Using GIS to Analyze ITS Traffic Count Data

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Data are collected automatically by sensors compared to traditional traffic count collection.

- Data are available everyday.
- Data are collected at high frequency, such as 5-minute interval.
- Data includes multiple items such as speed, volume, and occupancy.
Why Analyze ITS Traffic Count Data

- Analyze traffic flow patterns (AM and PM peaks).
- Identify traffic incidents.
- Figure out how other factors (e.g. weather) affect traffic flow.
Traffic Count Data Preprocessing

- Categorize data by traffic direction
- Group data between interchanges
Traffic Count Data Locations

East-Bound Traffic and 7 Groups
Traffic Count Data Characteristics

Data overlap at each location

Every data point at each location has different stamp
Traffic Count Data Structure

- Data Frequency: 5-minute interval
- Data Item
  - FWY_SPD: Speed
  - FWY_VOL: Volume
  - FWY_OCC: Occupancy
  - SPD_CV: Coefficient of variation for speed
  - VOL_RATIO: Ratio of max volume lane to min volume lane
<table>
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<tr>
<th>DATE</th>
<th>TIME</th>
<th>STATION_ID</th>
<th>FWY_SPD</th>
<th>FWY_VOL</th>
<th>FWY_OCC</th>
<th>SPD_CV</th>
<th>VOL_RATIO</th>
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</table>
Traffic Count Data Processing

Generate Spatial Weight Matrix

Do Hot Spot Analysis

Summarize Analysis Results
Traffic Count Data Processing Model
Generate Spatial Weight Matrix

- Time Interval: 60, 90, 120, 150, 180, 210 minutes
- Critical Distance: Determined by tool
Do Hot Spot Analysis

* Analysis is based on each Spatial Weight Matrix generated
Count the number of hour in the following cold or hot spots.

- Speed: Cold Spot
- Volume: Hot Spot
- Speed Variance: Hot Spot
- Volume Ratio: Cold Hot
Summarize Analysis Results (Cont’d)
High z-score and small p-value: Spatial clustering of high values.

Low negative z-score and small p-value: Spatial clustering of low values.

Z-score >196 (95% confidence level), clustering of high values
Summarize Analysis Results (Cont’d)

- Hour count based on 95% confidence level
Summarize Analysis Results (Cont’d)
Compare Results

Analysis Locations
Compare Results (Cont’d)

Speed, Volume, Speed Variance, Volume Ratio
Frequency Chart at Different time Interval
Compare Results (Cont’d)

Locations

Location 1

Location 2

Location 3
Compare Results (Cont’d)

Speed, Volume, Speed Variance, Volume Ratio Time of Day Chart @ Location 1
Compare Results (Cont’d)

Speed, Volume, Speed Variance, Volume Ratio Time of Day Chart @ Location 2
Compare Results (Cont’d)

Speed, Volume, Speed Variance, Volume Ratio Time of Day Chart @ Location 3
**Conclusion**

- Volume is a good indicator to identify peak hour traffic.
- **120-minute** is the recommended time interval to do the analysis.

![Table of Frequency and Time Count]

**High Frequency**

- [24, 6]
- [36, 7]
- [16, 9]
- [23, 10]
- [33, 11]
- [24, 12]
- [24, 13]
- [36, 14]
- [36, 15]
- [36, 16]
- [36, 17]
- [30, 18]
- [5, 19]