Driving pattern analysis for emergency vehicle (EV) in Dallas, Texas, USA

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Introduction



> Reduce response time: Advanced algorithm with considering real-time data

Less validation & limited computation resources Faster route but ignore the reasons for Unsuccessful Dispatches (UD)

Data-driven evidence-based approach

identify the key causes for UD and to improve emergency responses

Objectives

> A data-driven approach to uncover UD.

Understand distribution of UD in micro-level (e.g., street segments).

> Identify response time variability.

Framework



Data

- 532,653 emergency incidents from October 2015 to November 2017.
- 887,825 emergency runs.



Method





*circle size is not related to number, only work for presentation

Informative Results

Annual Unsuccessful Incident







Spatial and temporal Pattern

1. Micro-level (street-segment)

- City Peripheral experienced high proportion of UD
- High proportion cluster in part of area may relate to local characteristics
- 2. Macro-level (Census Tract) Norther Dallas have higher proportion of unsuccessful incidents



Median of speed on street level for UD

- Speed is a direct manifestation for the delay occurrence.
- Dallas downtown have more road segments that with lower speed.
- Unsuccessful dispatches with lower speed are more important

Response time variability

- 30 incidents (successful rate: 28/30 = **93.3%**)
- Successful incidents: 28.
- > Unsuccessful incidents: 2.



- 32 incidents (successful rate:4/32=12.6%)
- Successful incidents: 4.
- > Unsuccessful incidents: 32.



Total incidents: 1569 Successful rate: 95.3%

Total incidents: 1886 Successful rate: 95.9%

Total incidents: 1481 Successful rate: 96.1%



Discussions and future work

- Yearly pattern can be informative, but hourly pattern need to be developed due to response time variability.
- > Considering the site and situational characteristic in modeling.
- Based on the surrounding geographical features, how to model the success probability for an event at a specific location.

Thank you!

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