Automatic fitting procedure for the Fundamental Diagram

Victor L. Knoop and Winnie Daamen
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Fitting fundamental diagrams

- Finding capacity
- Capacity drop
- Scatter
- Errornous data
- Time mean speeds

- Risks:
  - far off
Fitting fundamental diagrams

- Automatic fitting procedure for the FD

- Fitting fundamental diagrams

- Chart showing data for 2 lanes and 3 lanes.

- Chart showing fit for 2 lanes.

- Chart showing fit for 2 lanes with data points.

- Chart showing fit for 2 lanes with density on the x-axis and flow on the y-axis.

- Chart showing fit for 2 lanes with density on the x-axis and flow on the y-axis.
Proposed solution

Automatic fitting procedure for the FD
Triangular fit

- Weights in the fit
How to test this procedure?

• Simulation to test quality
• Real data to test robustness
• Fit Wu's fundamental diagram (decreasing free flow speed)
  - different from simulation
  - capacity drop

![Graph showing the relationship between flow and density.](image)
Simulation

• Single vehicle class
• No driver heterogeneity
• Two lane, on-ramp
• Loops: time mean speed
• Loops: harmonically averaged speed
• Edie defs on parallelogram
• Moving bottlenecks: create jams with vehicle speed>0
Effect of data collection method

• Data collection method matters, especially in congestion
Results fitting

• Separation based on triangular FD works
• All parameters free gives bad estimates
• Best: fix the wave speed
  – That is known, so easy to do!
• Fixing free flow speed:
  fits OK, and more robust for real life data
Conclusions

• Robust method to fit fundamental diagram
• Separate free flow branch and congestion by triangular fit
• Consider effects of measuring
Acknowledgement

NWO “there is plenty of room in the other lane”