Use of Truck GPS Data for Freight Forecasting

Innovations in Travel Modeling

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Presentation Overview

Purpose

To improve truck trip generation rates with GPS data and disaggregate employment data

Overview

1. GPS Data
2. Grocery Store Trip Generation
3. On-going efforts
GPS Truck Data

Source

Washington State Department of Transportation (WSDOT) and University of Washington (UW)

Performance measures program

Description

2,500 trucks per day

Starts, stops, 15 minute reads when moving

> 3,000,000 records per month
Geo-Coding

Trucks travel everywhere!

Automation of GPS read coding to road network

Coding based on proximity to roadway and heading

60% match
Defining Origins and Destinations

Intentional stops need to be separated from traffic-related stops

Used 3-minute dwell time to differentiate

Which stops are of interest? i.e. parking location vs actual destination
Examined data from Fall 2008

One month of data results:

• 3,000,000 reads
• 358,000 trips
• 16 mile average trip distance
• 21 minute average travel time
• 34 miles per hour average speed
Considered “Large” grocers
  • ~50-100K SF
  • Independents and chains

Did not include
  • Big-Box
  • Convenience stores
Grocery Truck Statistics

Over 91 days:

- 2,400 trucks (26 trucks per day)
- 22,000 tours (242 tours per day)
- 215,000 trips (2362 trips per day)
- 9 tours per truck
- 0.1 tours per truck per day
- 10 trips per tour
- 2 trips to major grocer
## Grocery Truck Trips by Area Type

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Average Truck Trips per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metropolitan Cities</td>
<td>12.4</td>
</tr>
<tr>
<td>Core Cities</td>
<td>12.1</td>
</tr>
<tr>
<td>Larger Cities</td>
<td>8.4</td>
</tr>
<tr>
<td>Smaller Cities</td>
<td>6.6</td>
</tr>
<tr>
<td>Unincorporated Urban Areas</td>
<td>7.3</td>
</tr>
<tr>
<td>Rural</td>
<td>3.9</td>
</tr>
</tbody>
</table>
Grocery Truck Validation

GPS dataset is subset of all trucks

McCormack et al (2010) grocery trip generation study

- Favorable comparison to interview information (10 to 12 daily trucks)
- But half of observed manual counts (18 trucks per day)
Transferability to Other Sectors

Manual traffic counts for each sector is cost prohibitive

Need weighting factor so GPS truck data can represent all truck trips

Potential approaches:

• Traffic counts (cordon, zone, or link)
• Total truck population
Potential Outcomes

Data Products

Truck trips and tours disaggregated by employment sectors, land use types, and times of day

Average trip and tour lengths

Speed data and route choice

Uses

Calibration

• Aggregate distribution models
• Aggregate trip generation models

Air Quality studies/modeling

Potential for commodity flow model
Prospects and Limitations

Improving quality of GPS data
National availability

But,

It’s not cheap
May not have desired granularity
Research in nascent stage
Thank You

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