Region-wide Microsimulation-based DTA
Results and Findings at the NFTPO

presented by
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• Dynamic Traffic Assignments are helpful for analyzing capacity improvements, and essential for analyzing pricing and ITS strategies
• Appropriate congested travel times are crucial for planning model estimation
• Operational fidelity necessary for traffic engineering studies
• Many projects and traffic management measures have impacts that require lane-level behavioral resolution for proper evaluation
Effective deployment hinges on usability, robustness, and manageable run times

DTA potentially lends itself better to visualization and animation

A more compelling tool for engaging stakeholders and the public at large
• Dynamic shortest paths based upon departure times
• Potentially more realistic route choice and driver behavior
• Queue build-up and dissipation
• Short time intervals for travel time measurement
• Dynamic User Equilibrium condition - a temporal extension of Wardrop’s principle
• Iterative computation required to achieve convergence
Approach: Microscopic DTA

- Microscopic in level of detail
  - Referenced to ground truth with accurate geometry
  - Lane level and intersection area representation
  - Temporal dynamics (as low as 0.1-sec)

- Microscopic in modeling accuracy
  - Microscopic (car following, lane changing)
  - Employs realistic route choice models
  - Handles complex network infrastructure (signals, variable message signs, sensors, etc.)
  - Simulates multiple modes, user classes, vehicle types
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Implementation: North Florida TPO

Region-wide, Six-county coverage
Implementation: North Florida TPO

Parcel-level activity location
Implementation: North Florida TPO

Major and local streets and centroid connectors
Implementation: North Florida TPO

Intersection geometry and signal timings
Implementation: Framework

• Parcel-level origins and destinations
  – 492,684 parcels
  – Point-to-point route choice
  – Trips produced by DAYSIM
• Zonal truck and external traffic
  – 2,578 TAZs
  – Zone-to-zone route choice
  – Initial Matrices produced by Cube
• Integration/Linkage
  – DAYSIM
  – Cube
Implementation: Challenges
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Implementation: Features

• Read DAYSIM trips without temporal aggregation
• Handle parcel locations without spatial aggregation
• Use dense street network
  - Realistic accessibility, connectivity
• Simulate multiple travel modes
• Possess practical running times
Implementation: Input

- Demand: Disaggregate trip tables
  - Detailed demographic and trip information
  - Approximately 650K trips in 3-hour AM peak [6:00-9:00]
• DTA running time per iteration
  – Approx. 50 minutes overall
  – 3.1 GHz Intel Xeon Dual-Core 64-Bit CPU, 64 GB RAM
## Implementation: Calibration

### Link Flows vs. Counts: Percent RMSE by time period and facility type

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<th>Road Class</th>
<th>N</th>
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<th>w/i Preferable Error</th>
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Link Flows vs. Counts: Scattergram for AM Period
Implementation: Calibration

Departure Times: DAYSIM vs. Count Data

AM Departure Time Distribution: DAYSIM vs. Traffic Counts

- Daysim %
- Traffic Count %
Conclusion

• DTA approach is necessary for analyzing projects with lane level concerns
• DTA is a feasible approach for regional applications
• There is a reasonable interface with both ABM and trip-based approaches
• Significant calibration effort is necessary to replicate link-level queue lengths, and travel times, and link flows, however it is not insurmountable
• Ideally, signal timing and other operational data to replicate complex dynamics
Thank you for your time

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