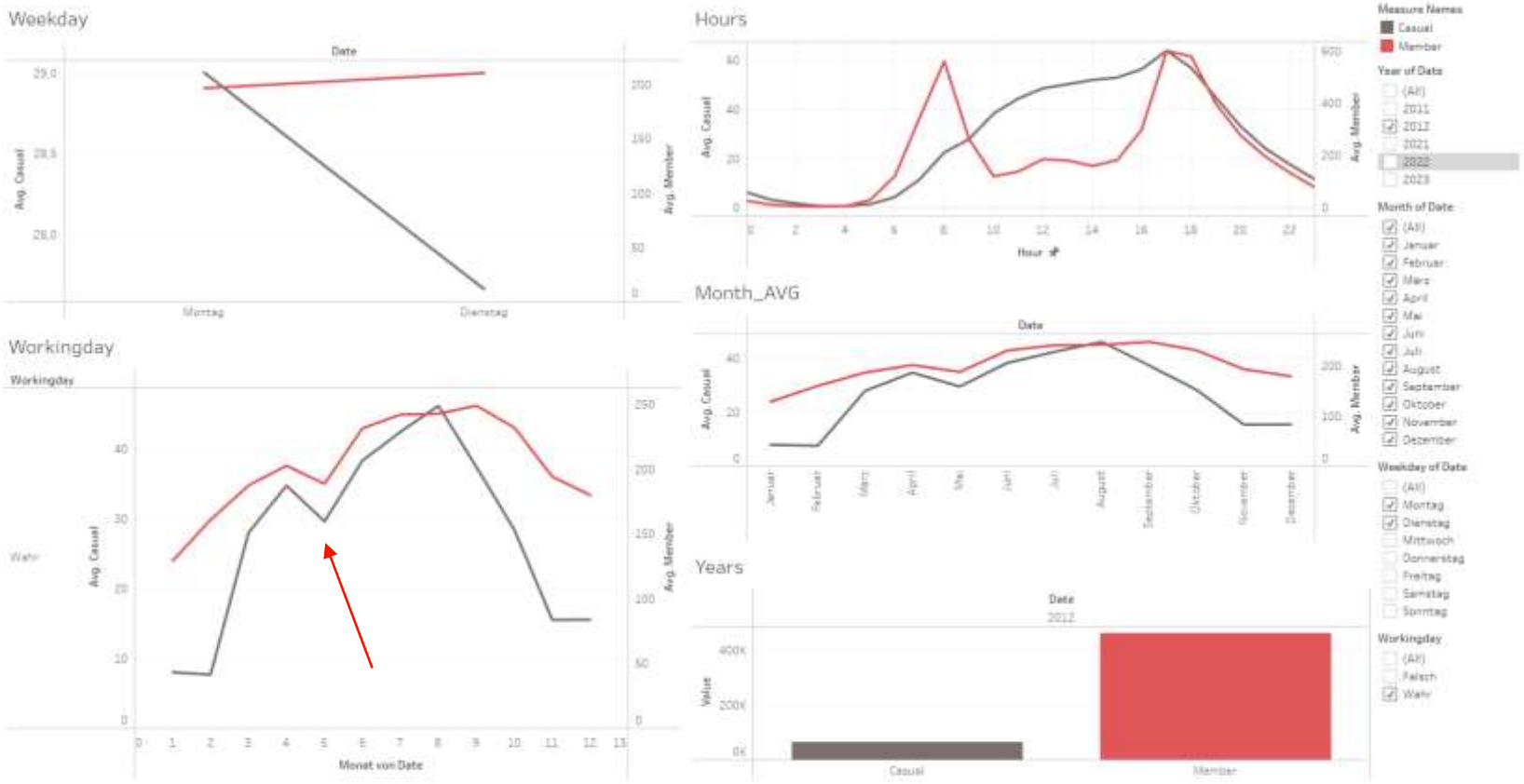
Source: https://www.washingtonian.com/2021/10/25/dc-residents-can-get-a-free-30-day-membership-to-capital-bikeshare/

KPI

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

Specific Measurable Attainable Relevant Time-bound

May Weekdays



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

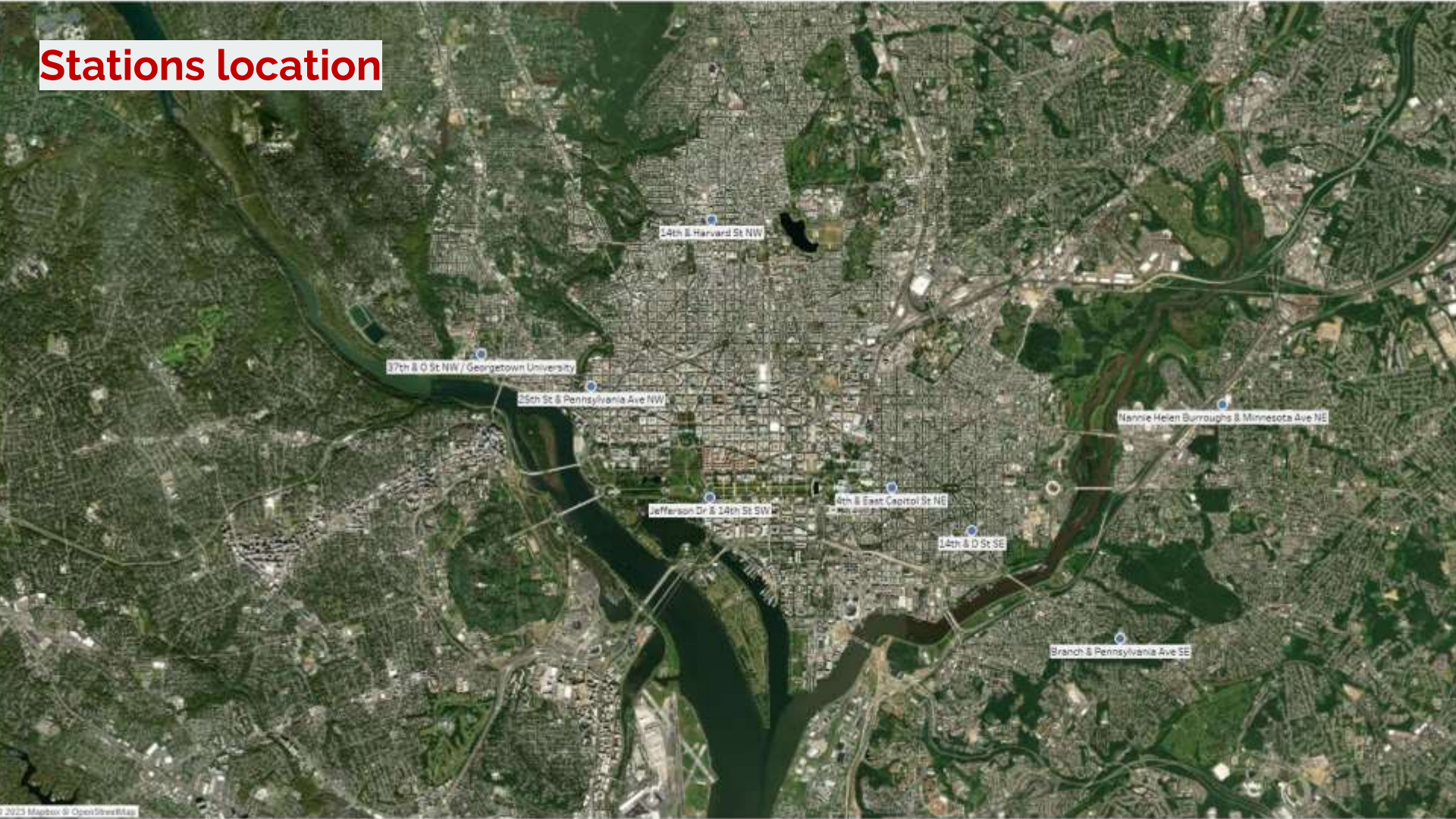
2023 (749)

240	103
154	49

202 not identified

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

Stations location

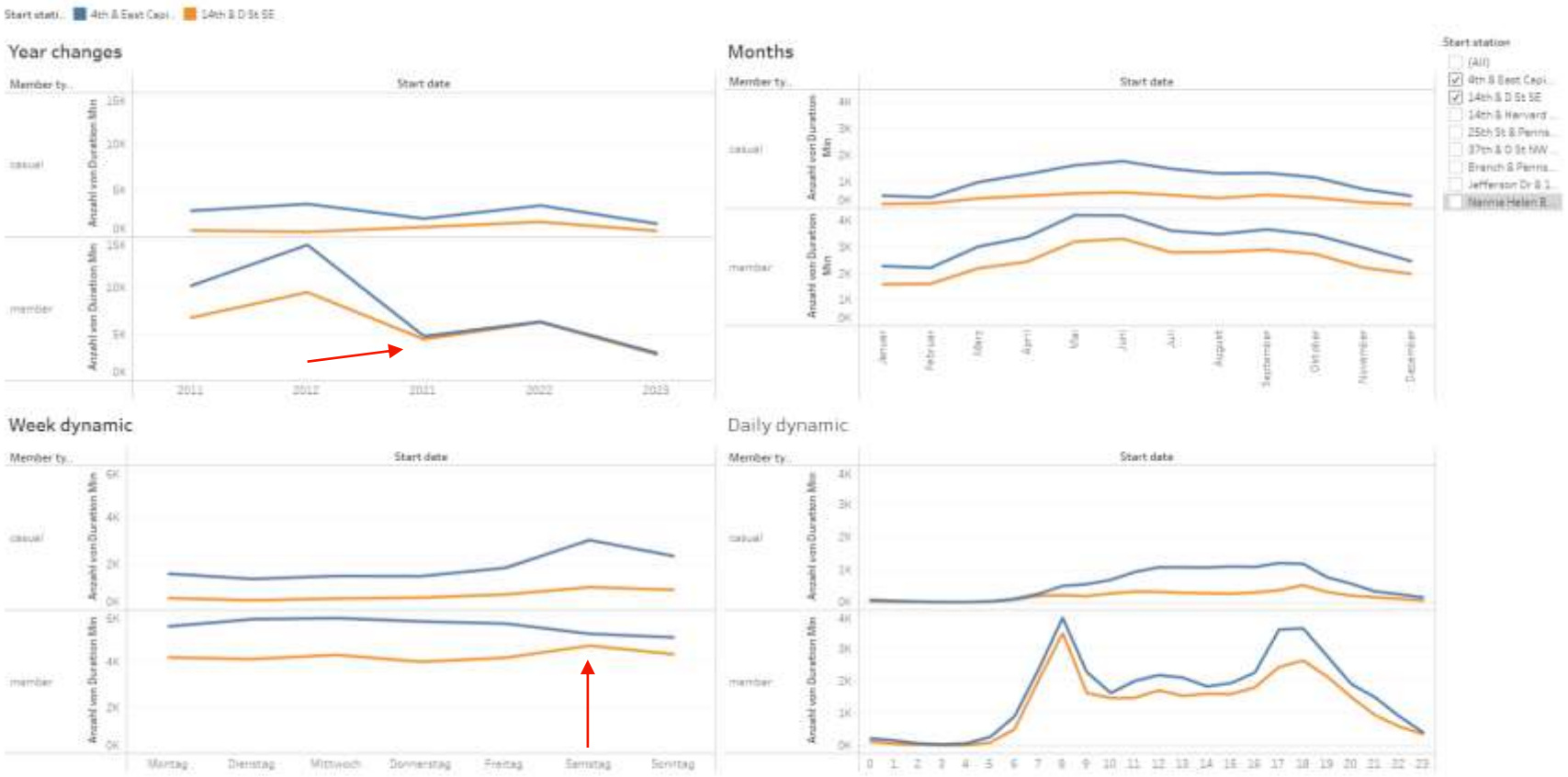


4th & East Capitol St NE	touristic spot
14th & D St SE	center
14th & Harvard St NW	residential area
25th St & Pennsylvania Ave NW	between residential area and center
37th & O St NW / Georgetown University	Students
Jefferson Dr & 14th St SW	touristic spot
Branch & Pennsylvania Ave SE	residential area
Nannie Helen Burroughs & Minnesota Ave NE	transport hub

4th & East Capitol St NE

14th & D St SE

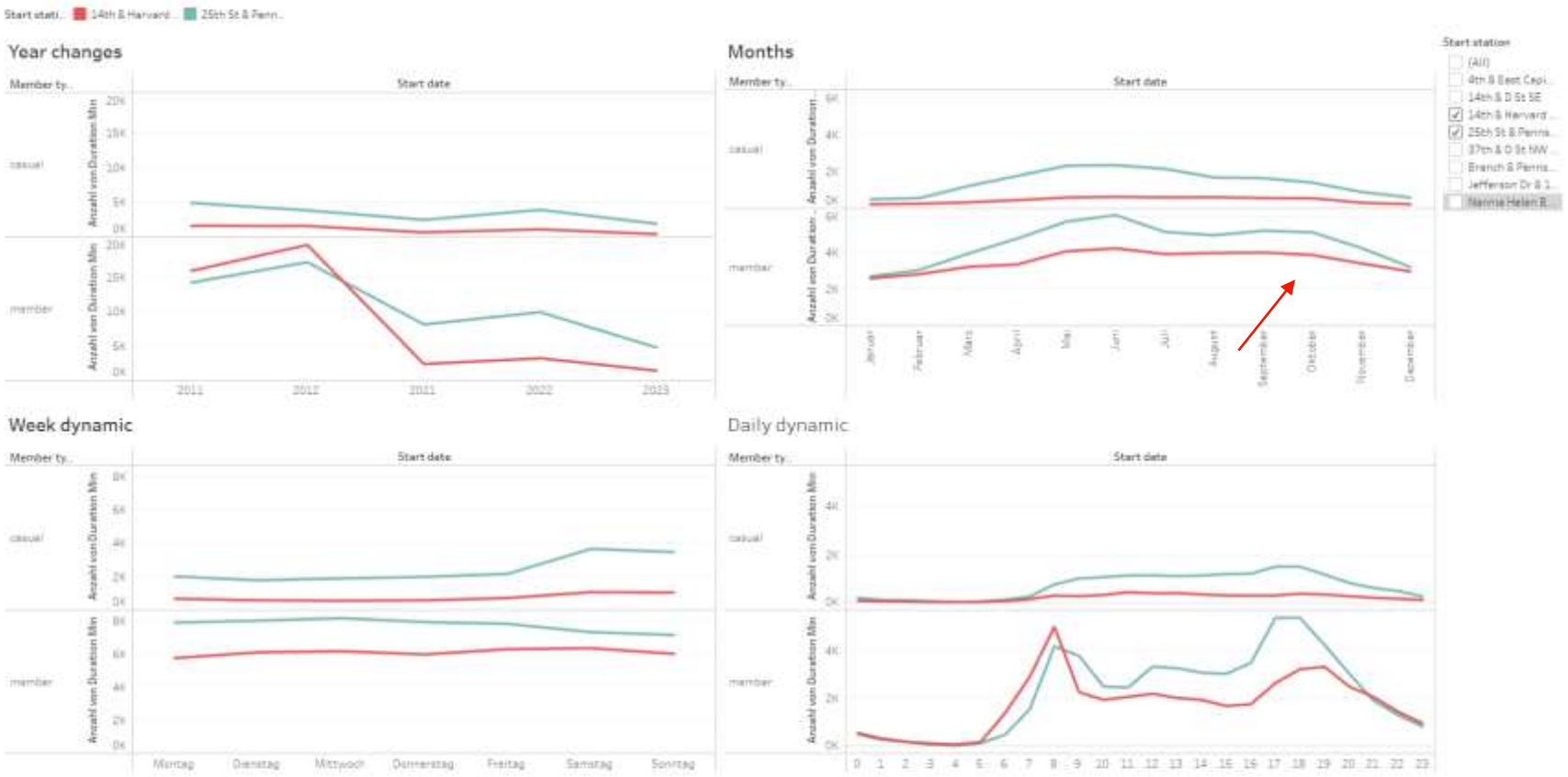
TC



14th & Harvard St NW

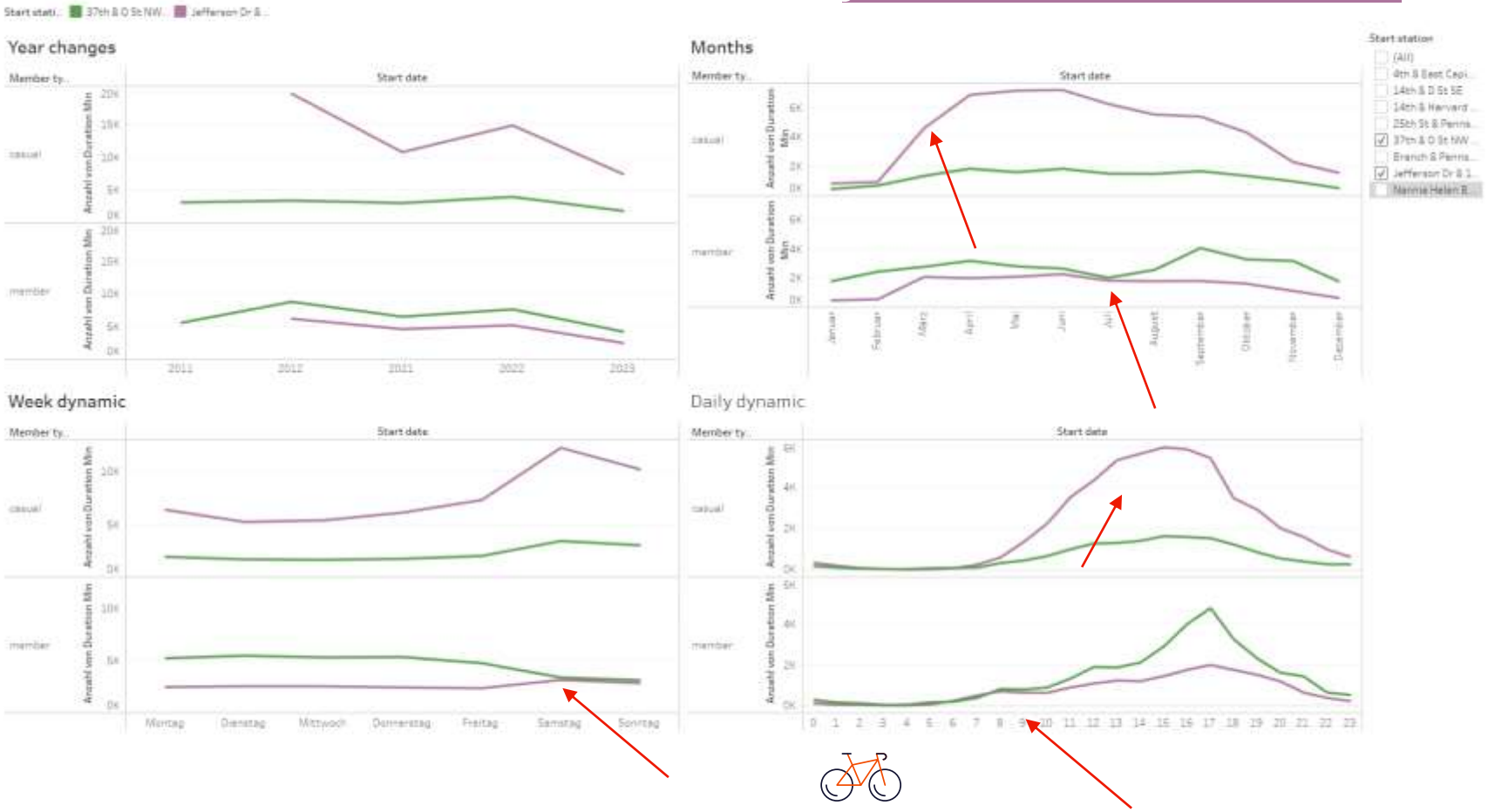
25th St & Pennsylvania Ave NW

RB



37th & O St NW / Georgetown University

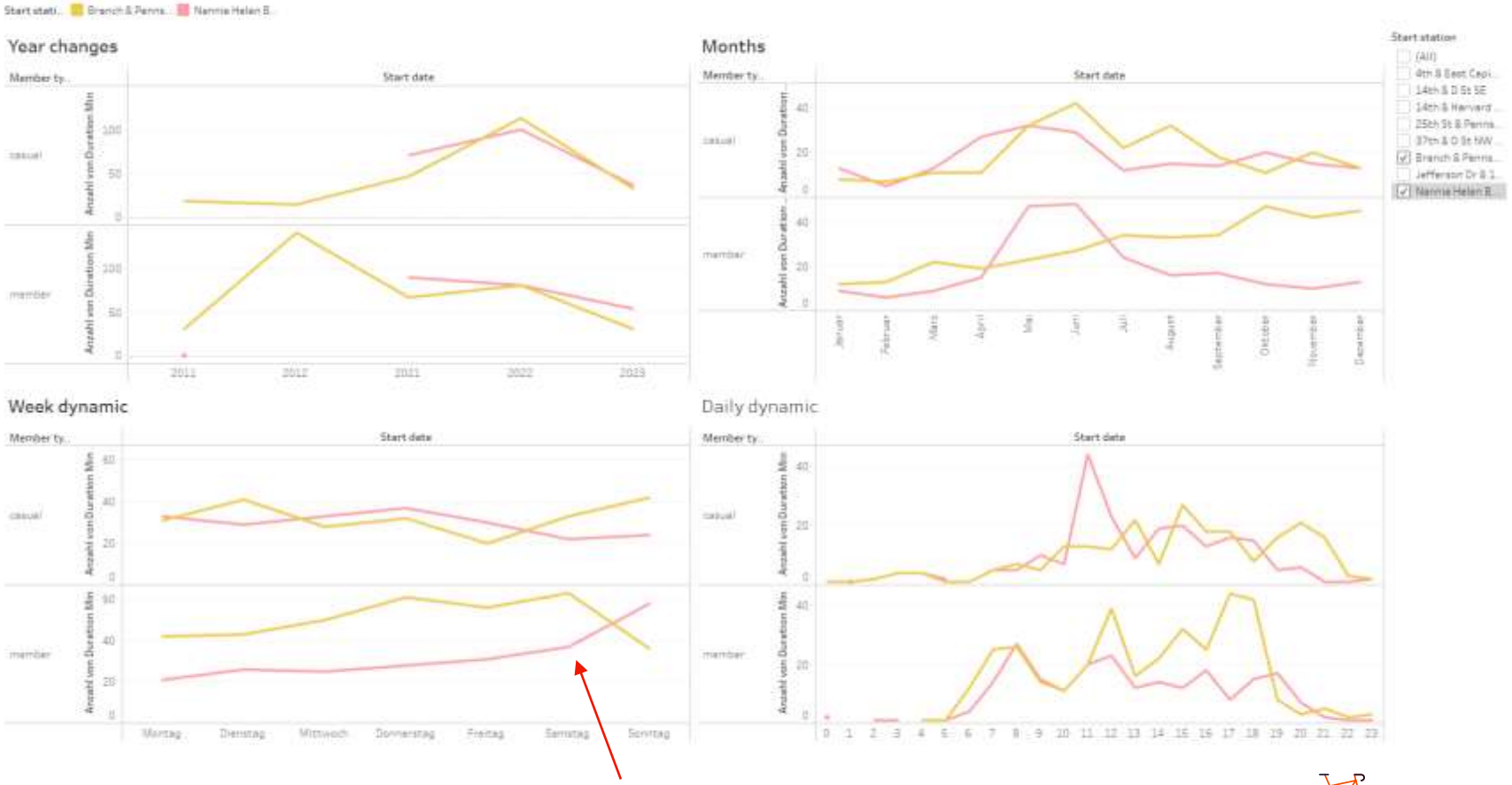
Jefferson Dr & 14th St SW



Branch & Pennsylvania Ave SE

Nannie Helen Burroughs & Minnesota Ave NE

RH



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.

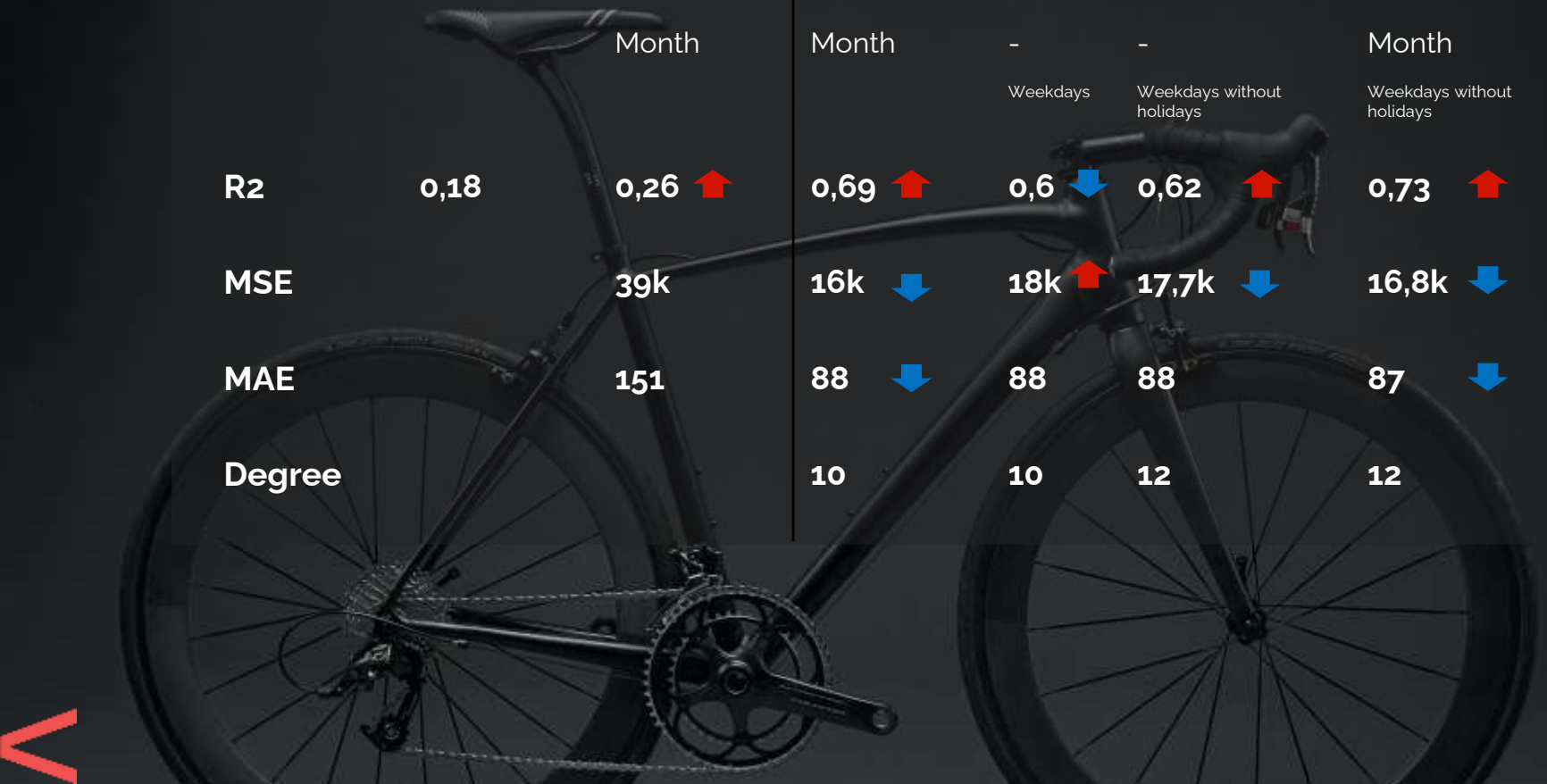
Recommendations

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			
		Month	Month	- Weekdays	- Weekdays without holidays	Month Weekdays without holidays
R2	0,18	0,26 ↑	0,69 ↑	0,6 ↓	0,62 ↑	0,73 ↑
MSE		39k	16k ↓	18k ↑	17,7k ↓	16,8k ↓
MAE		151	88 ↓	88	88	87 ↓
Degree			10	10	12	12



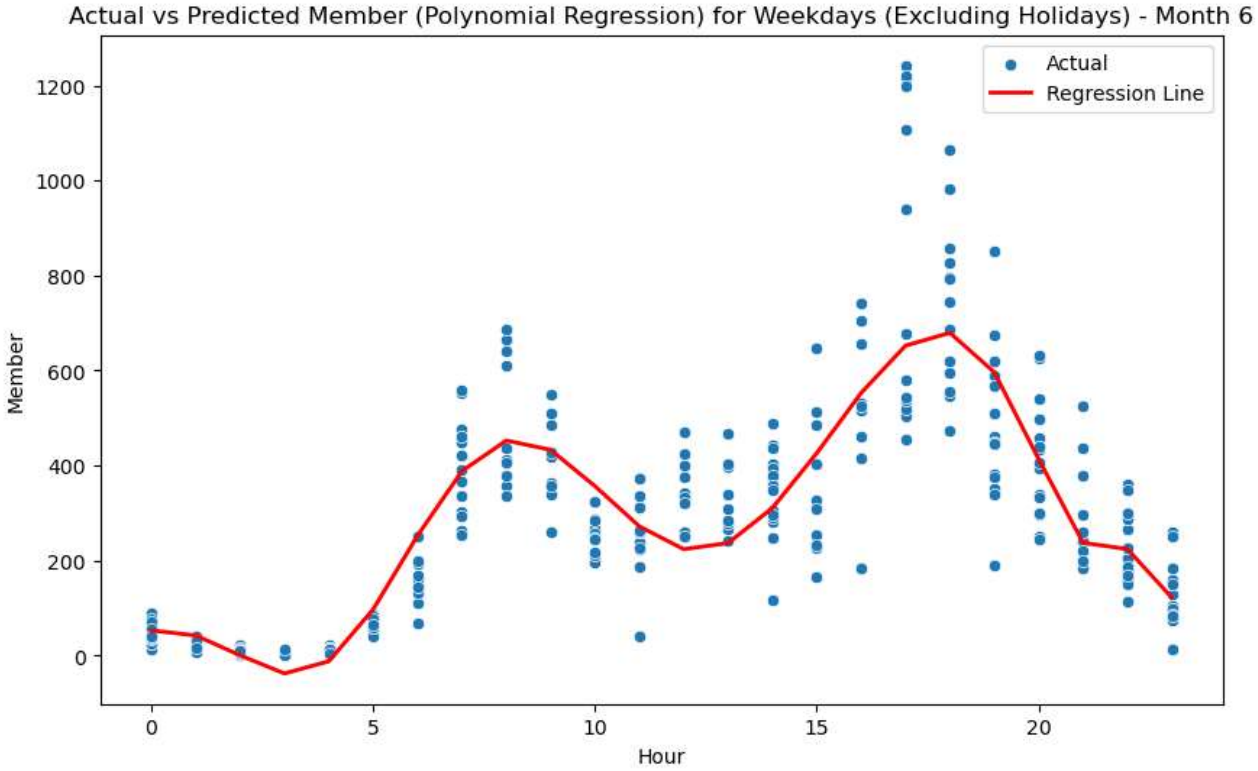
Polynomial Regression
forecasting member rides demand
by hours
and weekdays (without holidays) for June

R2
0,73

MSE
16,8k

MAE
87

Degree
12



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/