

# Complementary traffic pattern analysis method using a FCD-based traffic information in online map

Presented by : Sanghoon Ji, Kyunghee University

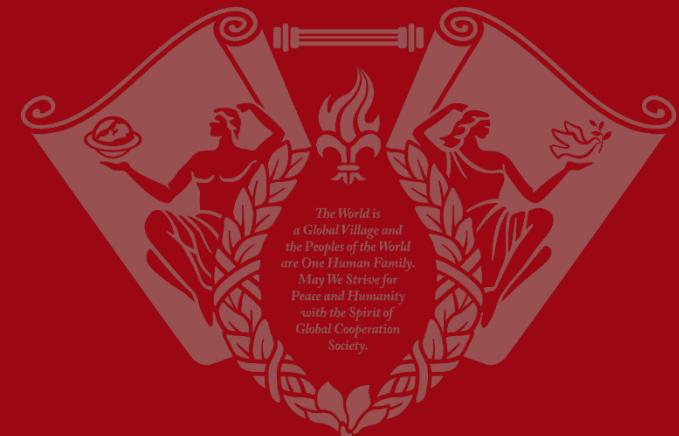
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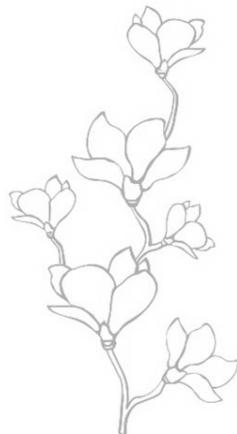
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# Contents



1. Introduction
2. Research Topic : Google Maps traffic estimation method
3. Research Design
  - Limitations of sensor-based data collection method
  - Spatio-temporal data modeling of Google Traffic Information
4. Comparison Analysis with sensor-based traffic data
  - Traffic Volume Data
  - Vehicle Speed Data
5. Study on the supplementary methods for traffic pattern analysis
  - Expansion of monitoring road range
  - Detailed congestion pattern analysis of road sections
6. Conclusion

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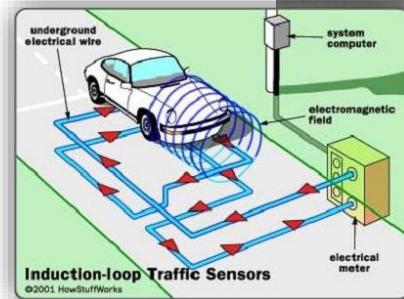
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# What traffic data are we using?

- ✓ Sensor-based data collection for traffic research



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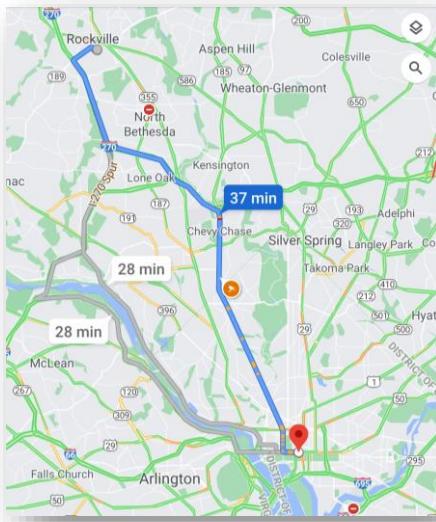
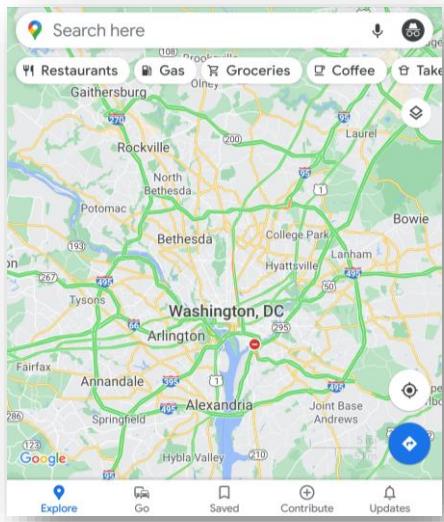
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# What traffic data are we using?



Real-time Traffic information from Google Map



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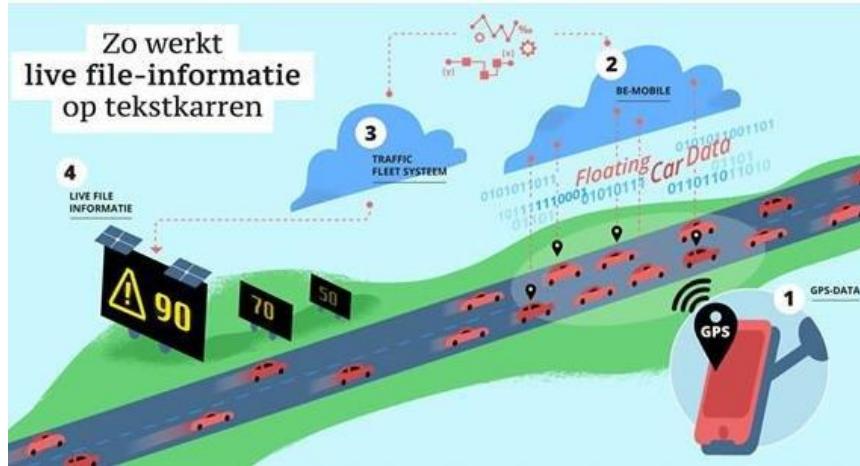
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## What is Floating Car Data ?

- ✓ Estimating traffic condition from crowd location data
  - Also called Crowdsourced traffic data



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## Step 1. Comparison Analysis with conventional sensor-based traffic data

- ✓ How accurate Google Traffic information?
- ✓ What kind of sensor for traffic data collection?
  - Traffic Volume Monitoring Sensor
  - Vehicle Speed Monitoring Sensor

## Step 2. Study on supplement methods for traffic pattern analysis

- ✓ What are limitations of sensor-based traffic data collection?
  - Sensors are only located in interstate highways
    - Unable to monitor another local roads
  - Sensors are located sparsely along the highway
    - Unable to analyze detailed traffic pattern of road sections between sensors
- ✓ Visualize the distribution of road sections for each traffic pattern
- ✓ Analyze road sections of county local roads that have not been monitored so far

## Spatio-temporal data modeling of Google Traffic Information

### ✓ Data collection

- Snapping Google Maps image
- From January 31<sup>st</sup> to March 25<sup>th</sup>, 2021 (41 Days)
- Collected every 10 minutes

< URL used for map image collection >

`www.google.com/maps/@39.1269755,-77.1876252,12z/data=!5m1!1e1\`

Latitude

Longitude

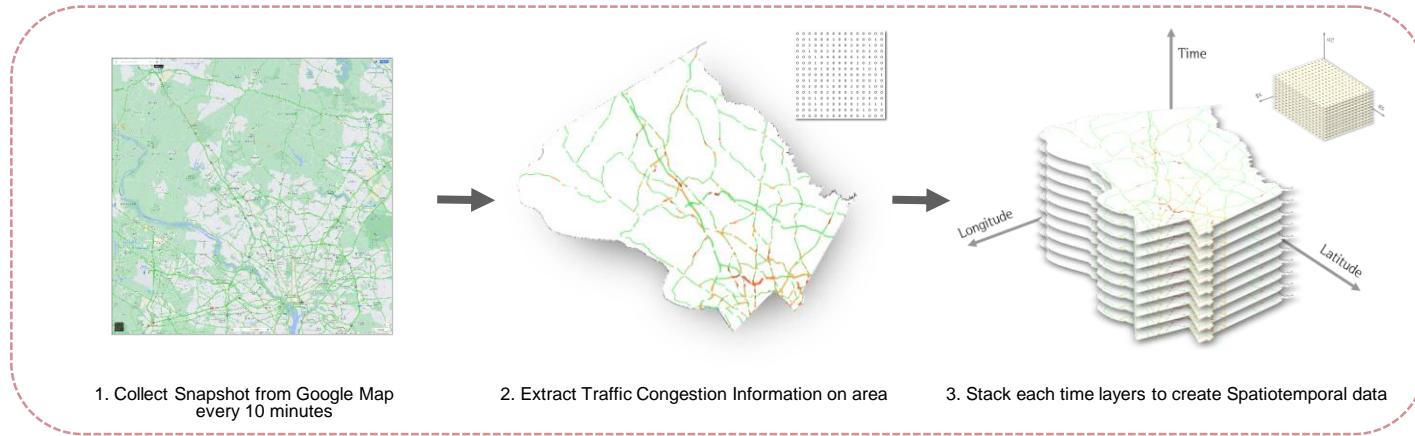
Scale

Traffic Layer

## Spatio-temporal data modeling of Google Traffic Information

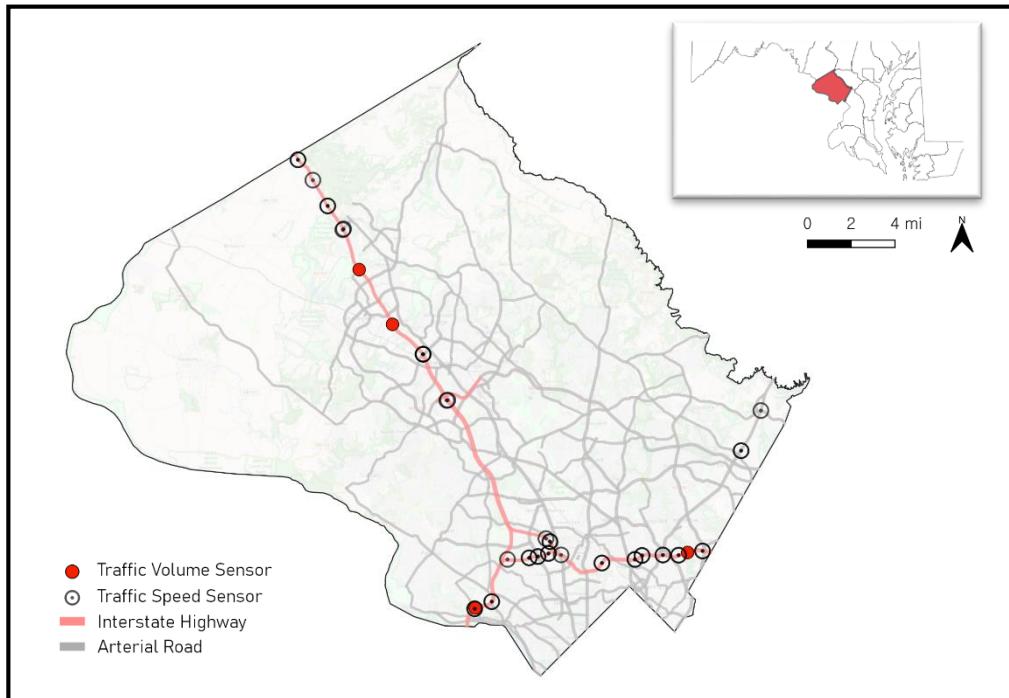
### ✓ Data modeling

- Processed with Python libraries – Numpy, OpenCV, Geopandas ...
- Stacked up into 3-dimentional spatio-temporal data
  - Numpy's multi-dimensional array structure
  - X axis : Longitude / Y axis : Latitude / Z axis : Time
- Replace each congestion indicate color into Congestion Index
  - Orange : 1 / Red : 2 / Dark Red : 4

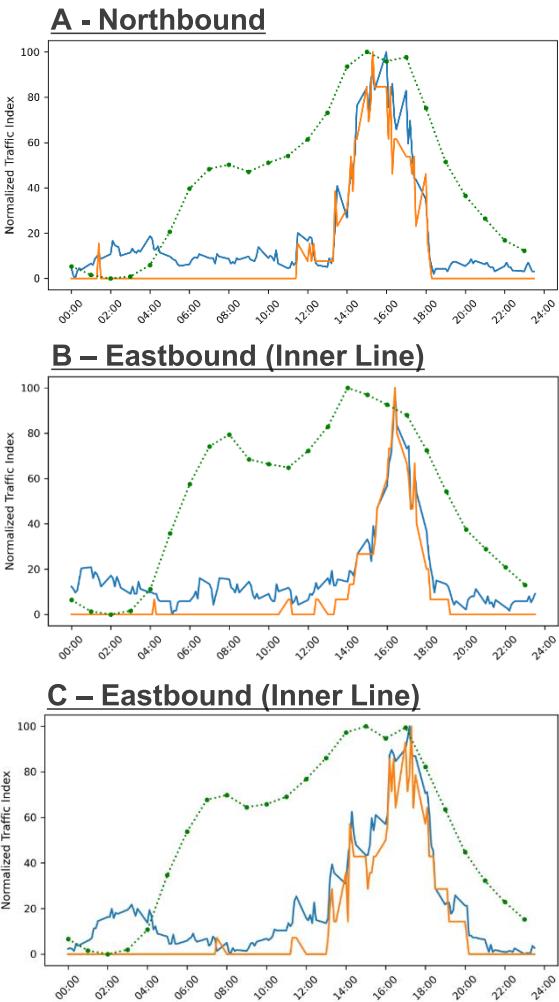
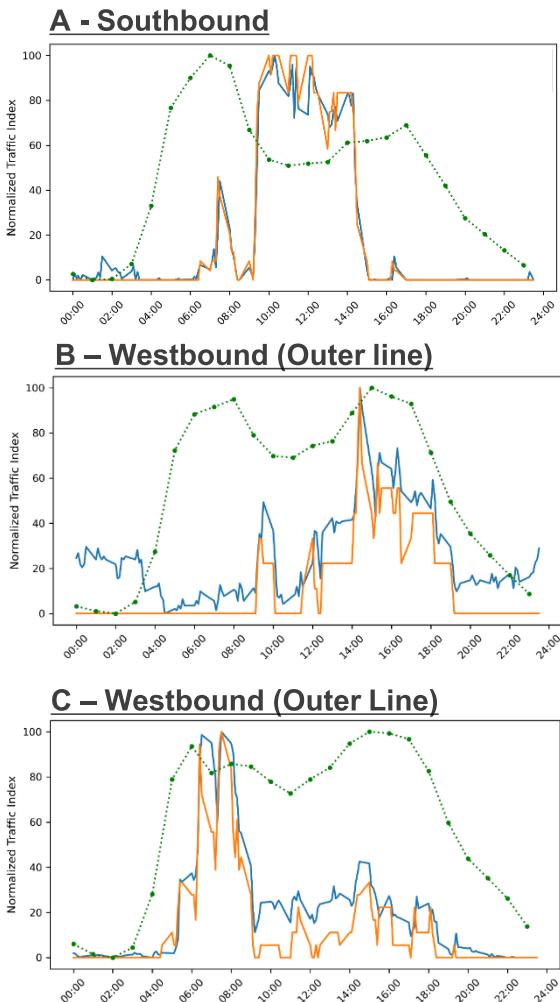
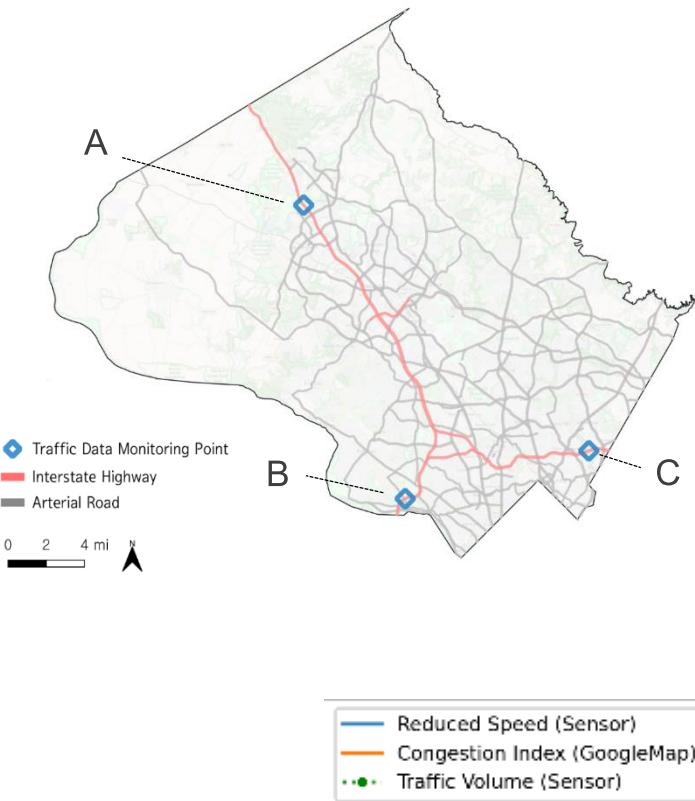


## (1) Data Comparison

- ✓ Traffic Volume Sensor / Vehicle Speed Sensor / Google Traffic Information
- ✓ Verifying correlation and accuracy of Google Traffic Information
- ✓ From March 15<sup>th</sup> to March 17<sup>th</sup>, 2021 (3 days)

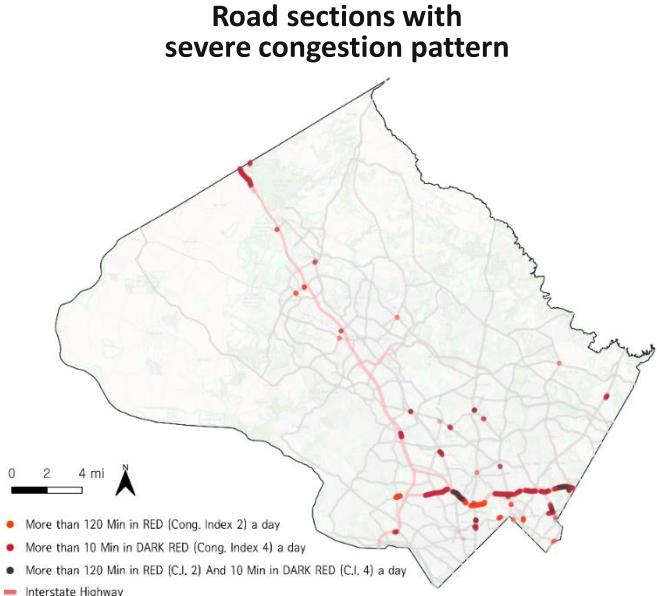
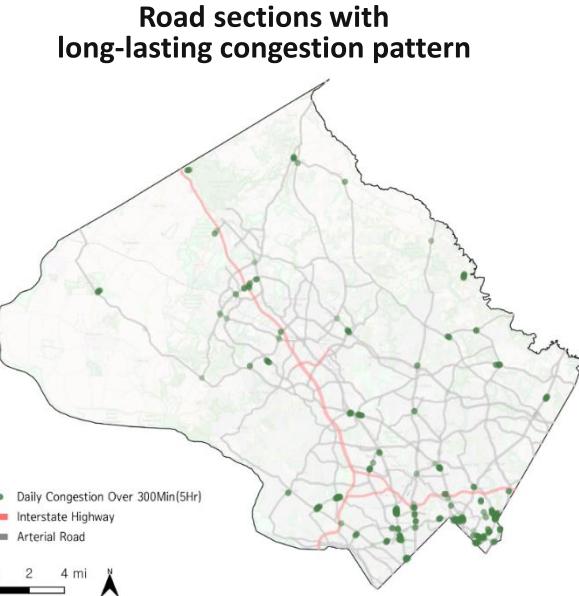
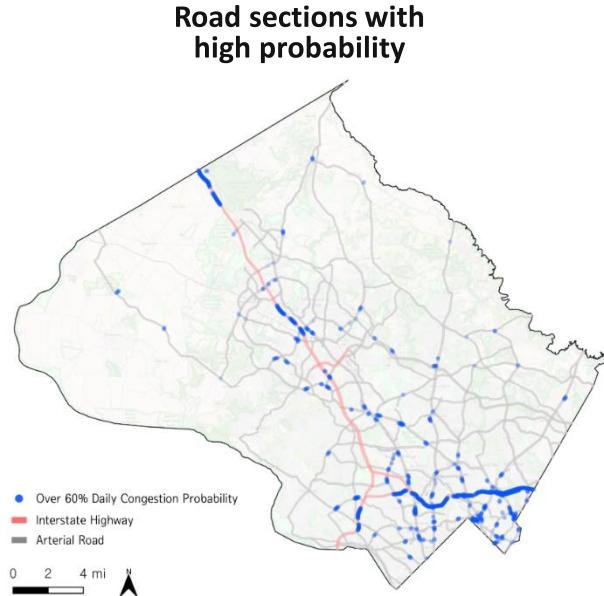


## (2) Comparison Result



## (1) Expansion of monitoring road range

✓ Analyze the road sections outside of interstate highways



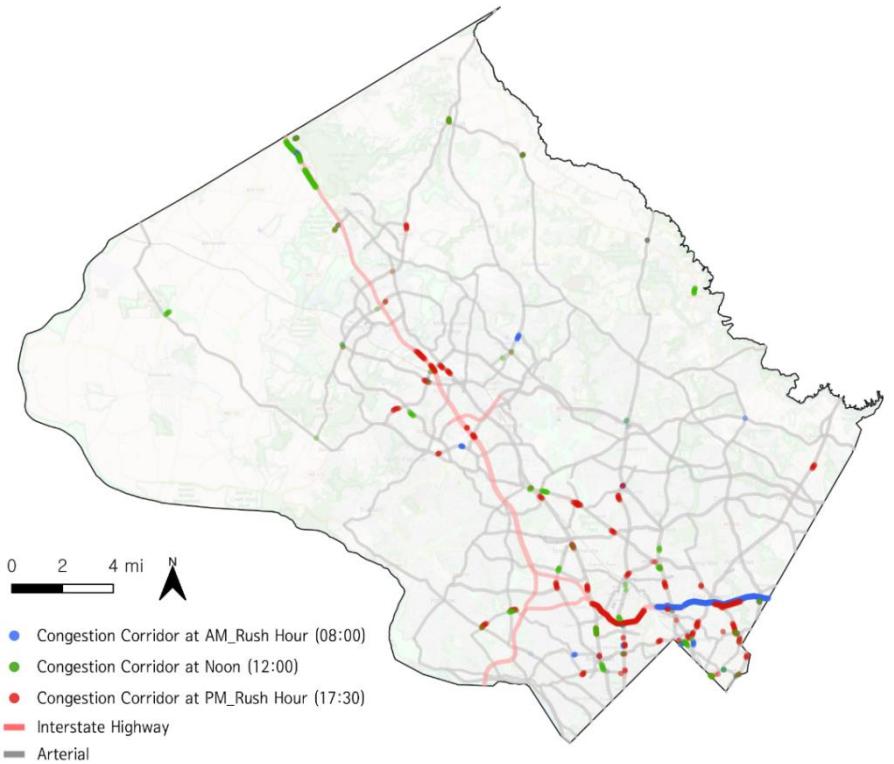
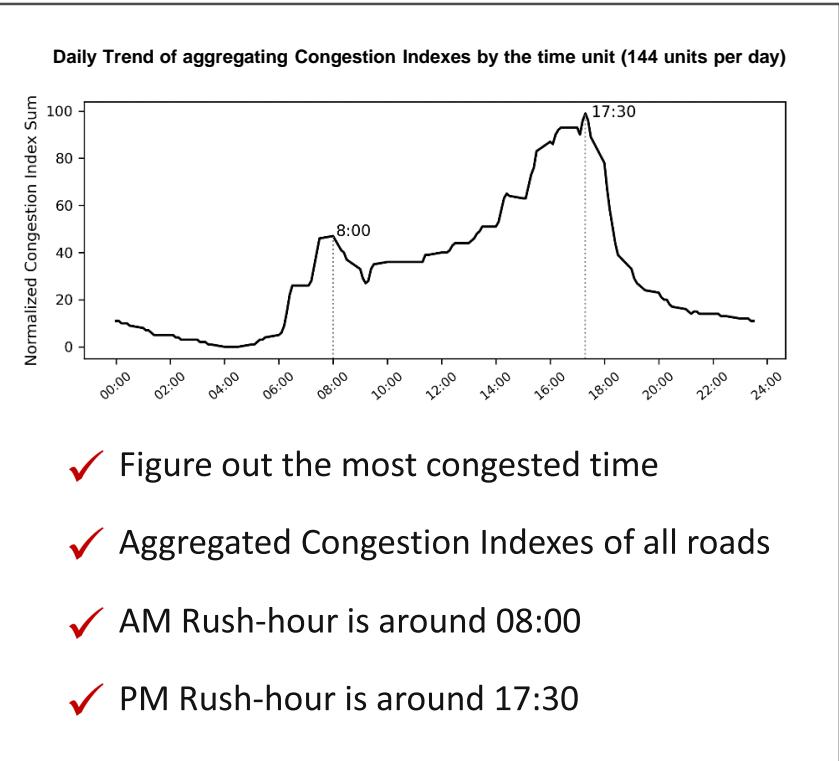
**\* Probability :**  
**Days congestion occurred at a particular time / Total days monitored**  
- Concentrated around Interstate 495 and urban areas in southern Montgomery county

**\* Daily averaged duration of congestion**  
- Concentrated in urban areas outside of highways  
- Long lasting congestion pattern, but not that severe

**\* Daily averaged number of each Congestion Index**  
- Concentrated on Interstate 495 highways  
- Severe congestion pattern, but not that long-lasting

## (2) Detailed congestion pattern analysis of road sections

- ✓ AM/PM Rush-hour congestion pattern analysis



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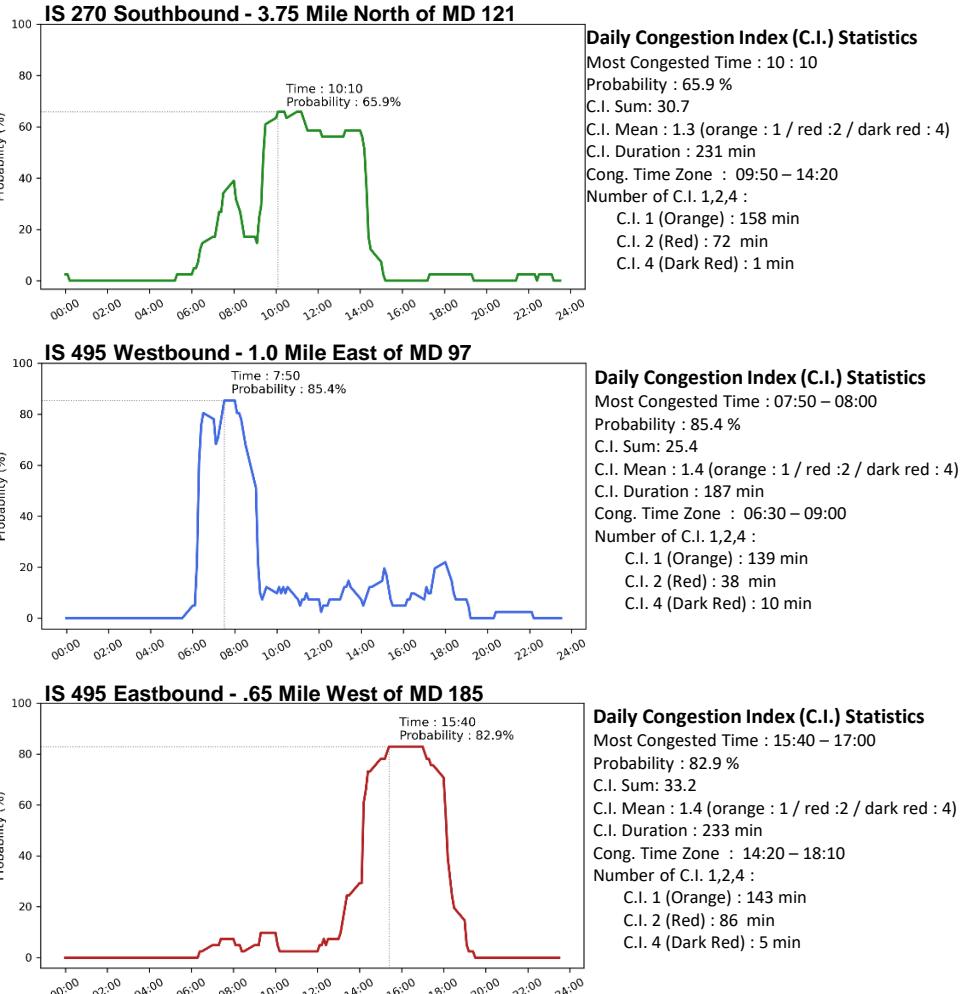
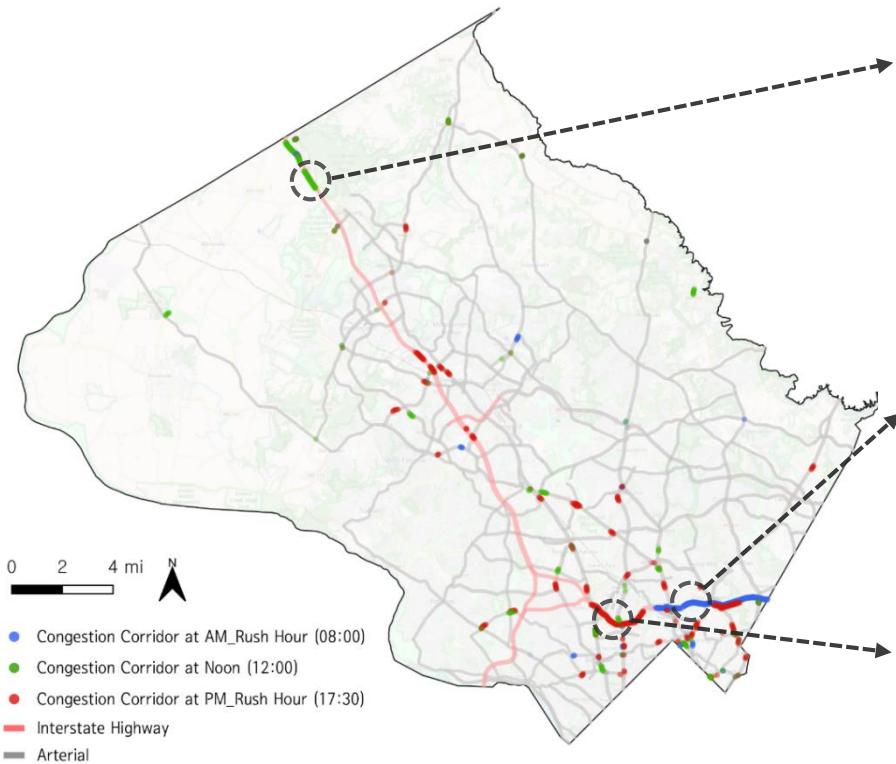
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## (2) Detailed congestion pattern analysis of road sections

- ✓ Daily congestion trend on the right plots
- ✓ Road points that couldn't be monitored



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04  
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- ✓ Research for utilizing Floating Car Data method (Google Maps traffic data)
- ✓ Googlemap stacked Spatio-temporal data model for traffic pattern analysis
- ✓ Google traffic information can complement the limitations of the sensor-based traffic data
  - ✓ Able to analyze on the road sections that sensors are not installed
  - ✓ Google traffic information enables to conduct detailed traffic pattern analysis on a wide range of areas.

# **Complementary traffic pattern analysis method using a FCD-based traffic information in online map**

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**Thank You**



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