Automatic fitting procedure for the Fundamental Diagram

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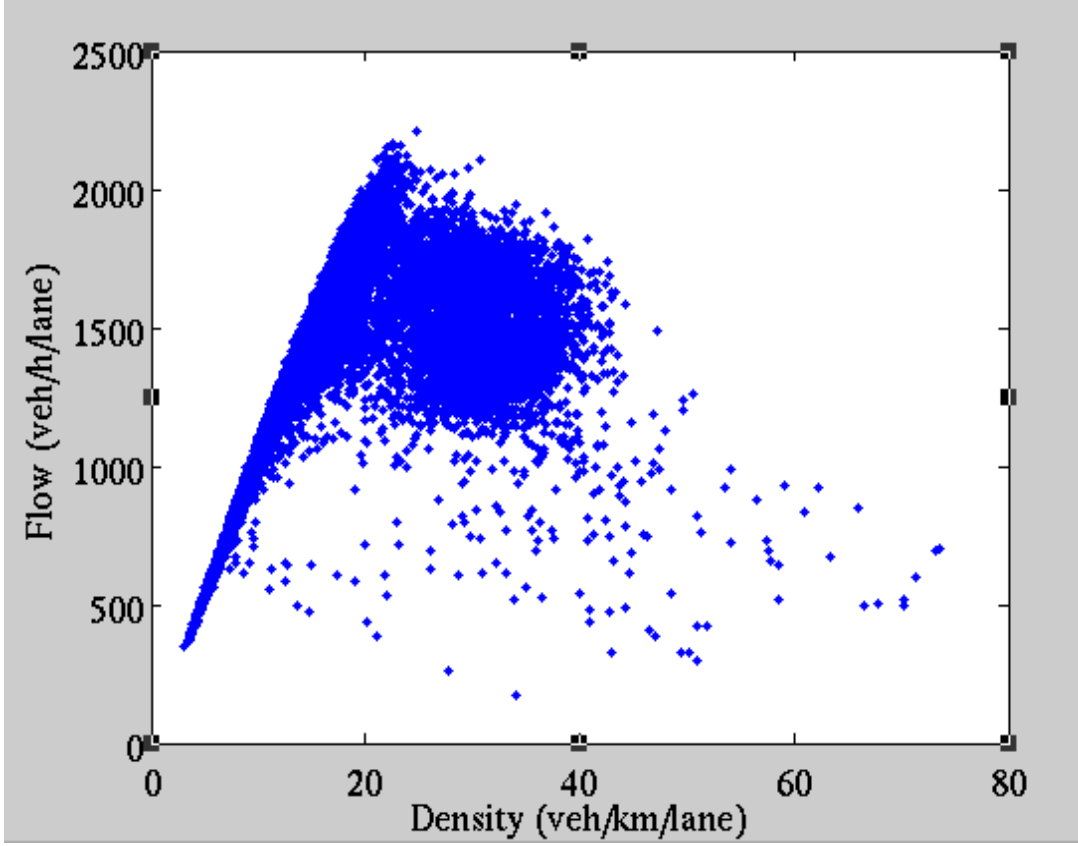
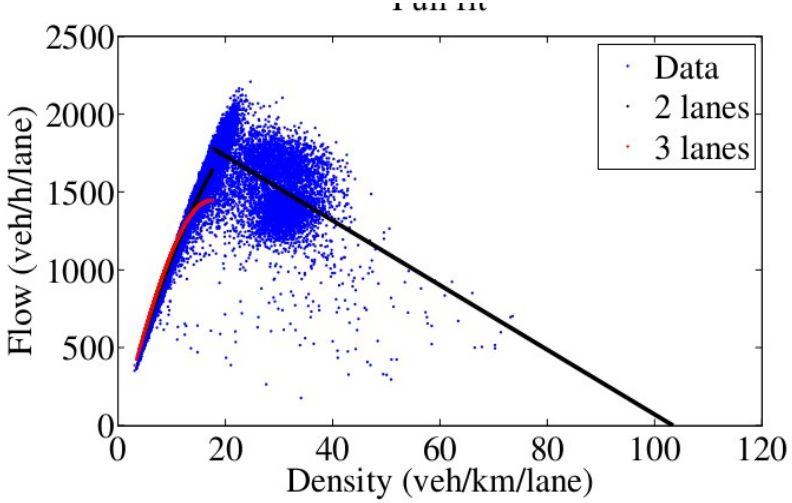
Fitting fundamental diagrams

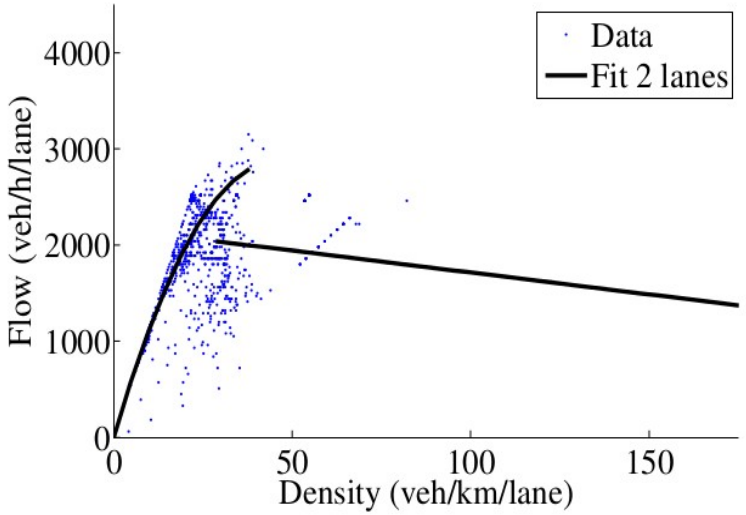
- Finding capacity
- Capacity drop
- Scatter
- Errornous data
- Time mean speeds

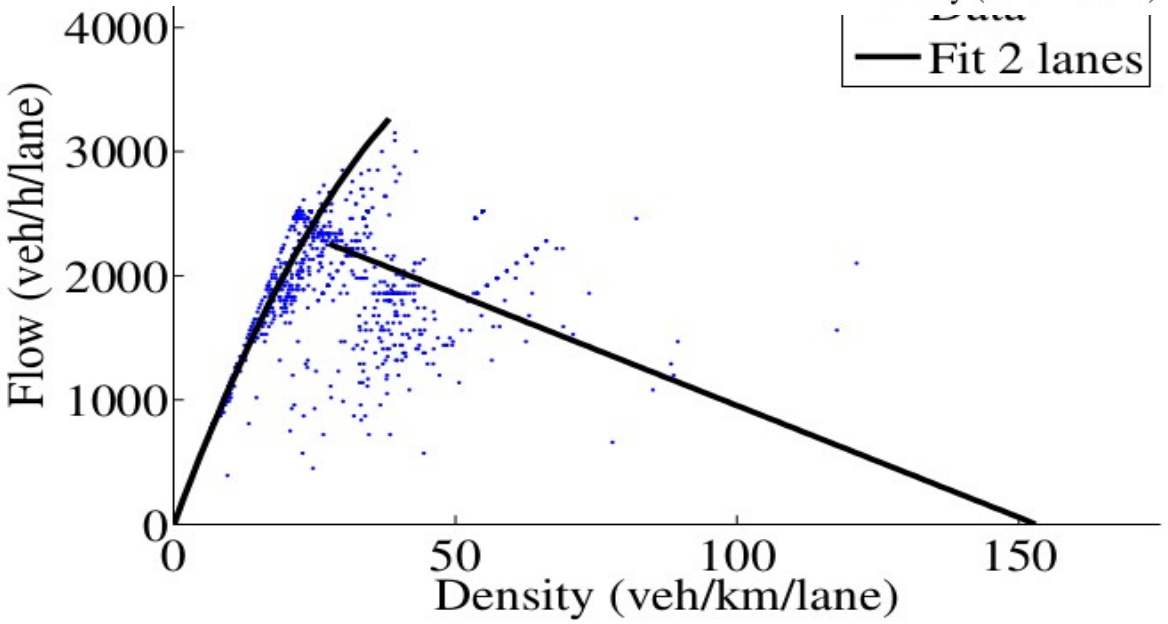
- Risks:
  - far off



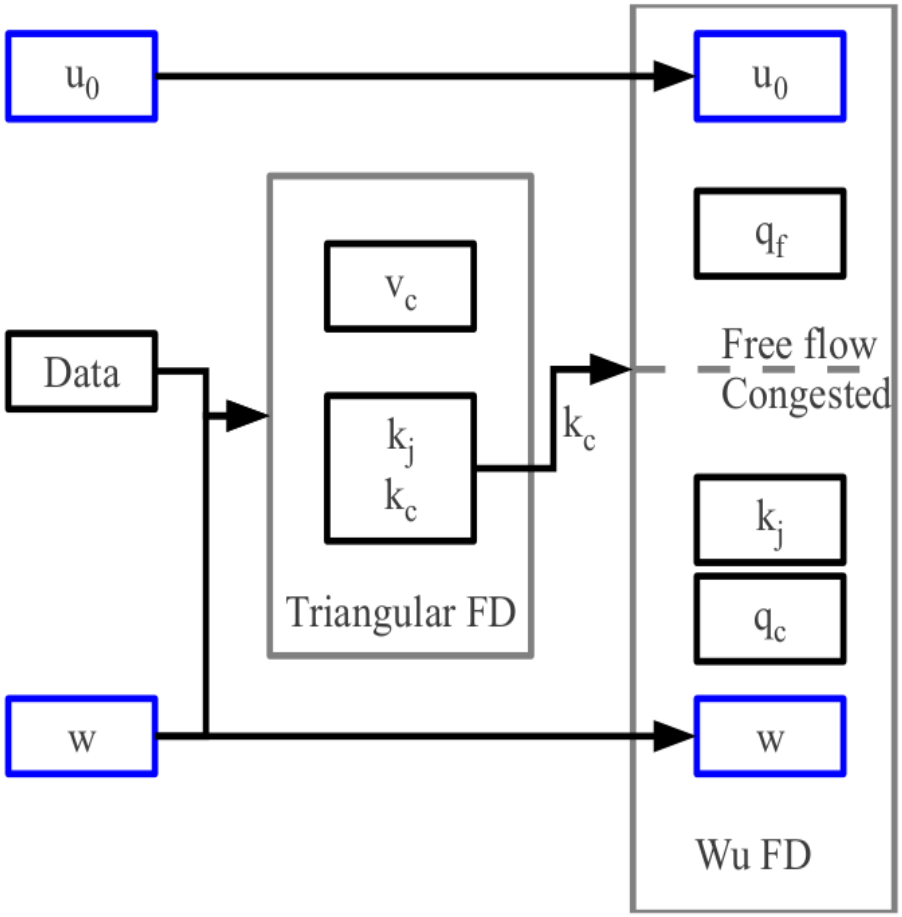
Fitting fundamental diagrams





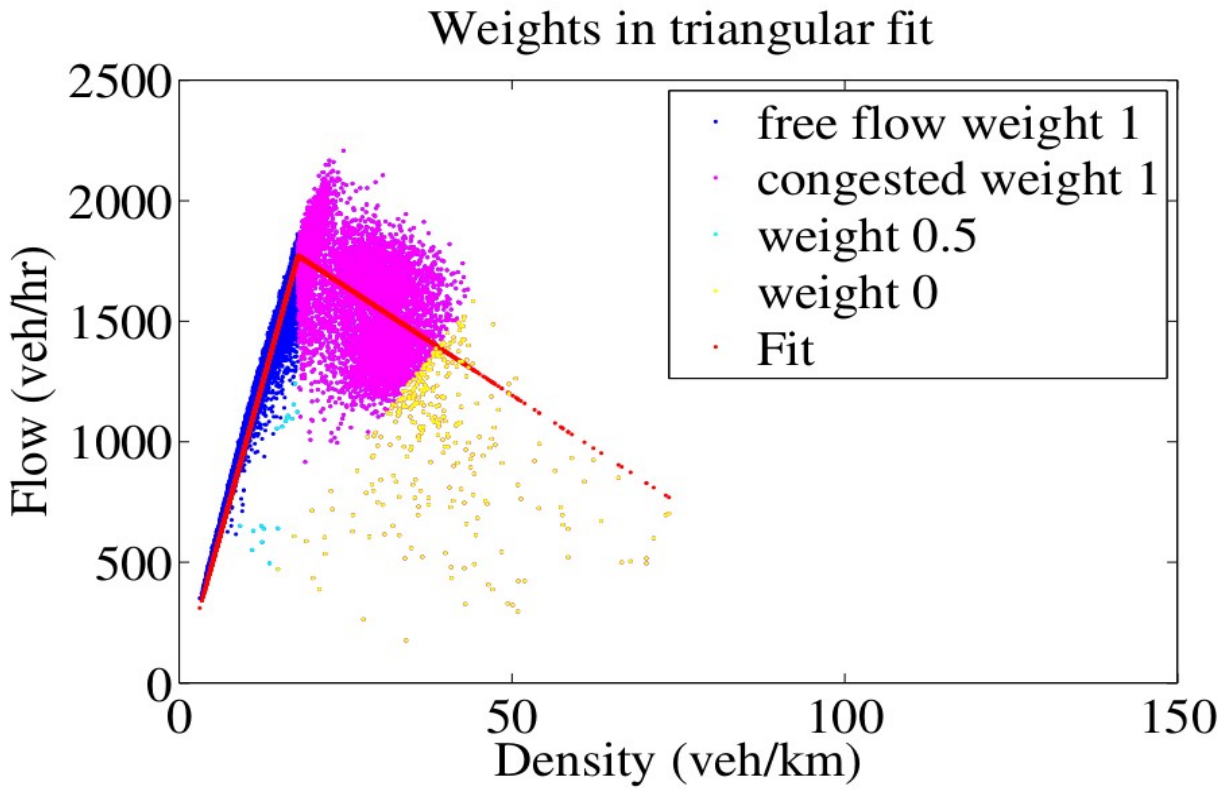


Proposed solution



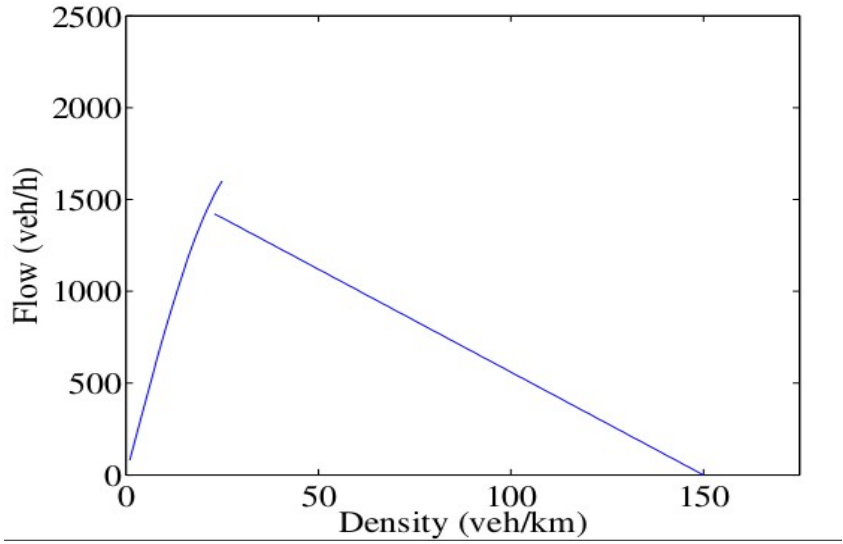
Triangular fit

- Weights in the fit

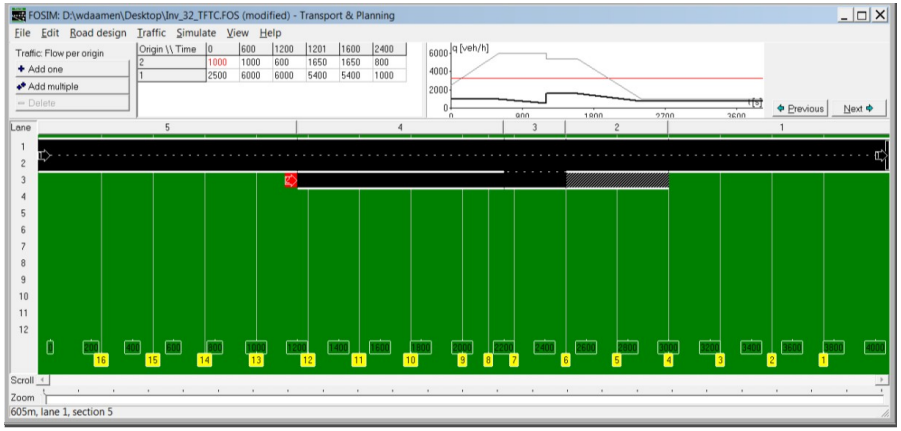


How to test this procedure?

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

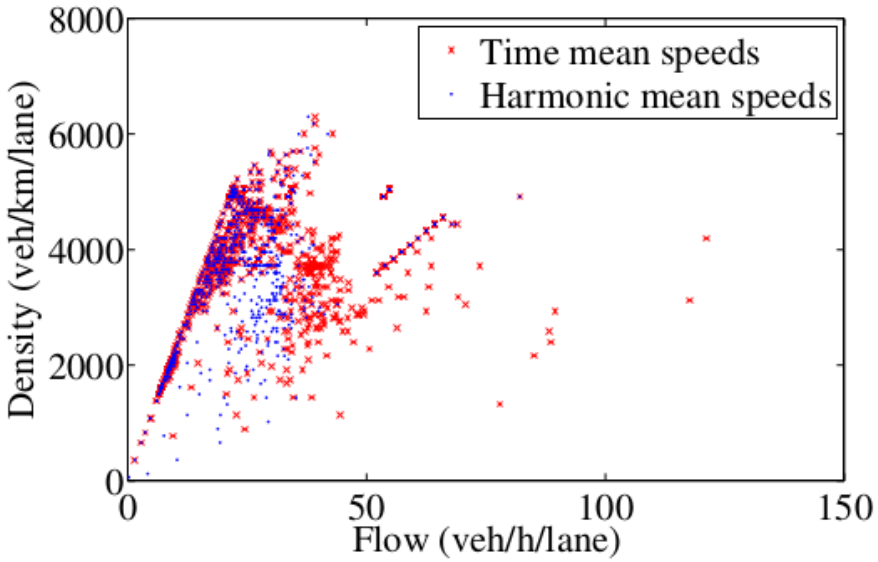


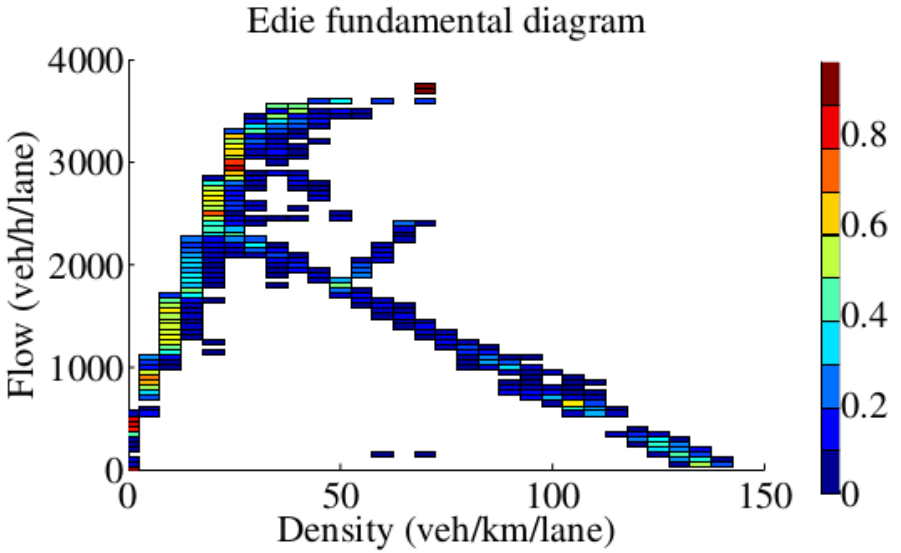
Simulation



- 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

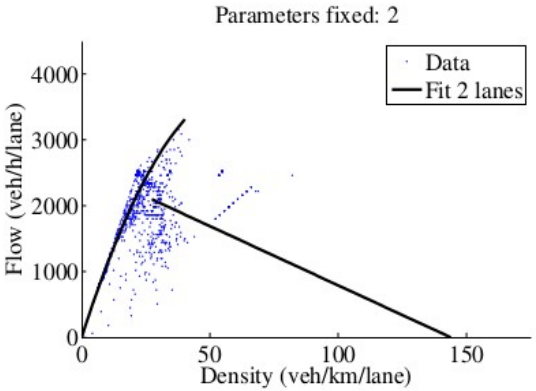


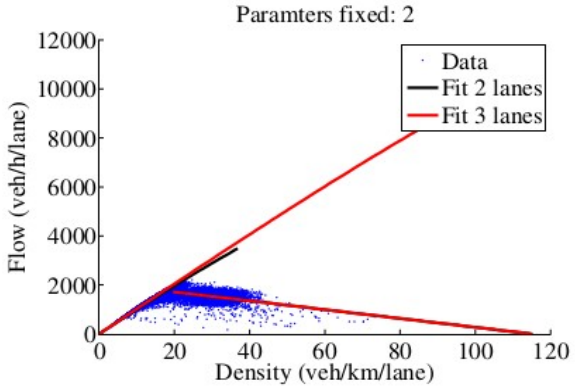


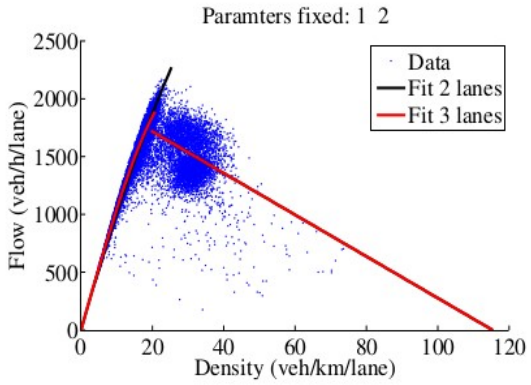
- Data collection method matters, especially in congestion

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”