Prediction and Scenario-based Traffic management (POST2) – Speed and Flow Day-Types in Network: does the data type matter?

David Gundlegård (LiU), Matej Cebecauer (KTH), Erik Jenelius (KTH), Clas Rydergren (LiU), Rasmus Ringdahl (LiU), Wilco Burghout (KTH), Anna Danielsson (LiU)

Trafik Stockholm, TrV STRESS
Sweco, UC Berkeley

matej.cebecauer@abe.kth.se
Outline

• Case study

• Day-types

• Speed-flow data types interchangeability
Case study

- **499** sensors at highways
- All days 2017 for clustering and training
- All days 2018 for evaluation
Day-types

Group of days with similar attributes

• Calendar-based day-types

• Data-driven day-types considering traffic observations.

Application:
– Scenario-based traffic management
– Understanding network-wide patterns
– Basis for prediction
Day-type centroids

Flow-based flow centroids

Speed-based speed centroids
Speed-flow data types interchangeability

Short-term prediction application

1. Classification of the new day to one of day-type groups
   • calendar
   • centroids and speed or flow observations

2. Prediction
   • Two models
     – simple (day-types centroids as basis for prediction)
     – and a bit less simple (day-types + exponential smoothing)

Interchangeability study

– How effective can be flow (demand) prediction, when day-type cluster is assigned to a new day by speed observations? or vice versa
Speed-flow data types interchangeability

Day-type centroids historical mean

Flow prediction

Flow classification

Speed classification

Speed prediction

Flow classification

Speed classification

Flow classification
Speed-flow data types interchangeability

Day-type centroids historical mean + exponential smoothing

Flow prediction

Speed prediction

Flow classification

Speed classification

Flow classification

Speed classification

Flow classification

Speed classification

Flow classification
Summary

• Day-type clustering improves prediction
• Flow based clustering works better, even when predicting speeds
• With more advanced prediction, clustering method matters less

References:
Cebecauer, M., D., Jenelius, E., Gundlegård, D. and Burghout, W., Revealing day-types in transport networks using traffic data clustering with external validation criteria, submitted to Transportation Research Part C: Emerging Technologies.

Cebecauer, M., D., Jenelius, E., Gundlegård, D. and Burghout, W., Similarity and interchangeability of flow and speed data for transport network day-type clustering and prediction, work in progress
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