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FACULTY OF SCIENCES

MASTER OF STATISTICAL DATA ANALYSIS
BAYRAK, CARTUYVELS, HEYVAERT, KOURFALI, O'SULLIVAN

DATABASES

SPARK PROJECT FOR NMBS / 14.12.2017

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BELGIAN PUBLIC TRANSPORTATION

Explore

Identify Problems

Suggest Solutions

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DESCRIPTIVE STATISTICS

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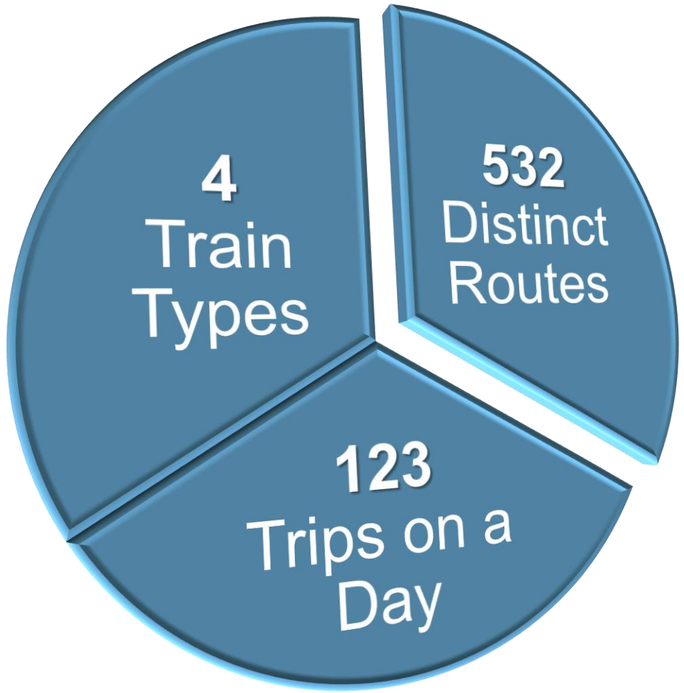
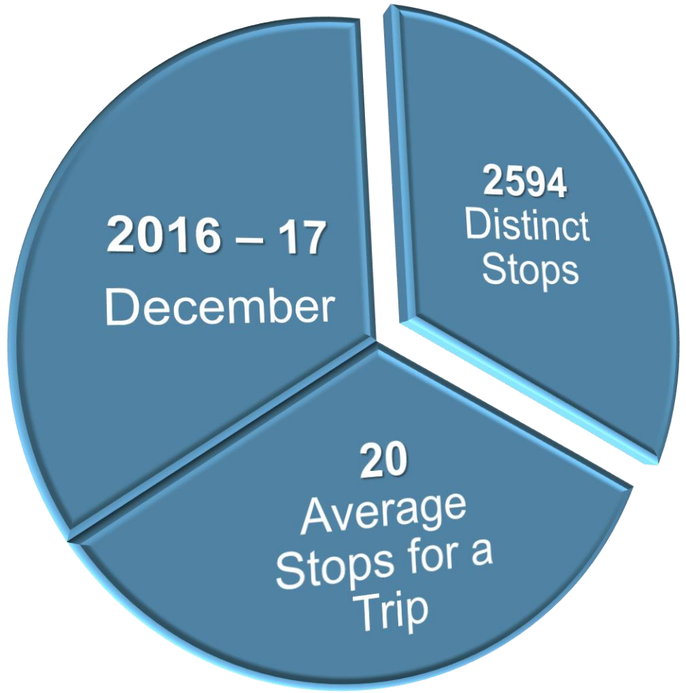
DESCRIPTIVE STATISTICS





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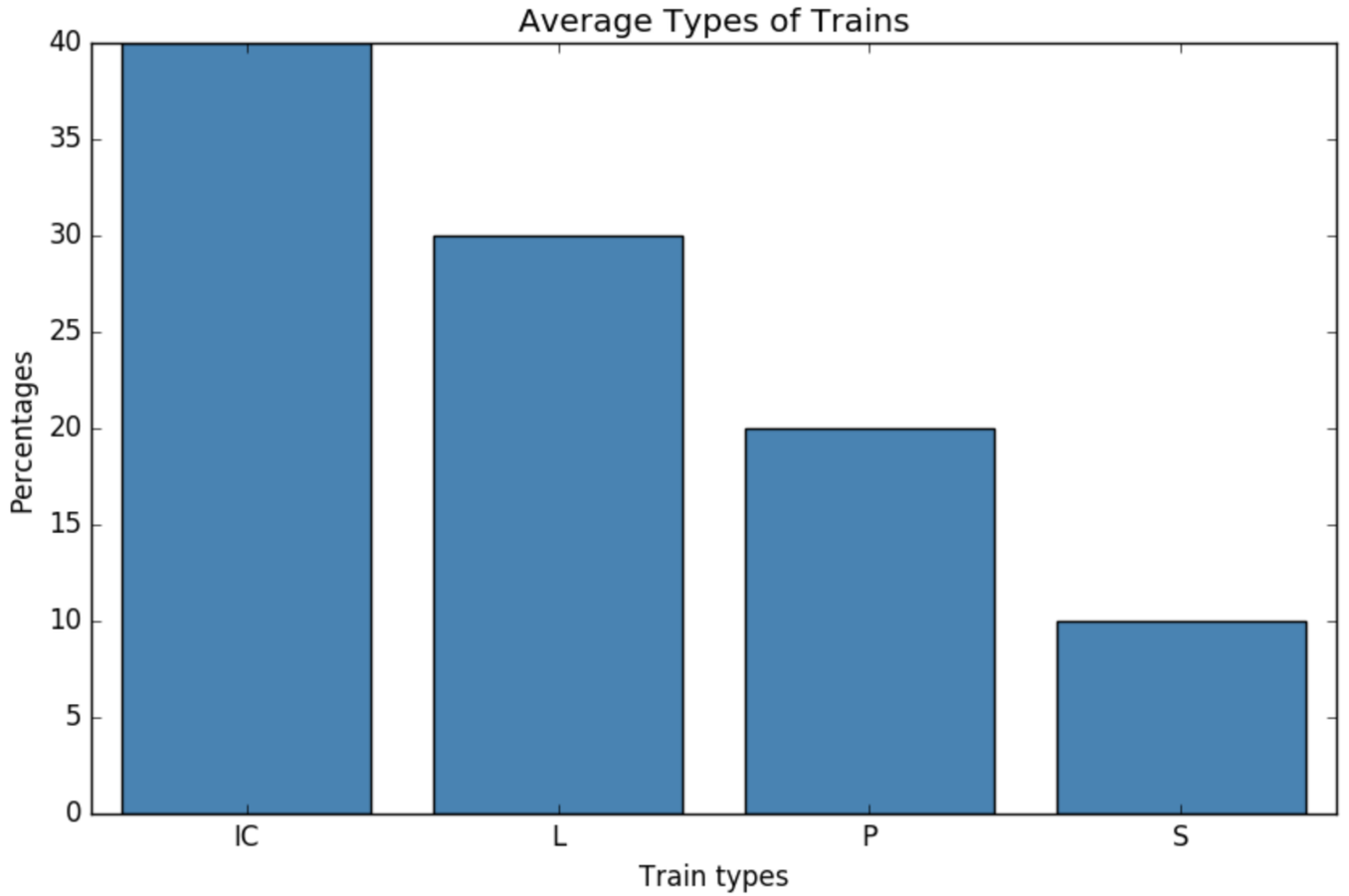

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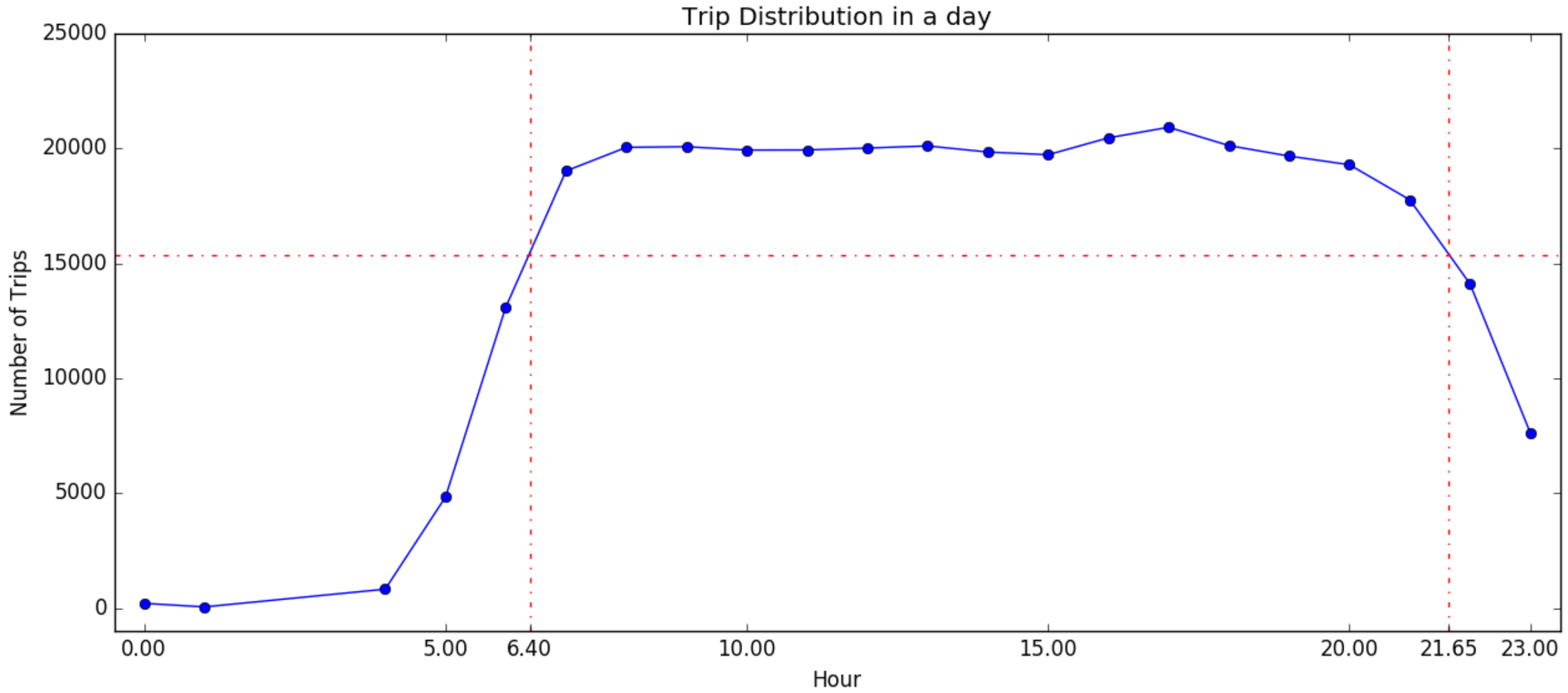

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INCOMING – OUTGOING TRAINS

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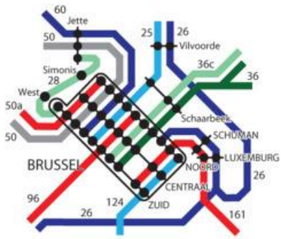

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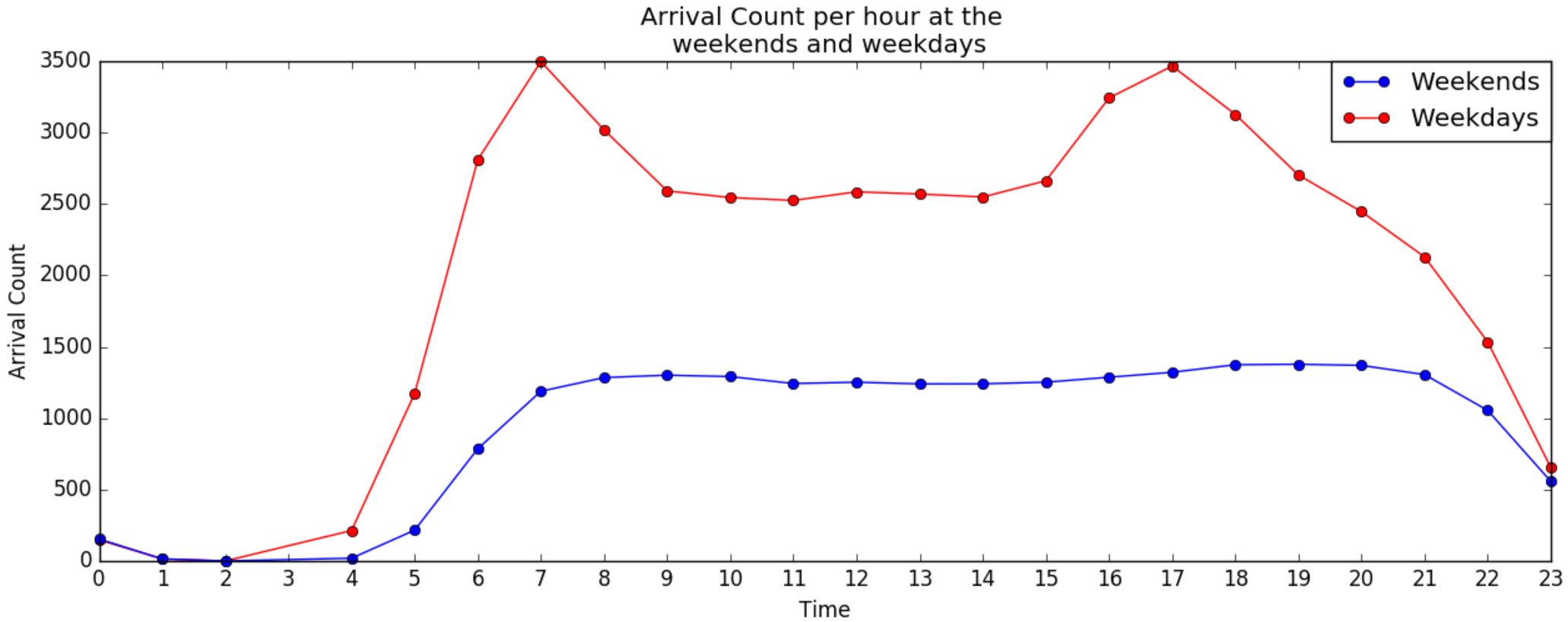

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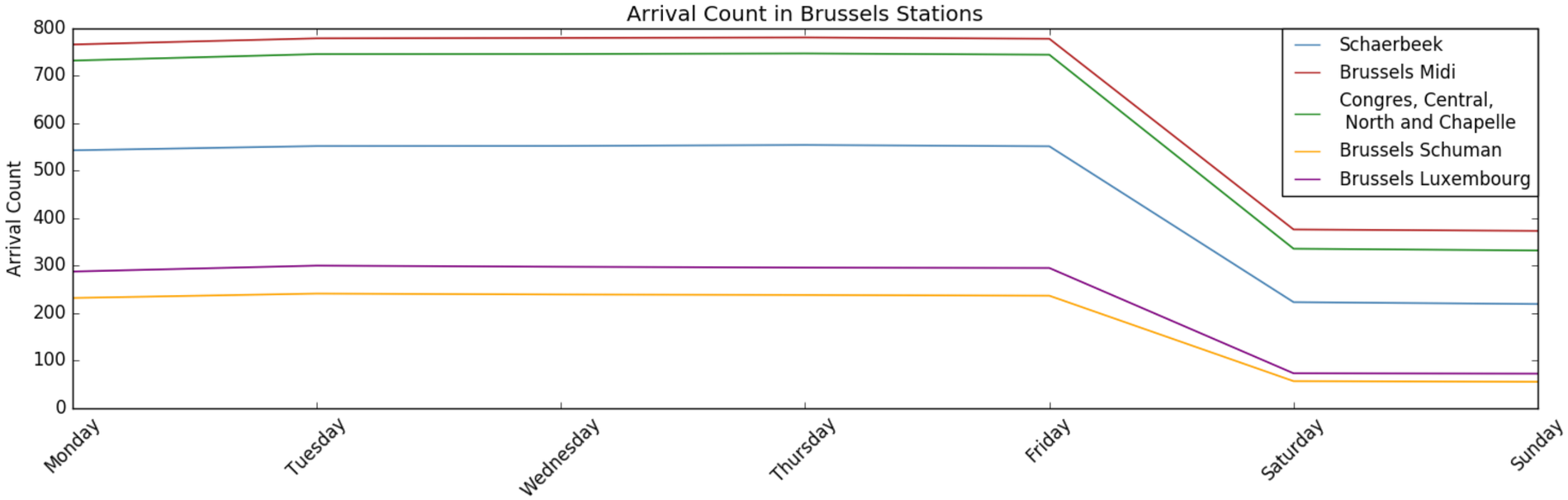

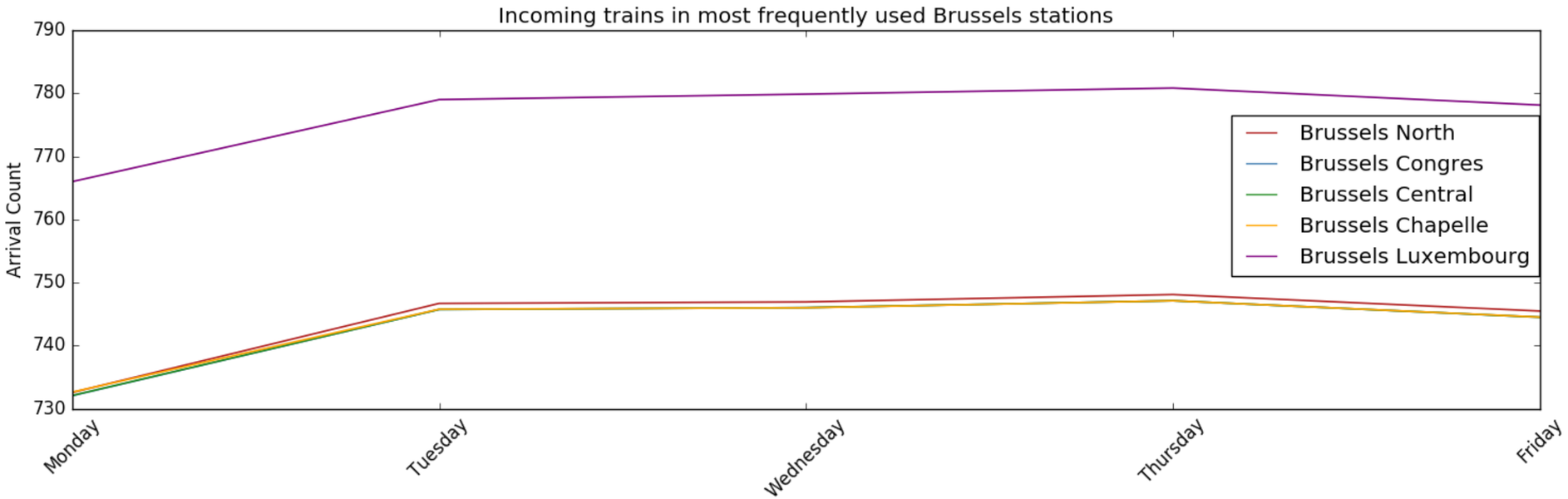

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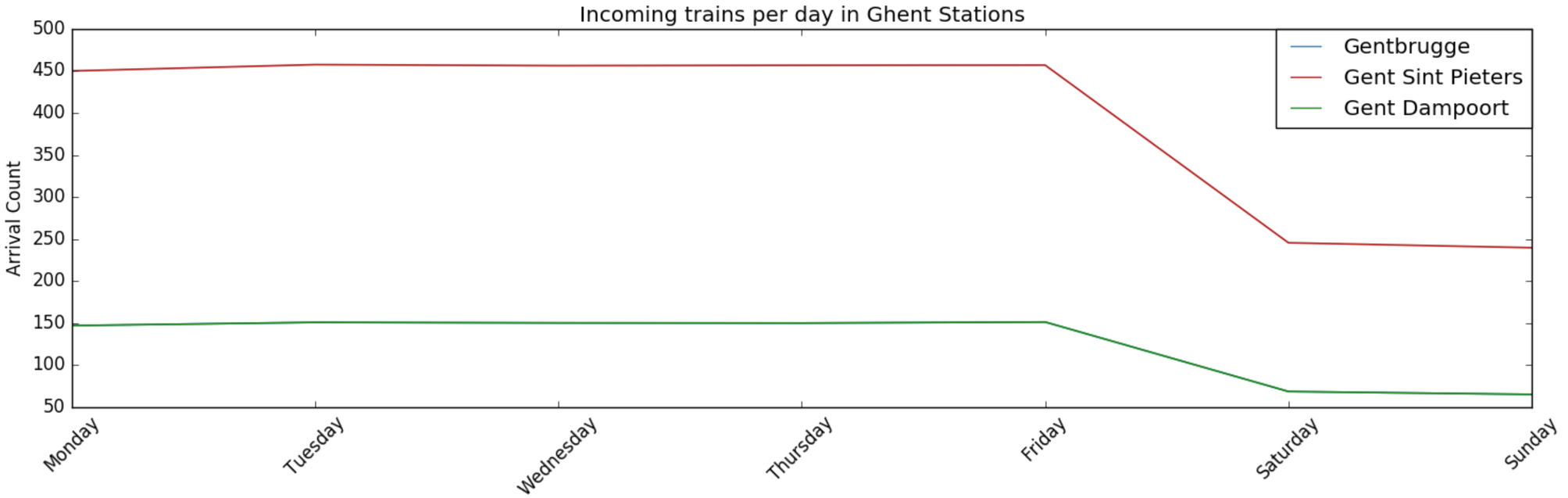

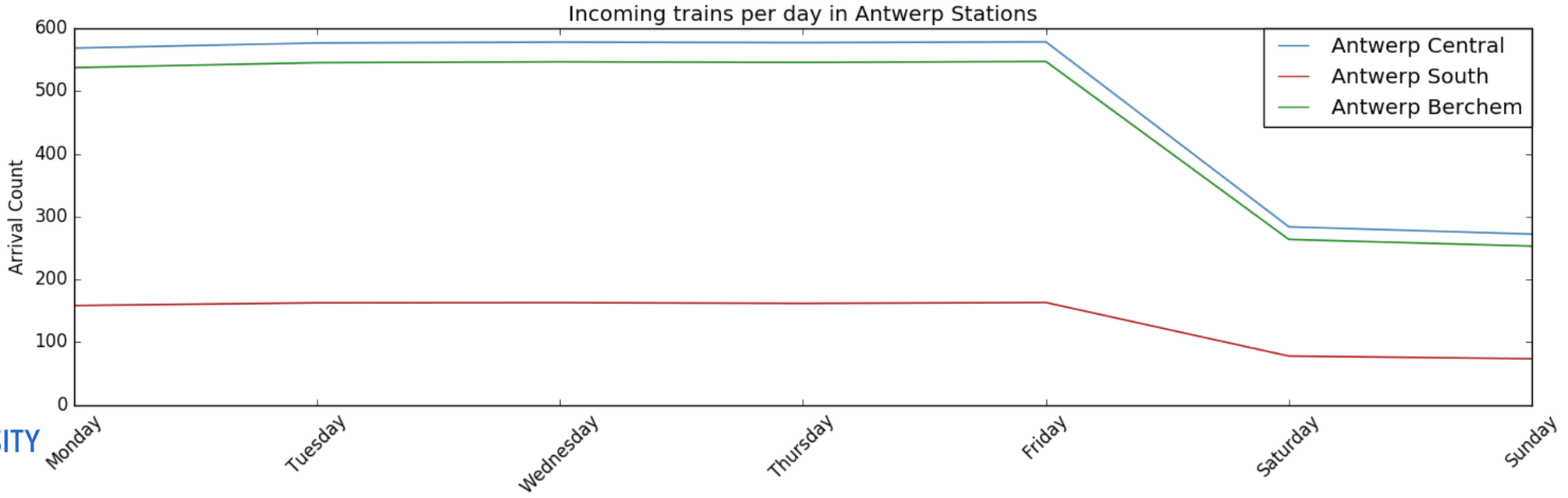

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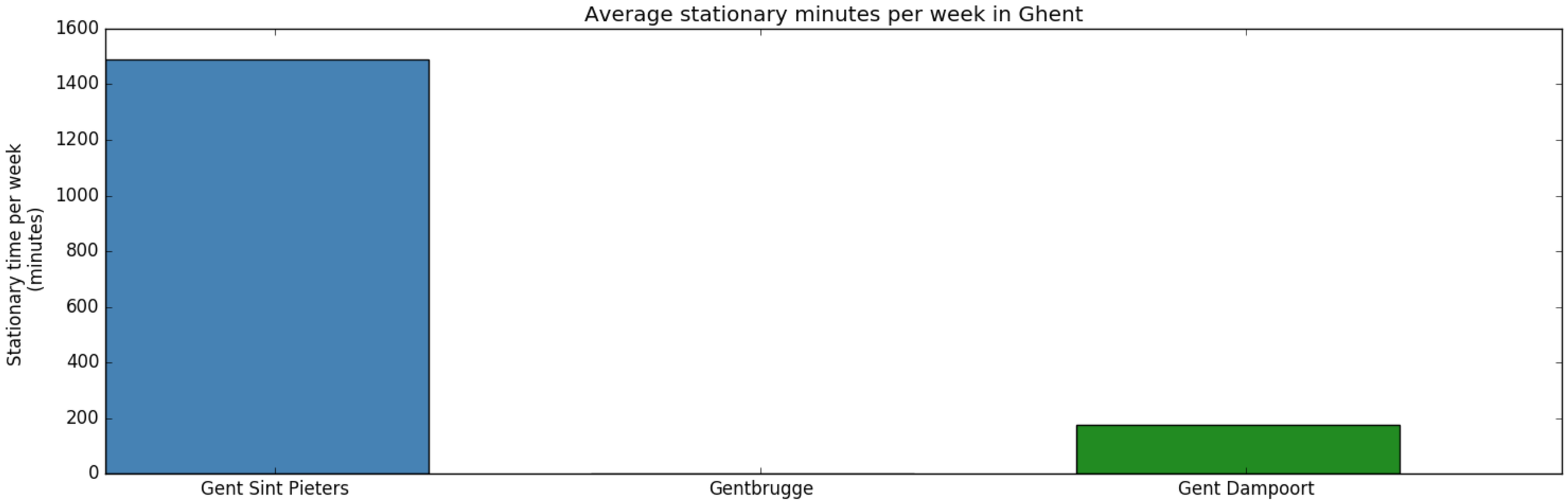

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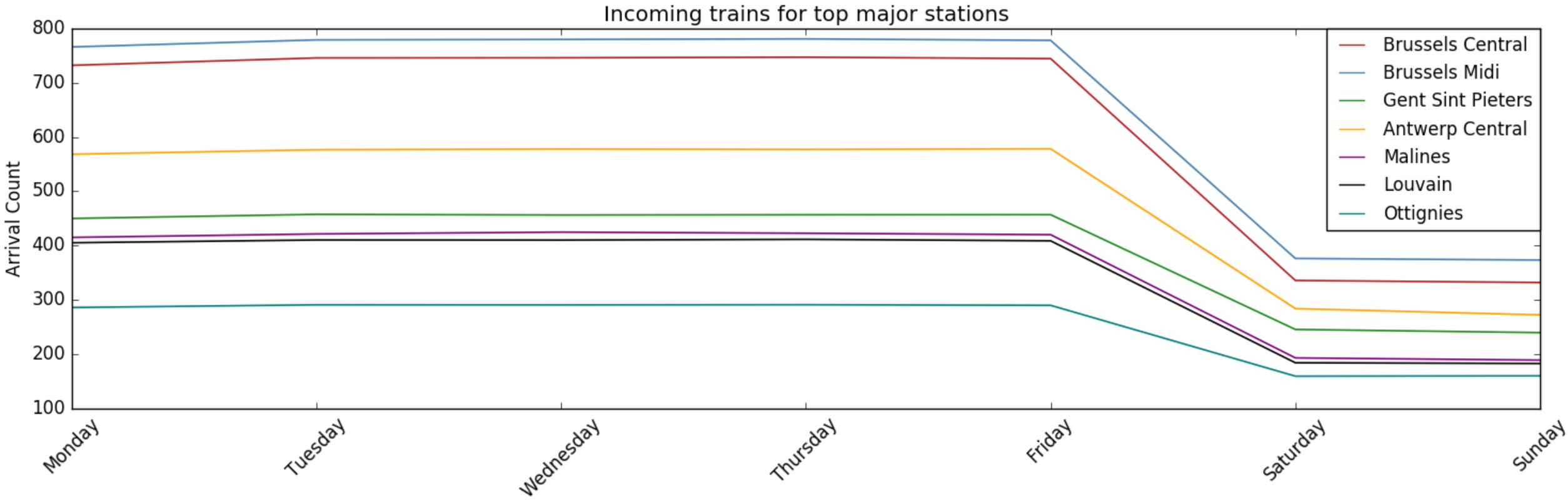

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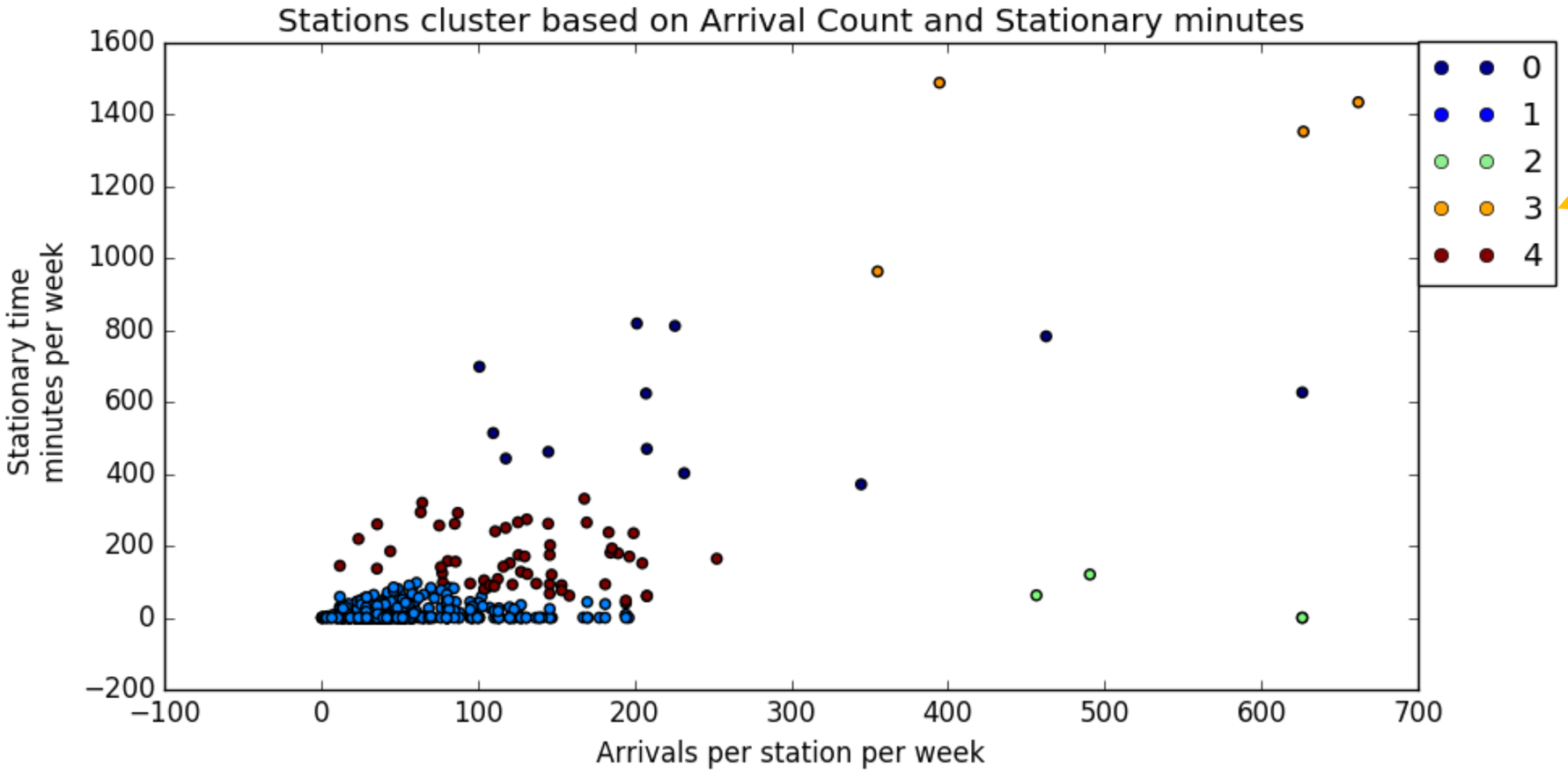

- Brussels Nord
- Brussels Midi
- Malines
- Gent Sint Pieters

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ANALYSIS OF DELAYS

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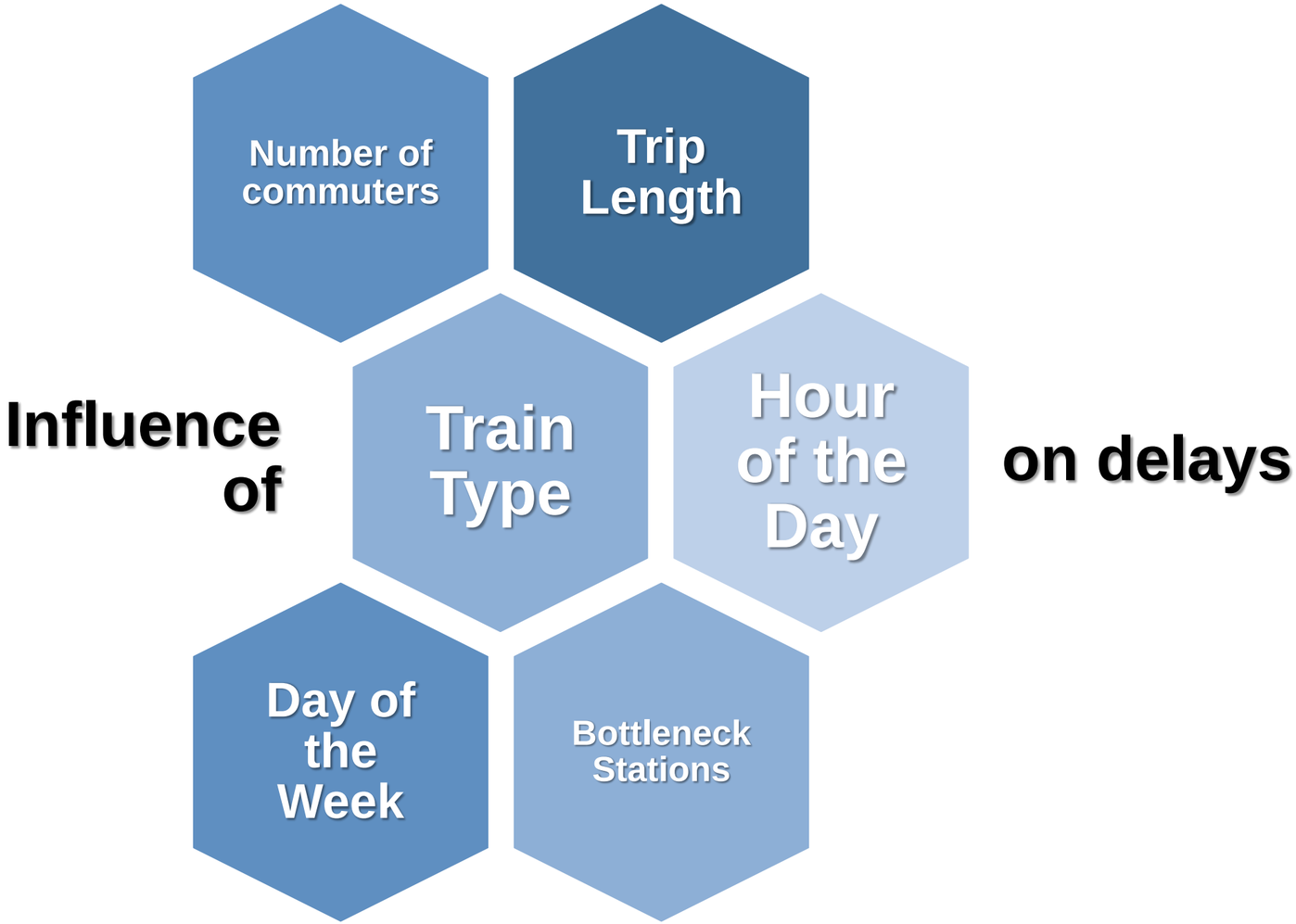

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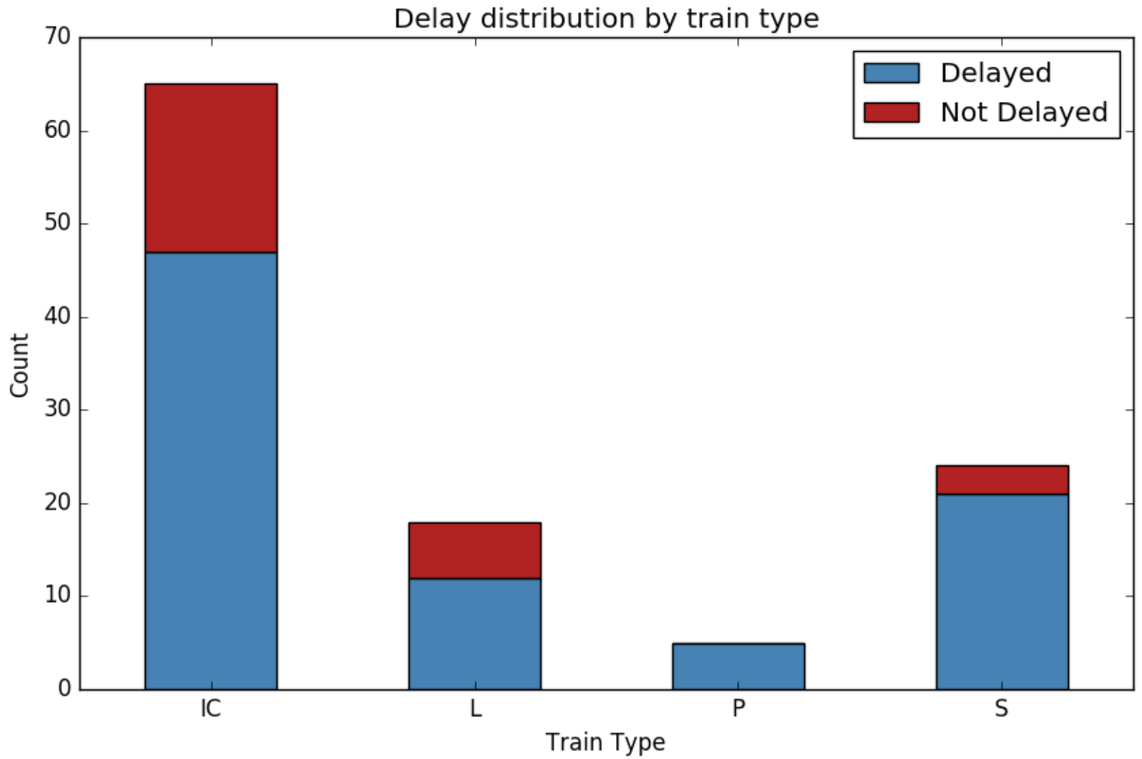
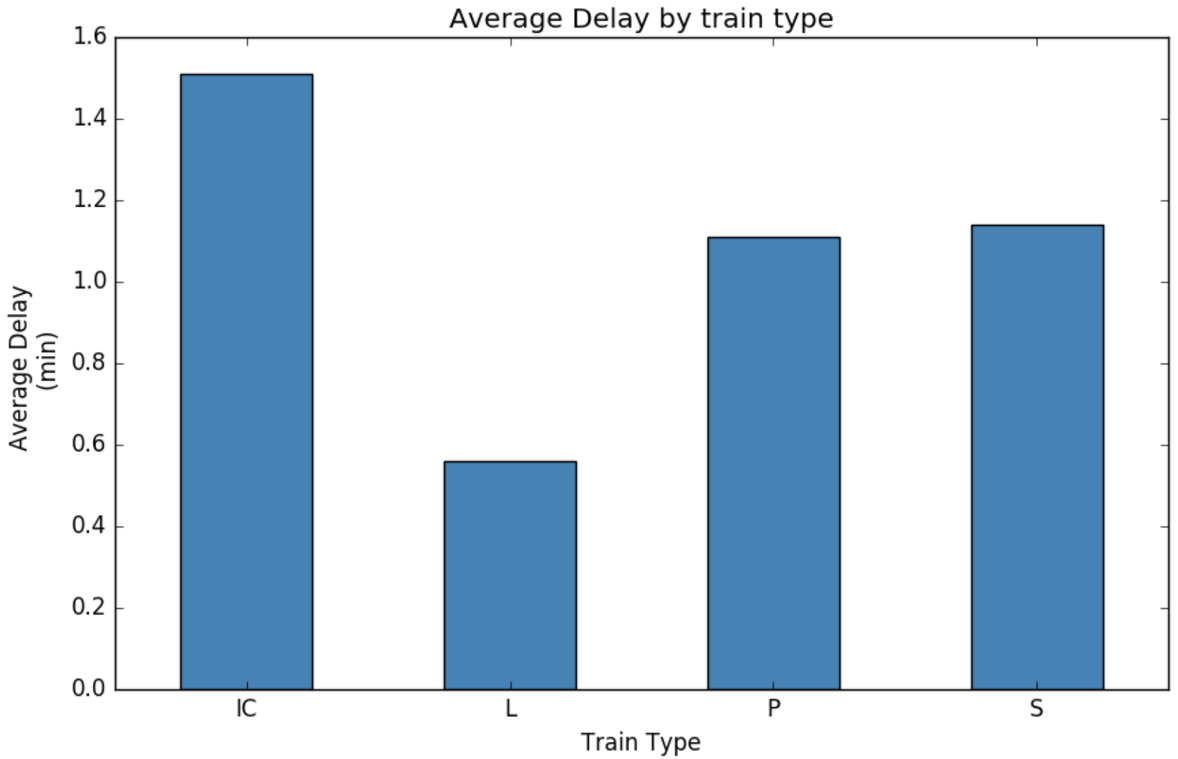
ANALYSIS OF DELAYS





* Not delayed: average delay time <= 0.25 min

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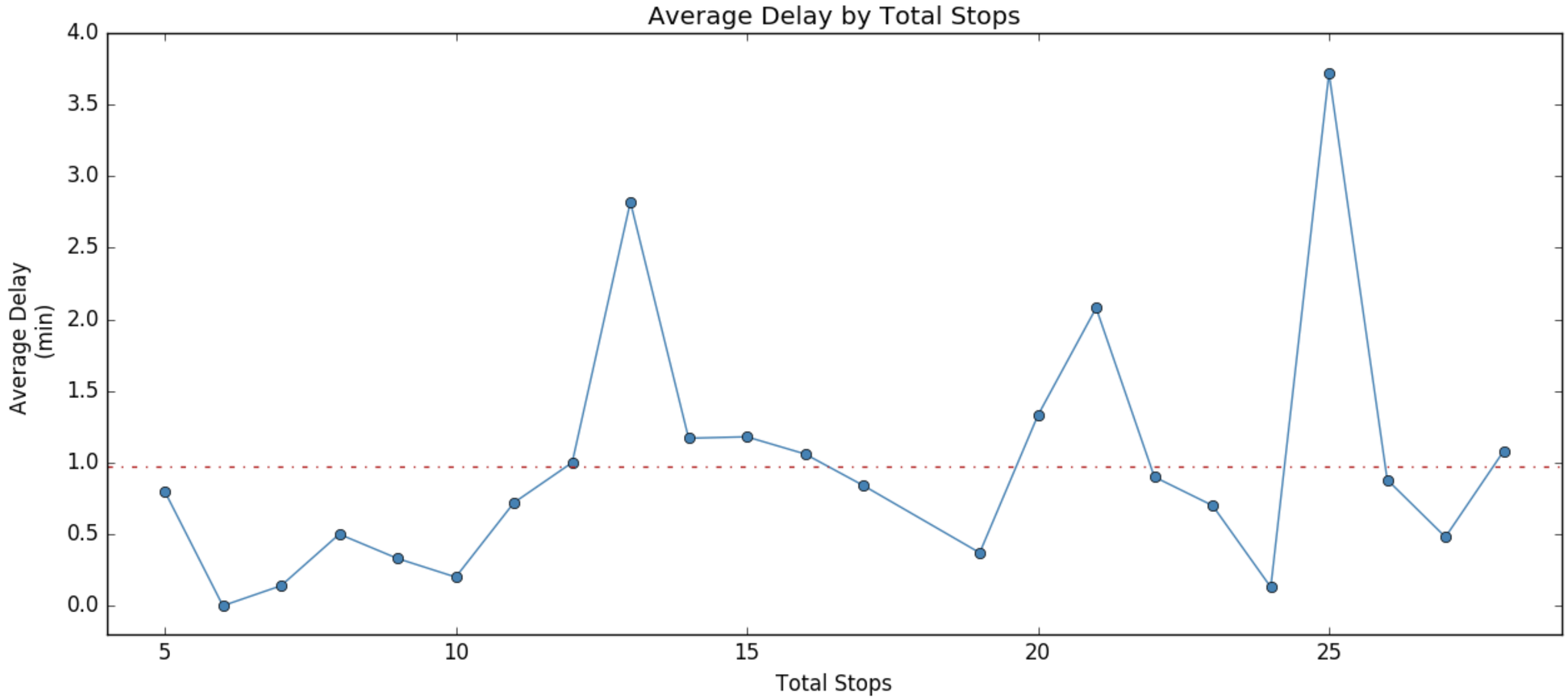
ANALYSIS OF DELAYS



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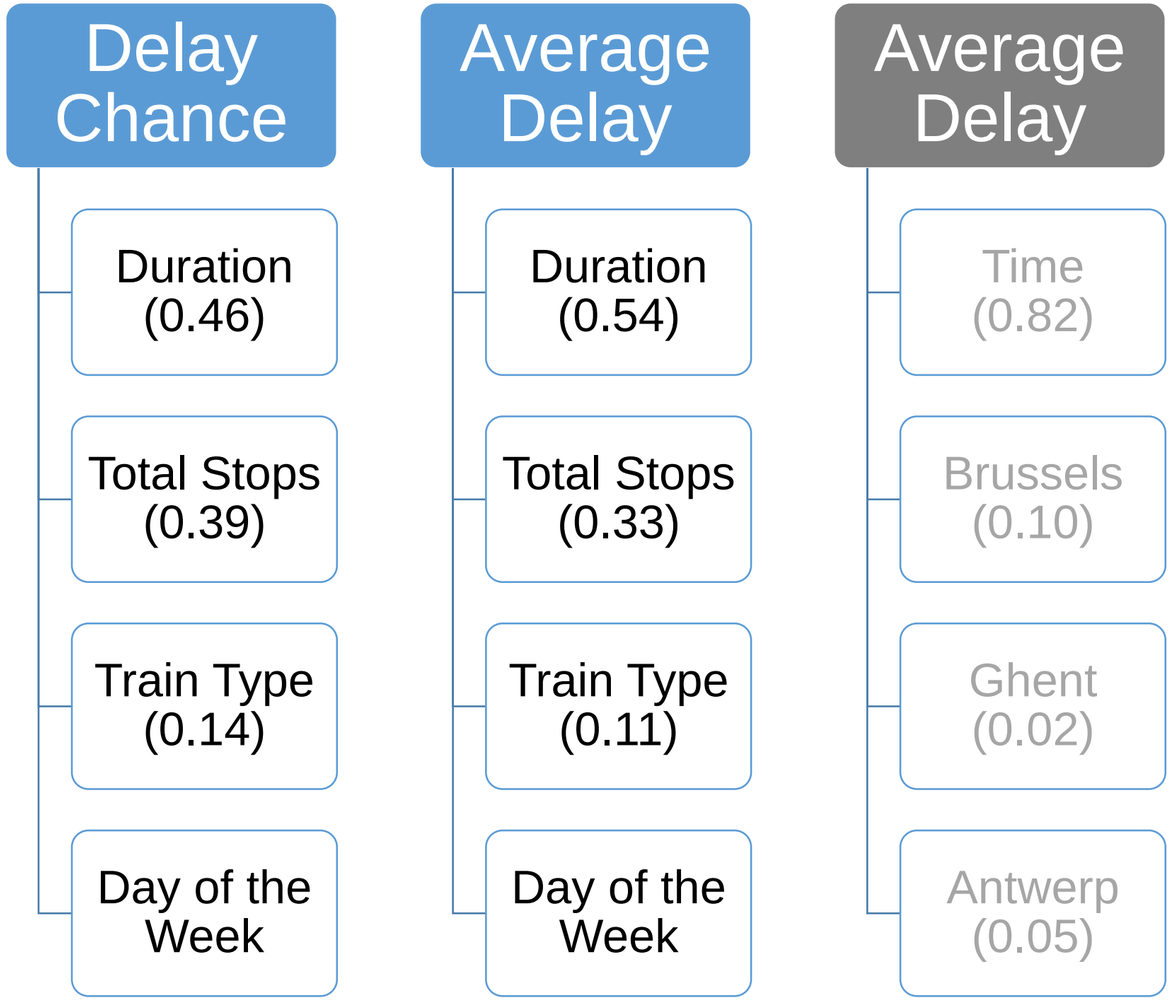
RANDOM FOREST



Random Forest Classification

AUC = 0.55

Accuracy = 69%

Random Forest Regression

Random Forest Regression

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INFLUENCE OF TIME OF DAY

- Is the delay time longer at certain moments?
- Include possible bottleneck cities (Brussels, Ghent, …)

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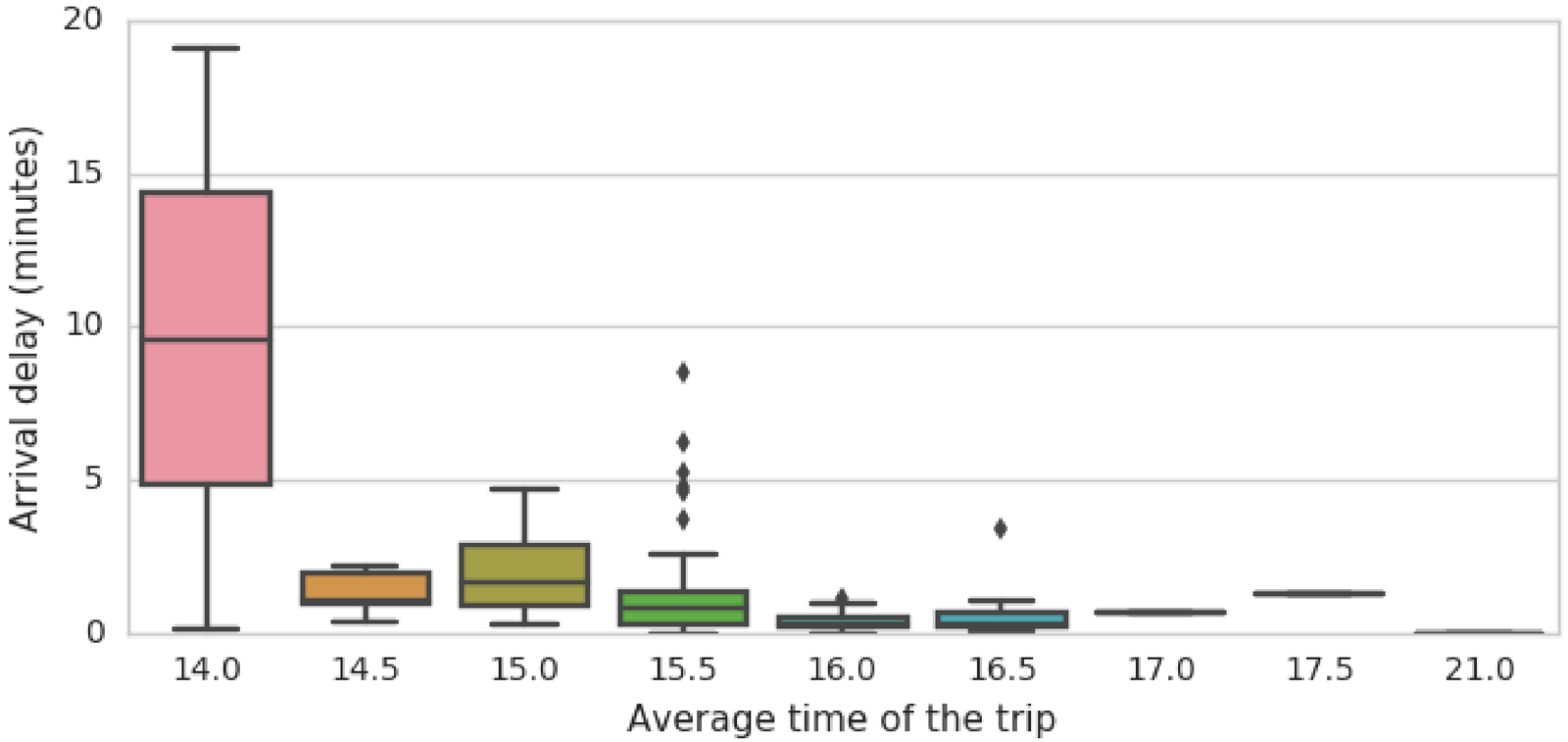
INFLUENCE OF TIME OF DAY



- Divide 24h day in categories of half an hour each
- Dummies for each train: whether it passed in Brussels, Ghent or Antwerp
- Perform random forest regression

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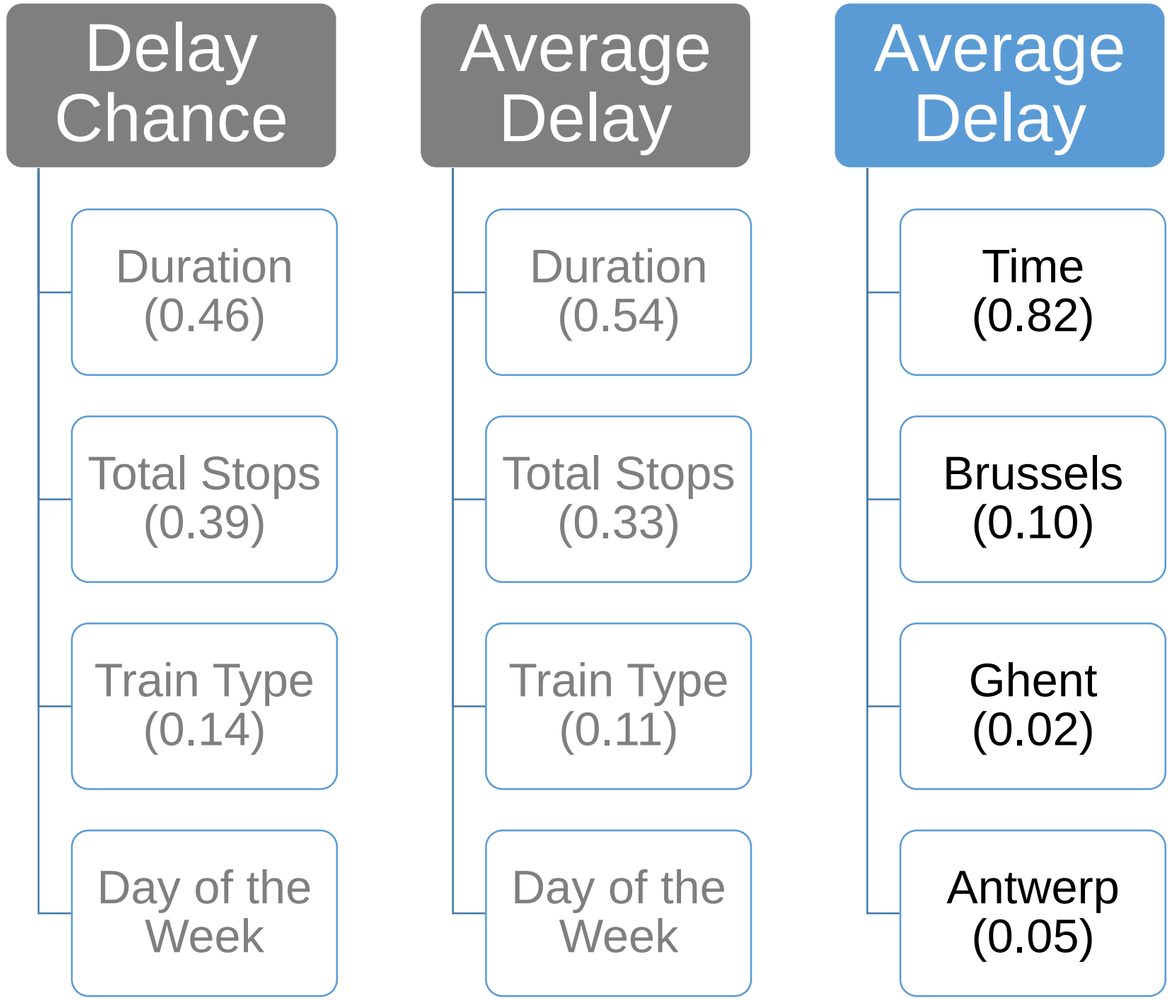
RANDOM FOREST



Random Forest Classification

AUC = 0.55

Accuracy = 69%

Random Forest Regression

Random Forest Regression

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INFLUENCE OF COMMUTERS

- Are trains more easily delayed in busier stations?

**Extra dataset: average number of commuters per station on weekday*

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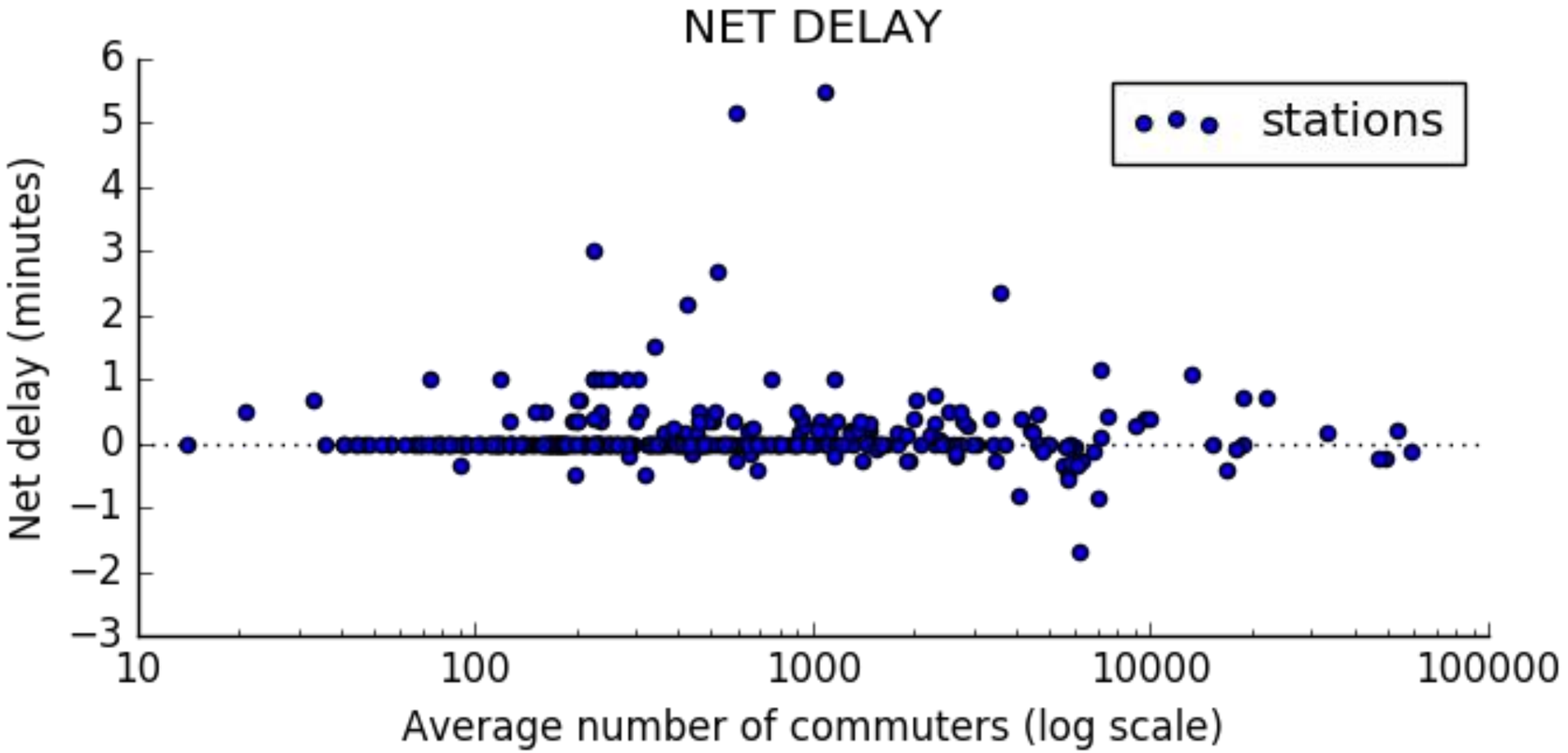
INFLUENCE OF COMMUTERS



Net delay: difference of departure delay and arrival delay

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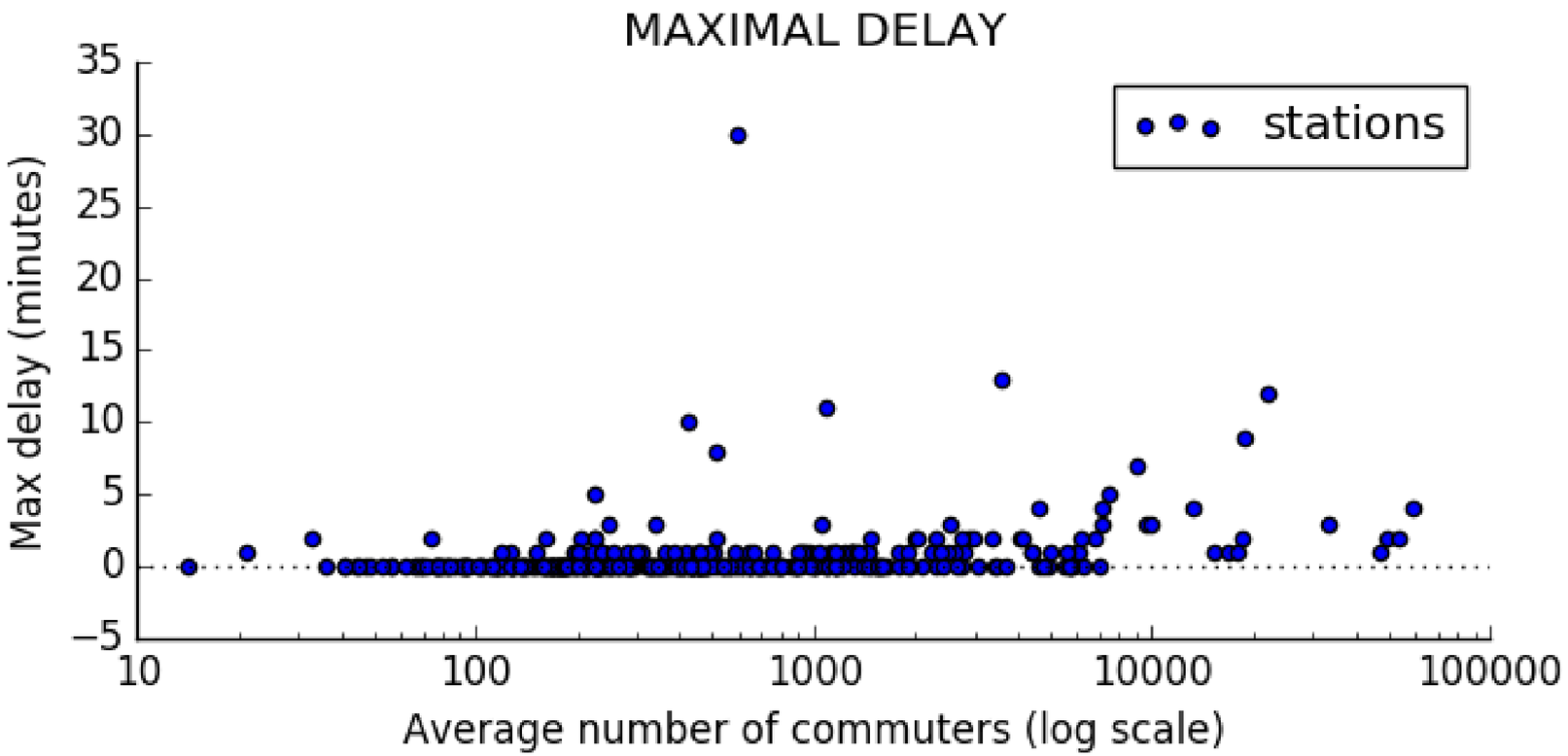
INFLUENCE OF COMMUTERS



Max delay: the maximal netto delay per station in the data set

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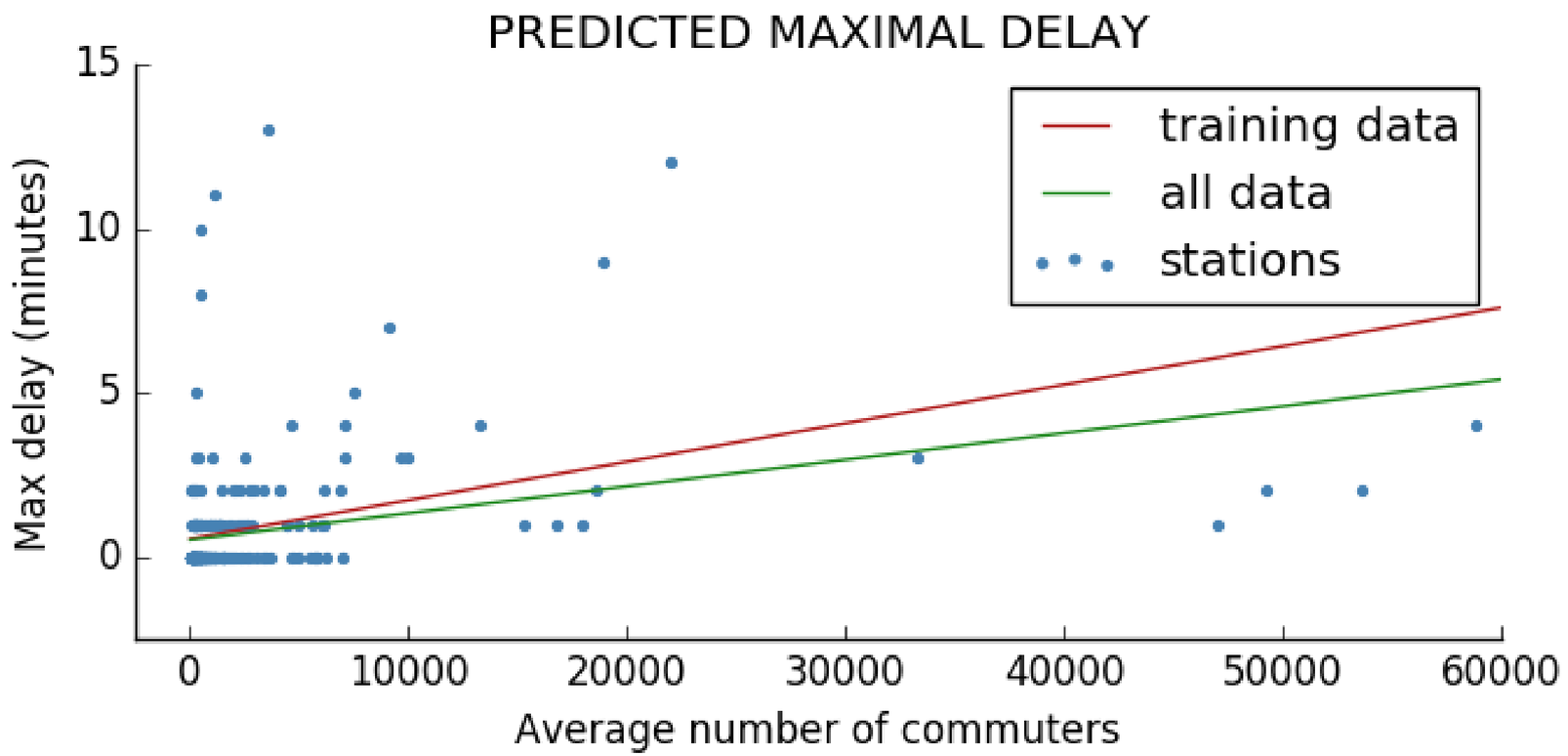
INFLUENCE OF COMMUTERS



- Simple linear regression
- Slope has significant *p*-value!

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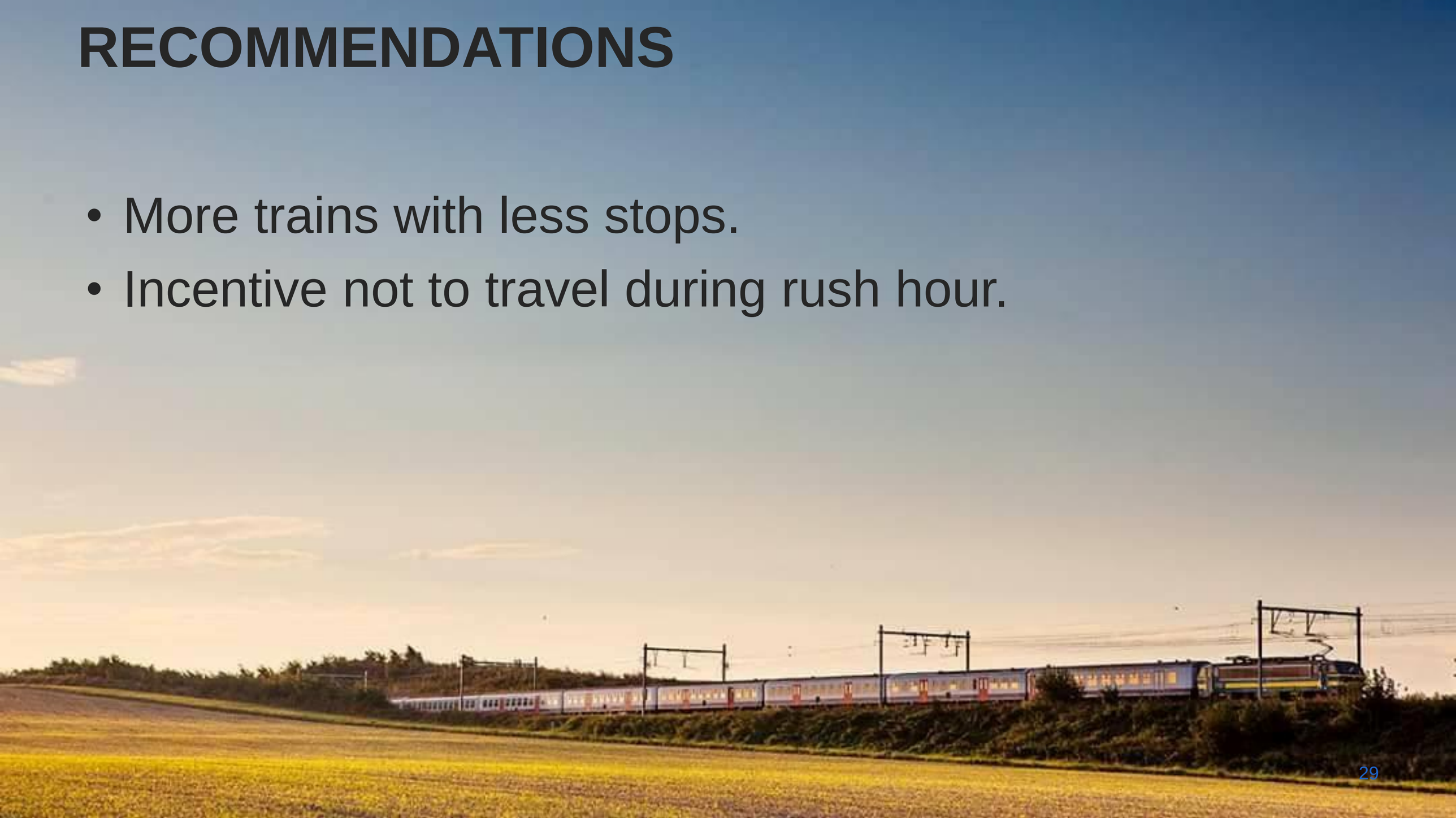
RECOMMENDATIONS

- More trains with less stops.
- Incentive not to travel during rush hour.



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THANK YOU

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