Utilizing GPS Data to Determine Truck Parking Needs

FMRI Webinar Series

Presenters
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09/09/2020
Presentation Objectives

• Discuss advantages, limitations, & complexity of GPS data in truck transport applications

• Data analytics and mining tools to assist decision makers & inform the public
Study objectives

• TDOT and FMRI (USDOT) funded study

• Identity existing parking areas with over-utilization (candidates for expansion)

• Identify locations for new truck parking facilities

• Survey trucking industry to identify specific issues in TN
Data

i. Truck GPS data first aggregated and anonymized (ATRI)

<table>
<thead>
<tr>
<th>Month</th>
<th># of ping (in millions)</th>
<th># of unique trucks</th>
<th>% of unique trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>~123.6</td>
<td>~152K</td>
<td>~0.12%</td>
</tr>
<tr>
<td>May</td>
<td>~124.6</td>
<td>~146K</td>
<td>~0.12%</td>
</tr>
<tr>
<td>July</td>
<td>~133.5</td>
<td>~145K</td>
<td>~0.11%</td>
</tr>
<tr>
<td>October</td>
<td>~113.7</td>
<td>~136K</td>
<td>~0.12%</td>
</tr>
<tr>
<td>October No Speed Limit</td>
<td>~171.4</td>
<td>~140K</td>
<td>~0.08%</td>
</tr>
</tbody>
</table>

ii. ETRIMS network with AADT

iii. Traffic Counts (hourly volumes)

iv. Public and Private rest area polygons & amenities

v. Software used: PostgreSQL, Matlab, PowerBi, ArcGIS Desktop & Online
Expansion Factors

1. Select any link within a 1-mile radius of a parking location

2. Estimate based GPS truck flows (hourly and daily)

3. Estimate count-based truck flows

4. Fit best probability distribution (in our case it was log-normal)

5. Mean: 2.104, STD: 0.924
Analytics/Mining Tools

- Utilization/Violations
- Increase Capacity
- New Locations

Utilization/Violations

Capacity Increase/New Facilities
Limitations

• Expansion factors

• Truck parking duration & GPS signal
  • Short trips with multiple visits to the same truck stop
  • Parking duration unit (e.g., 1 min VS 15 min VS 1 hour)
Future research

• Improve expansion factors (more GPS data)

• Develop data mining model for capacity expansion/new locations that include:
  • Accidents (involving trucks or during presence of illegal parking)
  • Freight facility locations
  • Commodity flows (disaggregate at zip code level-ongoing project)
  • Trip type (long haul, short haul, drayage etc.)
Thank you

Q/A

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