HOW CAN HISTORY-BASED PREDICTIONS IMPROVE SERVICE QUALITY?

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Trapeze Figures

- 2,000 customers – public and private transport companies
- Active in more than 20 countries worldwide
- Over 40 years of AVLC experience
- Trapeze Switzerland GmbH, European headquarter
QUESTIONS / MOTIVATION

WHAT METHODS EXIST FOR ARRIVAL / DEPARTURE PREDICTIONS IN AN AVLC SOLUTION?

• Can history-based predictions improve service quality?

• How can history-based predictions improve service quality?
WHY CALCULATE ARRIVAL PREDICTIONS?

Real-Time Information
- Better quality of decision-making by dispatchers
- Increased traveller satisfaction through better information
  Wait-time at the stop is perceived as shorter and can be productively used

Basis for Advanced Functionality
- Door-to-door travel assistance
- More efficient transfer protection
  Incidental transfers can be detected earlier, transfers can be broken earlier

#UITP2017
Algorithm

- Basic assumption:
  A vehicle will keep its schedule deviation throughout its journey

- Optimisations:
  - If behind schedule and scheduled dwell time >1 min: catch up some delay at that stop
  - If ahead of schedule: depart on-schedule at next stop (unless marked «do not dwell»)

Properties

- Works well if schedules have been carefully optimised to expected traffic and passenger load conditions for day types and time-of-day bands

- Works well if vehicles are generally not in congestion (rural areas, bus lanes)
HISTORY-BASED PREDICTION

SELF LEARNING SYSTEM

Short term data for segments (*)

Long term statistical values (*)

Timetables, supplied times

Categorization into day types

Time roster (30 min intervals)

Prognostic Module

Prediction for a vehicle

*) Measurements based on logical location update from vehicles
TIME BANDS FOR MEASURING QUALITY

WHICH PREDICTION METHOD WINS?

- 80% corridor for predictions
- Biggest focus on last 5 minutes
• Schedule is highly adapted to street traffic and passenger load situations for different day types and time-of-day bands.
• Public transport is prioritised with respect to private transport, resulting in generally good schedule adherence.
PRED. ERROR CITY A: DAY-TO-DAY

- History-based is consistently 30 seconds better than schedule-based
  → 50% of times displayed on signs would be different (better)!
History-based is slightly better than schedule-based
Both methods meet the target performance of the London KPI
PRED. QUALITY CITY A: THU 2015-12-10

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<th>h-KPI</th>
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<td>98.8%</td>
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«poor day»

- The 80% band of schedule-based is very wide
- Only history-based meets the target performance of the London KPI
Day-to-day of prediction error when looking 9-10 min into future
80% of predictions have smaller error than indicated data point
The 80% band of schedule-based is wide, indicating that the schedule is not very well adapted to the traffic conditions (and does not need to be).
PRED. QUALITY LONDON: 2015-12-08

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- History-based just meets the target performance of the London KPI
DIFFICULT SITUATIONS

Traffic light close to stop
• Problematic with or without traffic light pre-emption

Sudden blockage
• Truck stops on street for off-loading

Short Term Construction
• Long-term history cannot be used (as well scheduled times...)

Path Dispatch
• Driver performs a path dispatch action, not using the system functionality -> no available measurements for newly driven section
SUMMARY & OUTLOOK

History based prediction outperforms the “traditional method” consistently. Arrival / departure times are more precise and improve the service quality for passengers.

London uses this logic since 2007...

...what about you?