Short term ridership prediction in public transport by processing smart card data

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Introduction
• Challenges PT: more quality and higher efficiency
• Current approach predictions: spreadsheet analyses; no network impacts; existing models too complex
• Availability smart card data enables new approach
• Combination of demand modeling software and simple elasticity calculations

Step 1: Importing network and timetable into modeling software

Step 2: Importing current OD-pairs from actual smartcard data

Step 3: Calculating new generalized costs per OD; assessing future demand per OD using elasticity method

\[ C_{ij} = \alpha_1 T_{ij} + \alpha_2 W T_{ij} + \alpha_3 N T_{ij} + \alpha_4 F_{ij} \]

With:
- \( C_{ij} \): Generalized costs on OD pair \( i,j \)
- \( \alpha_1, \alpha_2, \alpha_3, \alpha_4 \): Weight coefficients in generalized costs calculation
- \( T_{ij} \): In-vehicle travel time on OD pair \( i,j \)
- \( W T_{ij} \): Waiting time on OD pair \( i,j \)
- \( N T_{ij} \): Number of transfers on OD pair \( i,j \)
- \( F_{ij} \): Fare to be paid by the traveler on OD pair \( i,j \)

Step 4: Results: expected ridership and link loads

Conclusions
• Case: Valid approach for complete bus and tram network; calculation time about 15 min.
• Valuable insights into network impacts
• Further research: Update of elasticity values by RP research (smart card data)