Dynamic Traffic Assignment

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Modeling Tools for Today & Tomorrow

Choosing the Right Tool

How Dynamic Traffic Assignment (DTA) Works

Applications of DTA
Choosing the Right Tool
Multi-Scaled Modeling Simulation

Macroscopic Analysis
- Regional scale
- Static traffic assignment
- TransCAD

Mesoscopic Analysis
- Subarea scale
- Dynamic Traffic Assignment
- VISTA

Microscopic Analysis
- Local/Corridor scale
- Traffic Simulation
- SYNCRO
- CORSIM
<table>
<thead>
<tr>
<th></th>
<th>Macroscopic Model</th>
<th>Mesocopic (DTA) Model</th>
<th>Microsimulation Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional traffic assignment run</td>
<td>Minutes</td>
<td>Days</td>
<td>N/A</td>
</tr>
<tr>
<td>Data needs</td>
<td>Lowest</td>
<td>Medium</td>
<td>Highest</td>
</tr>
<tr>
<td>Equilibration</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Vehicle trajectories</td>
<td>Approximated from link flows</td>
<td>Output from model</td>
<td>Input to model</td>
</tr>
<tr>
<td>Intersections</td>
<td>Approximated with delay functions</td>
<td>Modeled</td>
<td>Modeled</td>
</tr>
<tr>
<td>Volume-to-Capacity</td>
<td>&gt;1 possible</td>
<td>&lt;=1</td>
<td>N/A</td>
</tr>
<tr>
<td>Queues and Shockwaves</td>
<td>No</td>
<td>Yes, on each roadway segment</td>
<td>Yes, lane-by-lane</td>
</tr>
<tr>
<td>Time Step</td>
<td>24 hour or peak period</td>
<td>6-second simulation intervals</td>
<td>1-second simulation interval</td>
</tr>
<tr>
<td>Transit</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>ITS (e.g., ramp metering, VMS)</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
How DTA Works

Demand in each 15 minute time period

Network Controls

Update path set to include shortest paths for each departure time interval and each origin-destination pair

Update assignment of vehicles to paths

Simulate vehicle movements to update travel times and other performance measures

Convergence achieved?

Retrieve performance measures

Yes

No
Applications of DTA

- Adding or Changing Roadways
- Increasing Local Demand
- Investigating Travel Demand
- Analyzing Transit Operations
- Intelligent Transportation Systems
Current conditions

Average time = 11.65 min
Average distance = 3.78 miles

2-way 7th St. and 8th St.

Average time = 9.27 min
Average distance = 3.48 miles
### AVERAGE RESULTS

<table>
<thead>
<tr>
<th>Location</th>
<th>Current Network</th>
<th>2-way 7&lt;sup&gt;th&lt;/sup&gt; and 8&lt;sup&gt;th&lt;/sup&gt; St.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7&lt;sup&gt;th&lt;/sup&gt; St. EB, Guadalupe to IH-35 frontage</td>
<td>4 lanes Travel Time = 238 sec (3.97 min)</td>
<td>2 lanes Travel Time = 288 sec (4.80 min)</td>
</tr>
</tbody>
</table>

### DYNAMIC RESULTS

![Travel Time Graph](attachment:image.png)

- **7th St. EB – One Way**
- **7th St. EB – Two Ways**

- **Travel Time** [minutes]
  - 07:00:00 AM: 3
  - 07:30:00 AM: 4.5
  - 08:00:00 AM: 5
  - 08:30:00 AM: 4.5
  - 09:00:00 AM: 4
Williamson County
Rundberg Lane

- Extend Rundberg Lane to Ferguson Lane
- What size roundabout is needed at the intersection to accommodate demand?
Route 1 SB Calibration

Graph showing the comparison between Scheduled Run Time, Measured Run Time, and Simulated Run Time. The x-axis represents the GPS-Measured and Simulated Run Time (hr), while the y-axis represents the Scheduled Run Time (min). The graph includes data points marked with numbers from 1 to 13.
Critical Link Analysis made possible from Vehicle Path Analysis

Traffic flow that uses a southbound MO-Pac link

• Can easily evaluate market using a road/toll
Variable Message Signs

VMS

Construction
Questions

http://www.utexas.edu/centers/nmc/