

Results - Draft

Niklas Christoffer Petersen
Trafikselskabet Movia

May 18, 2017

Abstract

1 Background

2 Data

| Link Name | Link Travel Time | | | |
|--|------------------|------|----|-----|
| | Mean | Std. | p5 | p95 |
| Valby St. (10427) - Toftegårds Plads (1183) | 74 | 34 | 39 | 130 |
| Toftegårds Plads (1183) - Vestre Kirkegård Nord (2673) | 67 | 22 | 45 | 98 |
| Vestre Kirkegård Nord (2673) - Sankt Annæ Gymnasium (2675) | 66 | 24 | 54 | 87 |
| Sankt Annæ Gymnasium (2675) - Sjælør St. (1188) | 52 | 14 | 41 | 78 |
| Sjælør St. (1188) - Mozarts Plads (1190) | 88 | 20 | 62 | 122 |
| Mozarts Plads (1190) - Bådehavns-gade (1192) | 154 | 48 | 93 | 228 |
| Bådehavns-gade (1192) - Sluseholmen (1193) | 50 | 18 | 30 | 74 |

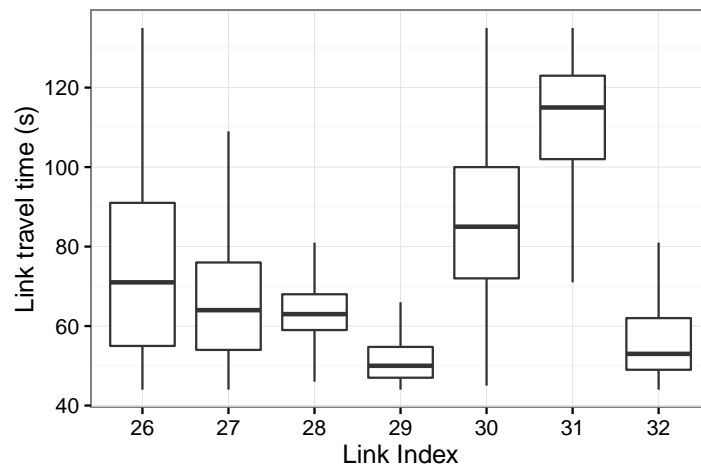


Figure 1

2.1 Outliers

Slowest 5% pr each link. Number of links in set for each journey.

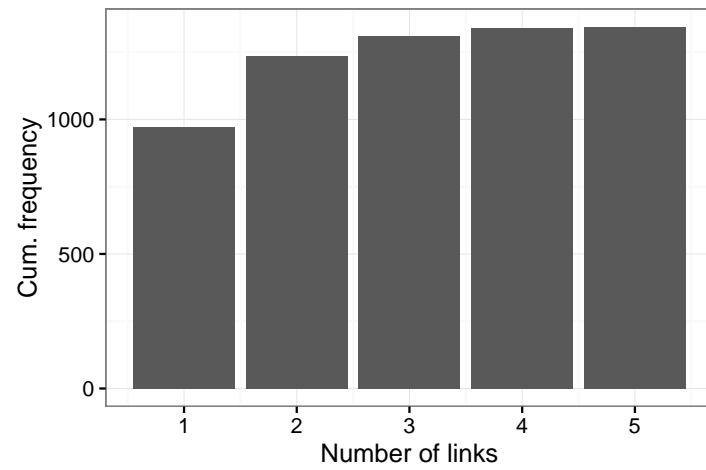


Figure 2

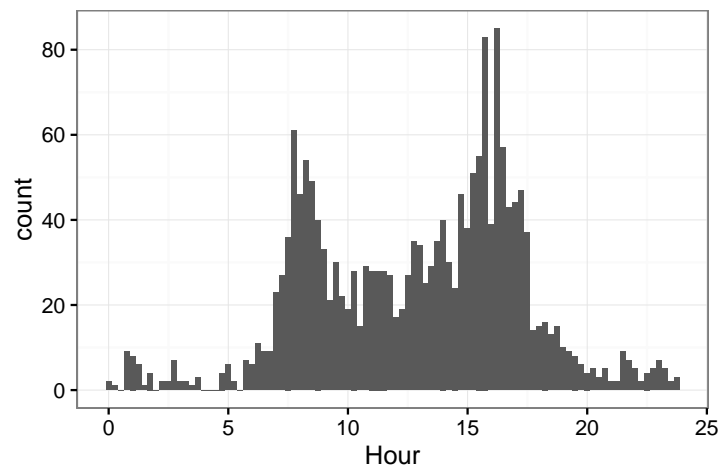


Figure 3

3 Results

3.1 General models

LR general models

| Link | MAPE (%) | MAE (s) | RMSE (s) |
|--|----------|---------|----------|
| Valby St. (10427) - Toftegårds Plads (1183) | 36.0% | 23.7 | 30.3 |
| Toftegårds Plads (1183) - Vestre Kirkegård Nord (2673) | 22.5% | 14.7 | 20.5 |
| Vestre Kirkegård Nord (2673) - Sankt Annæ Gymnasium (2675) | 11.5% | 7.8 | 11.3 |
| Sankt Annæ Gymnasium (2675) - Sjøelør St. (1188) | 13.8% | 7.7 | 13.4 |
| Sjøelør St. (1188) - Mozarts Plads (1190) | 18.4% | 15.5 | 19.5 |
| Mozarts Plads (1190) - Bådehavns-gade (1192) | 22.7% | 31.7 | 42.3 |
| Bådehavns-gade (1192) - Sluseholmen (1193) | 20.4% | 9.1 | 12.0 |
| Overall | 20.8% | 15.7 | 23.7 |

Table 1: Results using a single LR model.

SVR general models

| Link | MAPE (%) | MAE (s) | RMSE (s) |
|--|----------|---------|----------|
| Valby St. (10427) - Toftegårds Plads (1183) | 32.5% | 22.7 | 30.0 |
| Toftegårds Plads (1183) - Vestre Kirkegård Nord (2673) | 20.8% | 13.9 | 20.0 |
| Vestre Kirkegård Nord (2673) - Sankt Annæ Gymnasium (2675) | 11.5% | 7.7 | 10.8 |
| Sankt Annæ Gymnasium (2675) - Sjøelør St. (1188) | 13.8% | 7.3 | 11.6 |
| Sjøelør St. (1188) - Mozarts Plads (1190) | 18.0% | 15.3 | 19.3 |
| Mozarts Plads (1190) - Bådehavns-gade (1192) | 21.6% | 30.7 | 40.6 |
| Bådehavns-gade (1192) - Sluseholmen (1193) | 19.3% | 8.7 | 11.4 |
| Overall | 19.6% | 15.1 | 22.9 |

Table 2: Results using a single SVR model.

NN general models

| Link | MAPE (%) | MAE (s) | RMSE (s) |
|--|----------|---------|----------|
| Valby St. (10427) - Toftegårds Plads (1183) | 34.4% | 23.1 | 29.9 |
| Toftegårds Plads (1183) - Vestre Kirkegård Nord (2673) | 22.4% | 14.4 | 20.1 |
| Vestre Kirkegård Nord (2673) - Sankt Annæ Gymnasium (2675) | 10.2% | 7.1 | 10.7 |
| Sankt Annæ Gymnasium (2675) - Sjøelør St. (1188) | 9.6% | 5.5 | 11.1 |
| Sjøelør St. (1188) - Mozarts Plads (1190) | 18.2% | 15.6 | 19.6 |
| Mozarts Plads (1190) - Bådehavns-gade (1192) | 21.7% | 30.4 | 39.9 |
| Bådehavns-gade (1192) - Sluseholmen (1193) | 19.1% | 8.6 | 11.4 |
| Overall | 19.4% | 14.9 | 22.7 |

Table 3: Results using a single NN model.

3.2 Link models

LN link models

| Link | MAPE (%) | MAE (s) | RMSE (s) |
|--|----------|---------|----------|
| Valby St. (10427) - Toftegårds Plads (1183) | 35.6% | 23.6 | 30.4 |
| Toftegårds Plads (1183) - Vestre Kirkegård Nord (2673) | 21.7% | 14.1 | 19.9 |
| Vestre Kirkegård Nord (2673) - Sankt Annæ Gymnasium (2675) | 10.8% | 7.3 | 10.7 |
| Sankt Annæ Gymnasium (2675) - Sjælør St. (1188) | 10.4% | 5.8 | 10.8 |
| Sjælør St. (1188) - Mozarts Plads (1190) | 18.2% | 15.4 | 19.2 |
| Mozarts Plads (1190) - Bådehavns-gade (1192) | 22.4% | 31.3 | 41.5 |
| Bådehavns-gade (1192) - Sluseholmen (1193) | 19.3% | 8.7 | 11.5 |
| Overall | 19.7% | 15.1 | 23.1 |

Table 4: Results using multiple LR link models.

SVR link models

| Link | MAPE (%) | MAE (s) | RMSE (s) |
|--|----------|---------|----------|
| Valby St. (10427) - Toftegårds Plads (1183) | 32.7% | 23.1 | 30.6 |
| Toftegårds Plads (1183) - Vestre Kirkegård Nord (2673) | 20.2% | 13.8 | 20.1 |
| Vestre Kirkegård Nord (2673) - Sankt Annæ Gymnasium (2675) | 10.0% | 7.0 | 10.8 |
| Sankt Annæ Gymnasium (2675) - Sjælør St. (1188) | 9.6% | 5.6 | 11.5 |
| Sjælør St. (1188) - Mozarts Plads (1190) | 17.8% | 15.4 | 19.5 |
| Mozarts Plads (1190) - Bådehavns-gade (1192) | 21.5% | 30.6 | 40.3 |
| Bådehavns-gade (1192) - Sluseholmen (1193) | 17.9% | 8.3 | 11.3 |
| Overall | 18.5% | 14.7 | 23.0 |

Table 5: Results using multiple SVR link models.

NN link models

| Link | MAPE (%) | MAE (s) | RMSE (s) |
|--|----------|---------|----------|
| Valby St. (10427) - Toftegårds Plads (1183) | 33.0% | 24.2 | 33.1 |
| Toftegårds Plads (1183) - Vestre Kirkegård Nord (2673) | 21.4% | 14.3 | 20.7 |
| Vestre Kirkegård Nord (2673) - Sankt Annæ Gymnasium (2675) | 10.9% | 7.4 | 11.0 |
| Sankt Annæ Gymnasium (2675) - Sjælør St. (1188) | 10.0% | 5.6 | 11.5 |
| Sjælør St. (1188) - Mozarts Plads (1190) | 17.9% | 15.4 | 19.5 |
| Mozarts Plads (1190) - Bådehavns-gade (1192) | 22.3% | 31.4 | 42.4 |
| Bådehavns-gade (1192) - Sluseholmen (1193) | 19.5% | 8.8 | 11.9 |
| Overall | 19.3% | 15.2 | 24.1 |

Table 6: Results using a multiple NN model.

3.3 Single vs. multiple plots (SVR/NN)

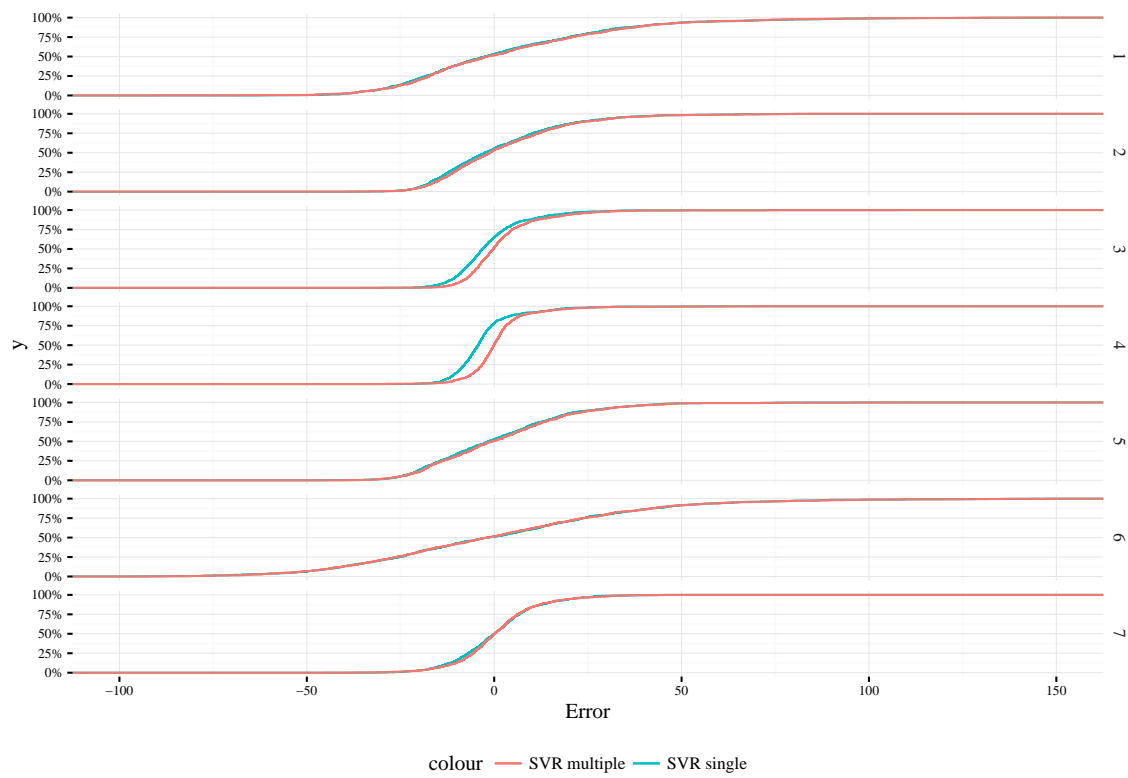


Figure 4

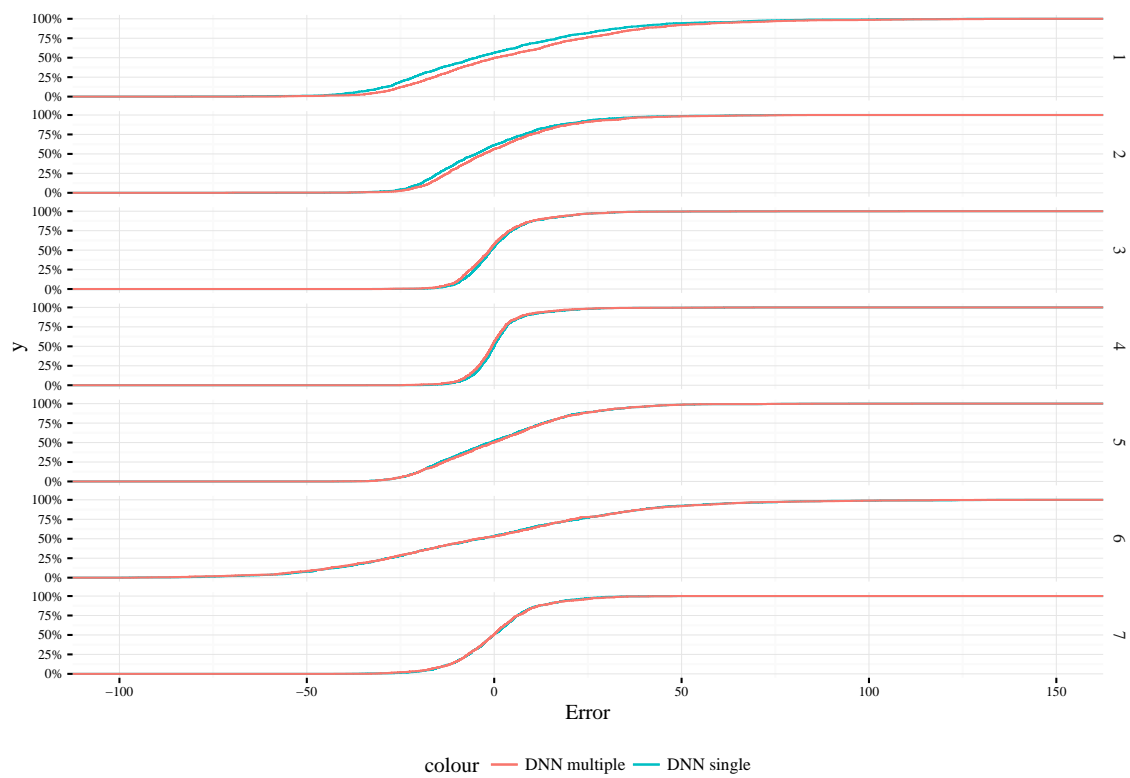


Figure 5

4 More inputs

- Peek non peek ✓
- no of Traffic lights
- parking?
- roadworks
- weather
- proximity to station, stadion etc.

Future work: - Distribution of error terms in single model vs. specialized models. -
Compare models - Demand based models -