Rob Minton

Turning Data Into Knowledge

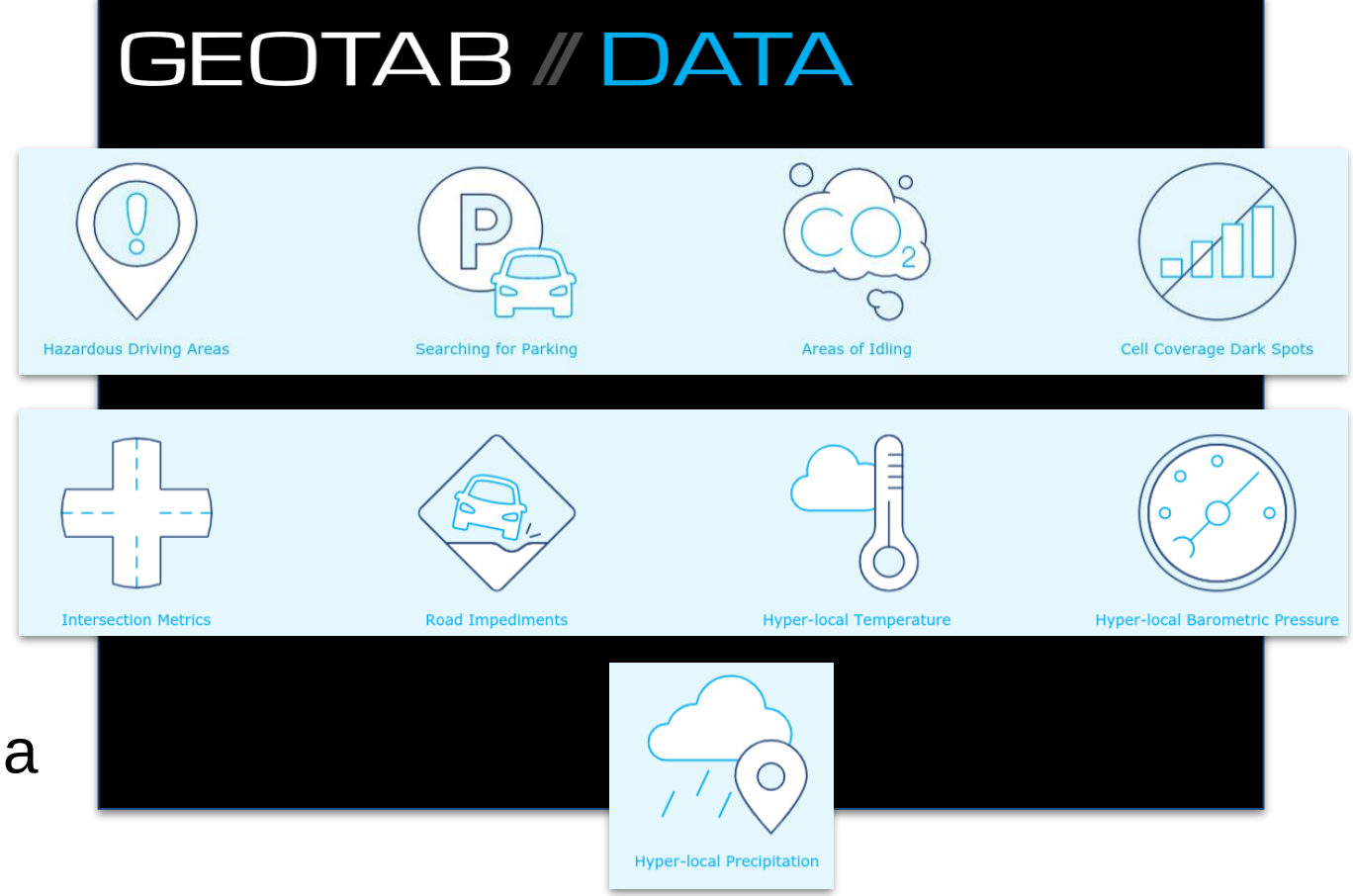
How To Get the Big Picture on Fleet Safety

Overview

- Where Does Data Come From?
- How Can I Keep Data Secure?
- Data and power of context
- Turning Insights into Action: Policy Design

Scale

- 1.8+ Million vehicles provides amazing coverage
- Allows us to aggregate data and provide global insights for both fleets and smart cities
- Provides opportunities to share aggregated smart city insights via data.geotab.com
  - 12 public datasets
  - Weather, safety, points of interest



The Origin of Data

GPS Then

GPS was developed to track asset position and improve communications on the battlefield

GPS Now - Shapes Businesses Today

Decrease Expenses

Optimize Your Fleet

Fleet Efficiency Reporting

Optimize Fuel Costs

Increase Productivity

Detailed Trip Reporting

Managing Your Trips, Anytime

Reporting Productivity

Safety

Risk and Safety Reports

Driver Coaching

Accident Notifications

Big Data

What does it actually mean

- Can't manage what you don't measure
- Measuring data at scale & doing comparisons

Why do we need open platform for big data

- Company must share their data
- Big data requires lots of sources to yield maximum benefit

Security

Can “Open” be secure?

- Yes (sign on & authentication)
- Data should be encrypted
- Demand to know how companies are protecting your data
- Security is the biggest issue facing companies

Big Data...Why Should I Care?

Big Data gives you the power to find hidden business opportunities and better anticipate corporate needs.

Big Data Use Case	Examples	Why it matters
Benchmarking	Fuel Economy Safety Time-to-Serve Metrics	What opportunities are we leaving on the table?
Intelligence Data	Dangerous Intersections Pothole Detection	How can we improve our urban infrastructure?
Predictive Analysis	Accident Prediction Vehicle Reliability	How can we better anticipate corporate needs?

Data: Both Large and Rich

The dataset you have access to should be both large and rich – both of which are important factors.

Large

- Provides enough data to conduct in-depth analysis and machine learning

Rich

- Access to data beyond just position (engine diagnostic data, third party connections, accelerometer, etc.)

The Importance of Data Enrichment

Raw data is not powerful until it is enriched. Enrich data by combining it with other data sets, running machine learning algorithms on the data, and transforming it into information that can be used to extract value and meaningful actionable insight.

Raw Data

- Engine Fault
- Engine Status
- GPS
- Accelerometer

+

Data Transformation

- Third-party Data
- Data Aggregation
- Machine Learning

=

Enriched Data

Intelligent Datasets

With hyper-local temperature data, direct maintenance crews to areas of highest priority based on current and expected road and bridge conditions.

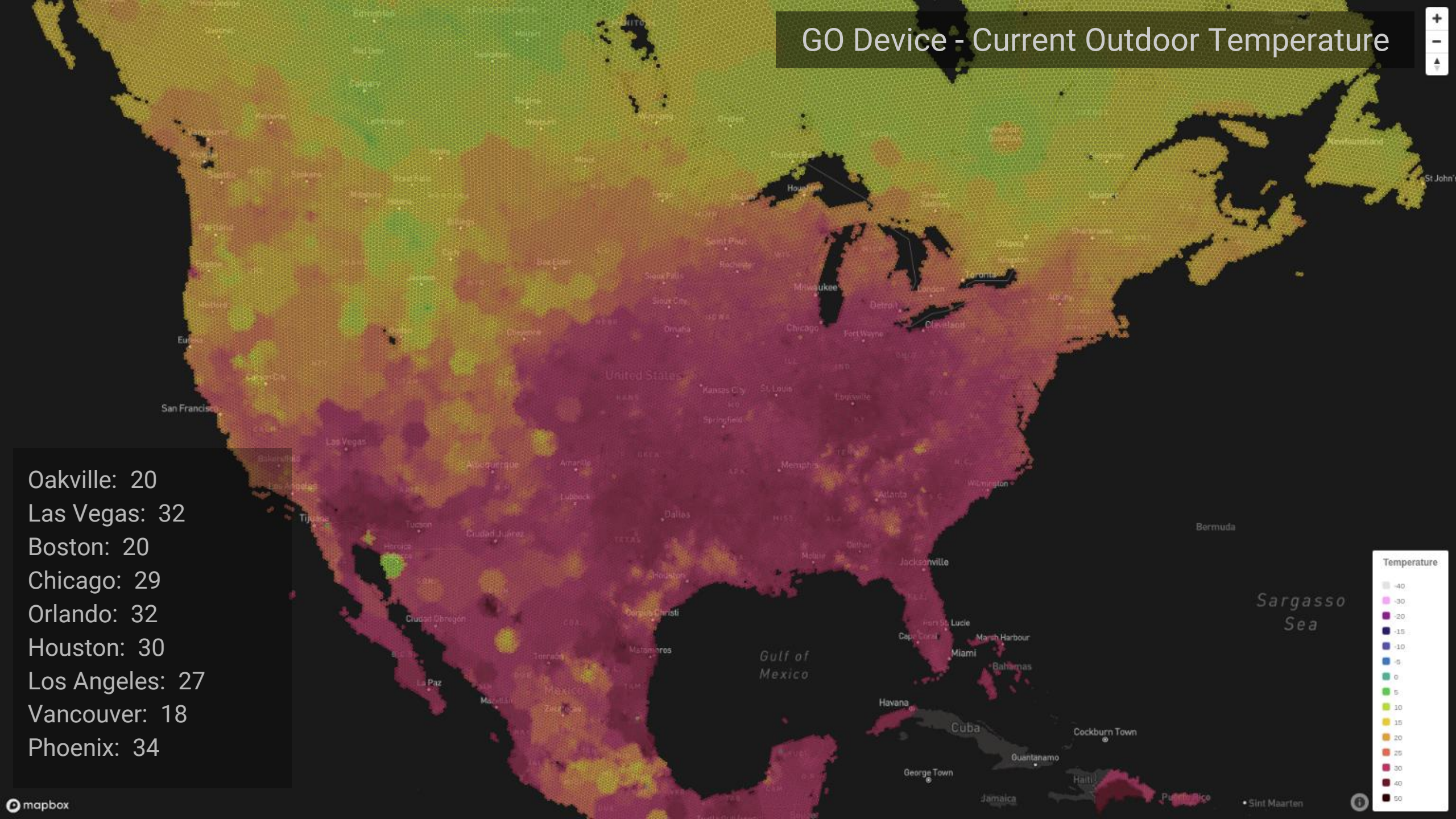
Identify and prioritize areas that are prone to hazardous driving incidents and determine which roads need improvements and new signage.

Intelligent Datasets

Understanding road impediments helps you plan for and schedule preventative road maintenance and pavement preservation.

Provide the latitude and longitude of truck parking locations that can help CHV operators find parking spaces that are closest to them.

GO Device - Current Outdoor Temperature



Oakville: 20
Las Vegas: 32
Boston: 20
Chicago: 29
Orlando: 32
Houston: 30
Los Angeles: 27
Vancouver: 18
Phoenix: 34

Safety Data: Where do we start?

Think Big, Start Small, Start Now!

Internal Data

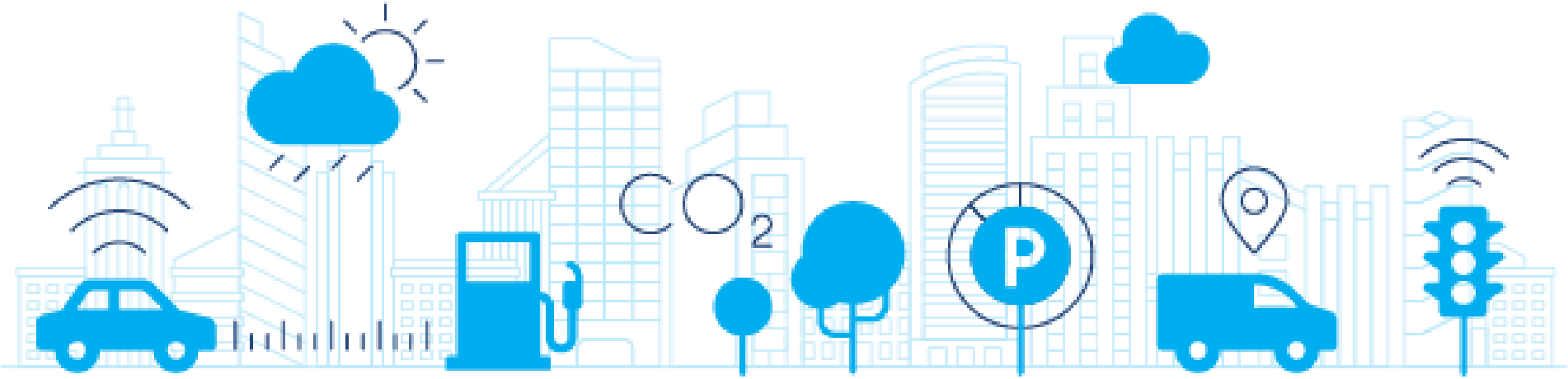
- Telematics
- Mobile app
- Maintenance
- Routing
- Driver Demographics

External Data

- Open data
- Research reports
- Industry trends
- Speed limits

Contextual Data

- Weather
- Dangerous neighborhoods
- Intersection insights
- Vocation



Examples:
Contextual data

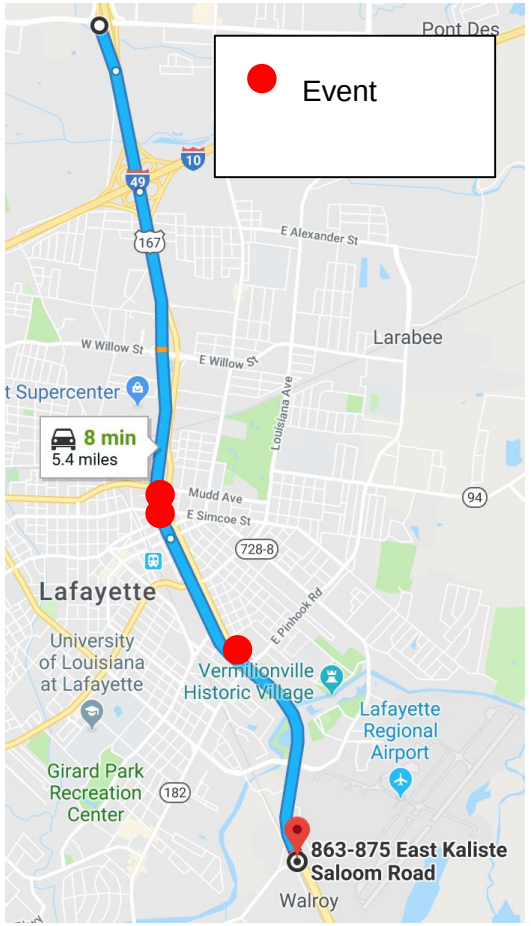
Maria and David drive similarly

Maria

Miles Driven – 5.4 km

Hard Braking – 2

Hard Acceleration – 1

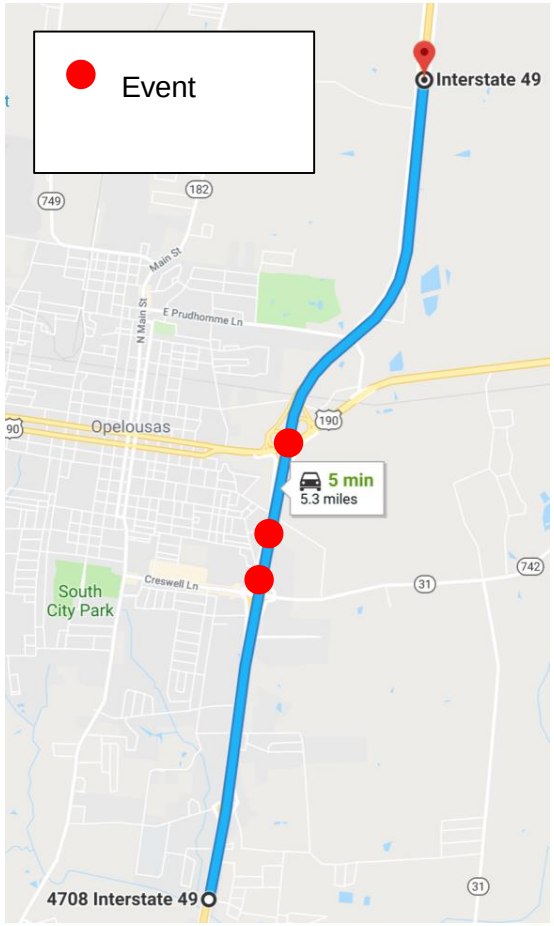


David

Miles Driven – 5.3 km

Hard Braking – 2

Hard Acceleration – 1



But they have very different routes

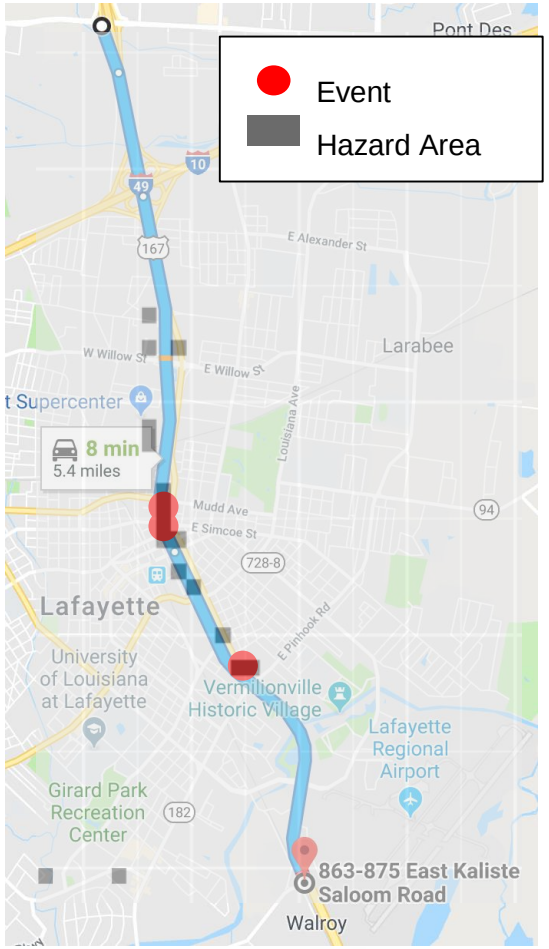
Maria

Miles Driven – 5.4 km

Hard Braking – 2

Hard Acceleration – 1

Hazard Area Events – 3



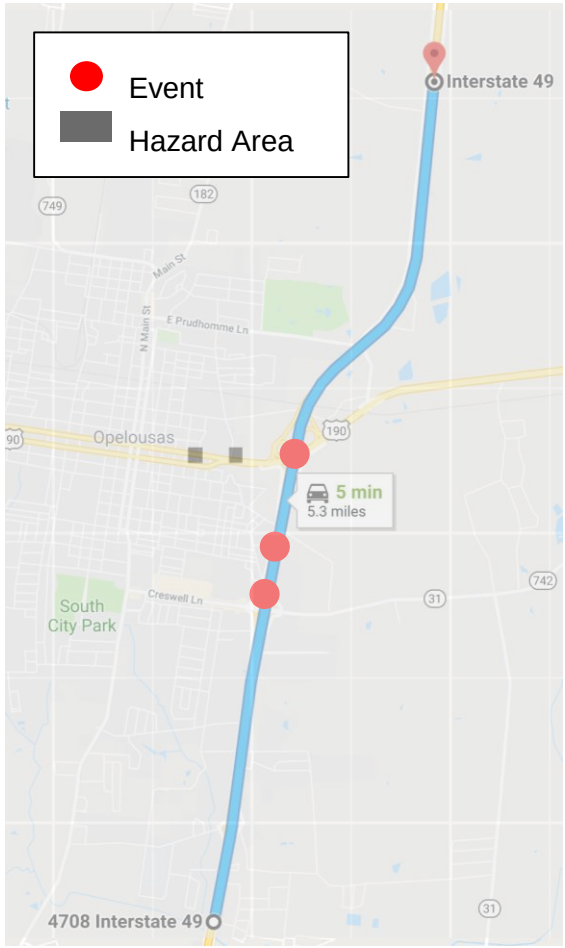
David

Miles Driven – 5.3 km

Hard Braking – 2

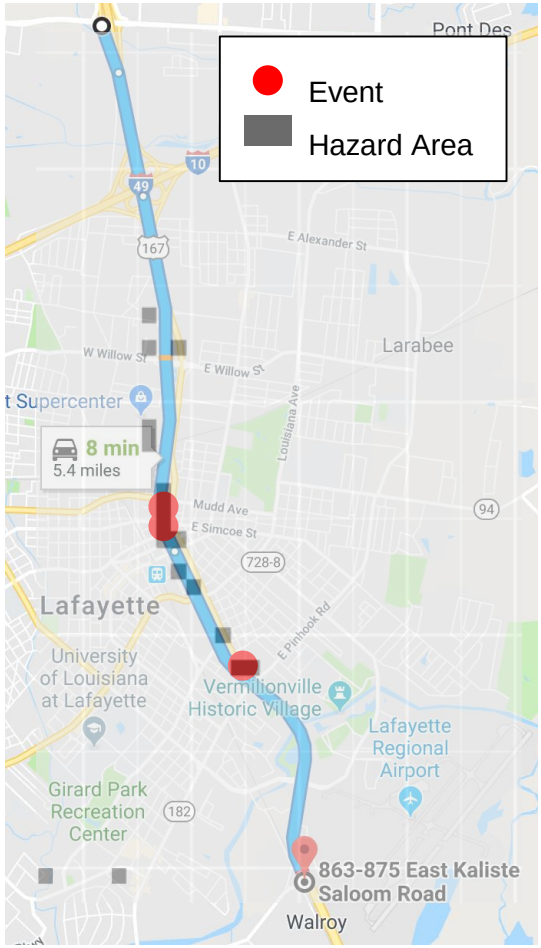
Hard Acceleration – 1

Hazard Area Events – 0



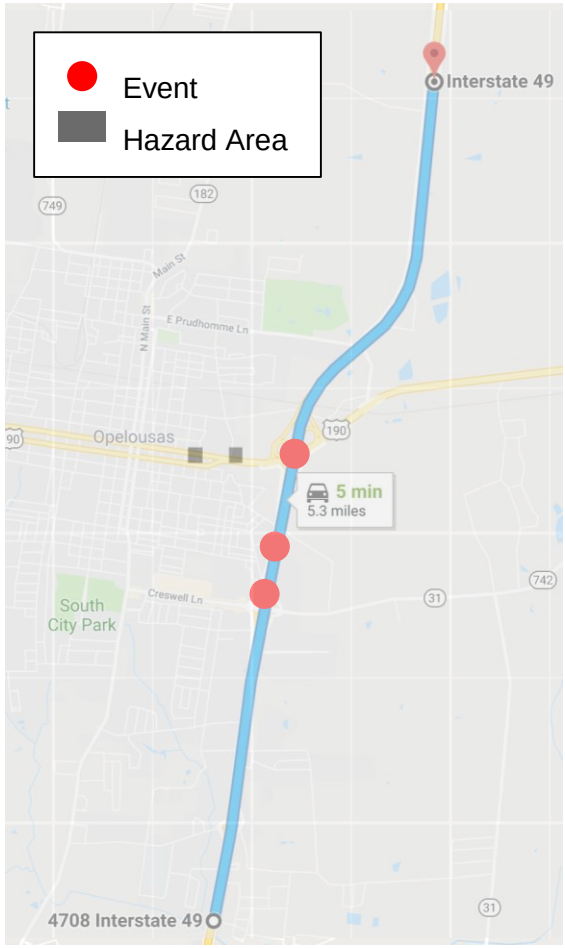
Different feedback is required

Maria



Maria drives well in hazardous areas compared to peers

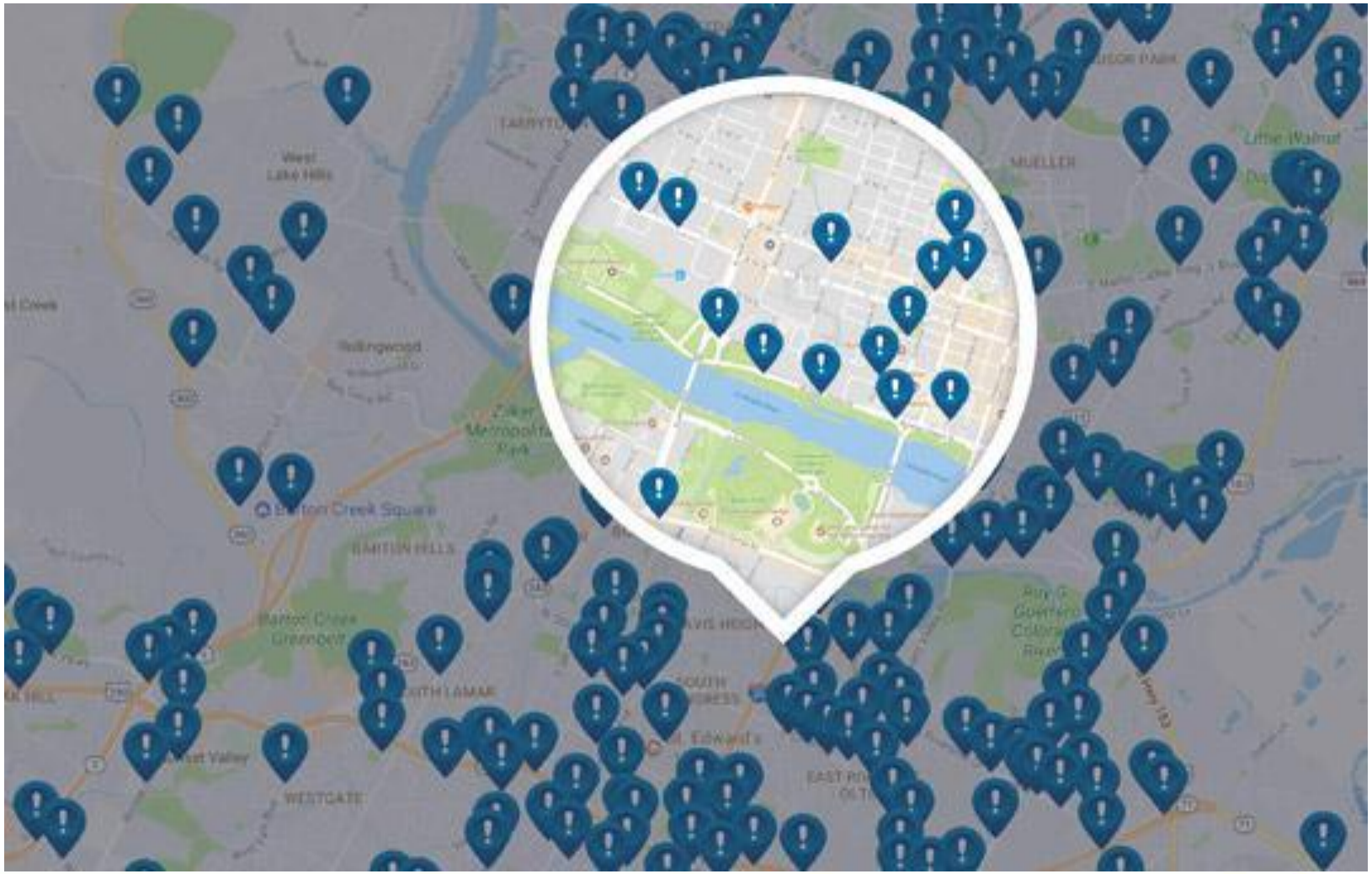
David



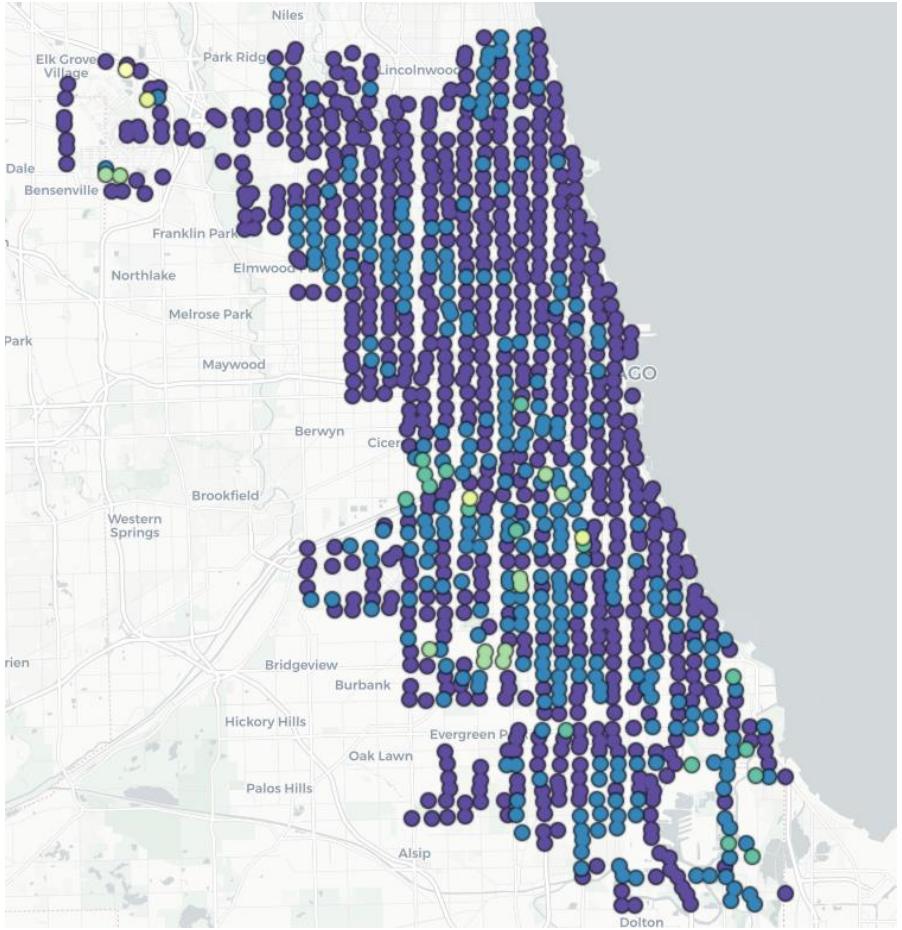
David drives poorly when driving on the highway

Road Conditions

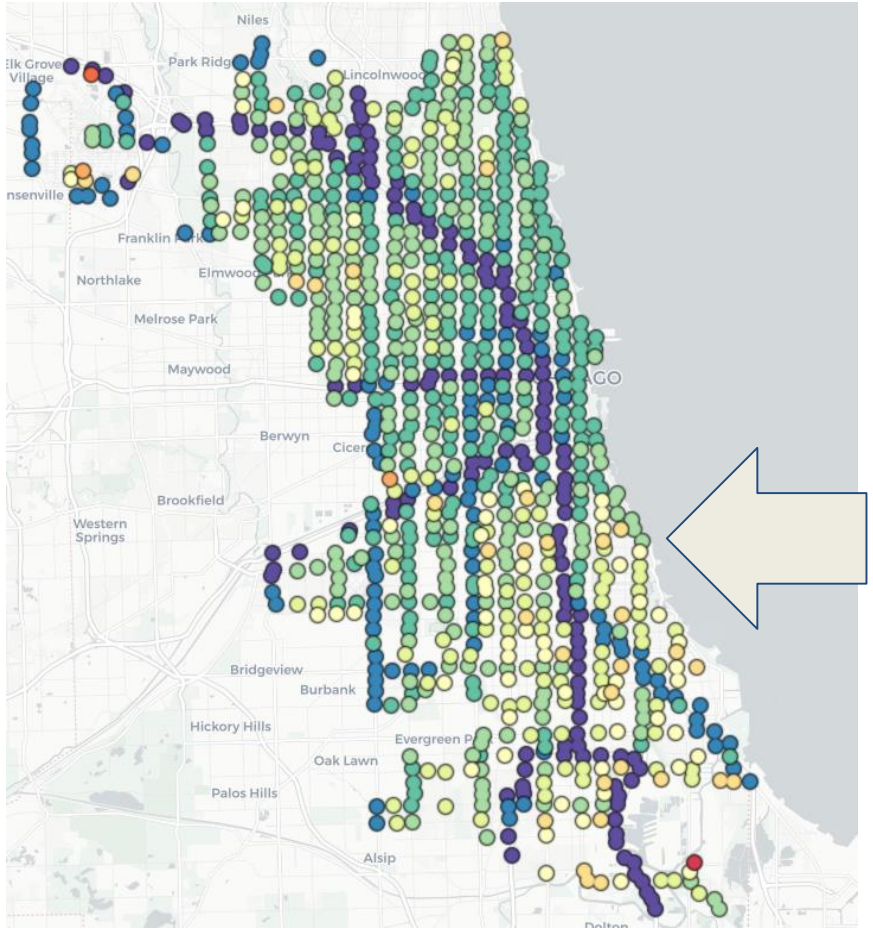
- Automatically identify potholes
- Aggregated accelerometer data indicates areas in need of road maintenance/repair.
- Data integrated into a city's public works dept. for automated dispatching and work orders.



Summer



Winter



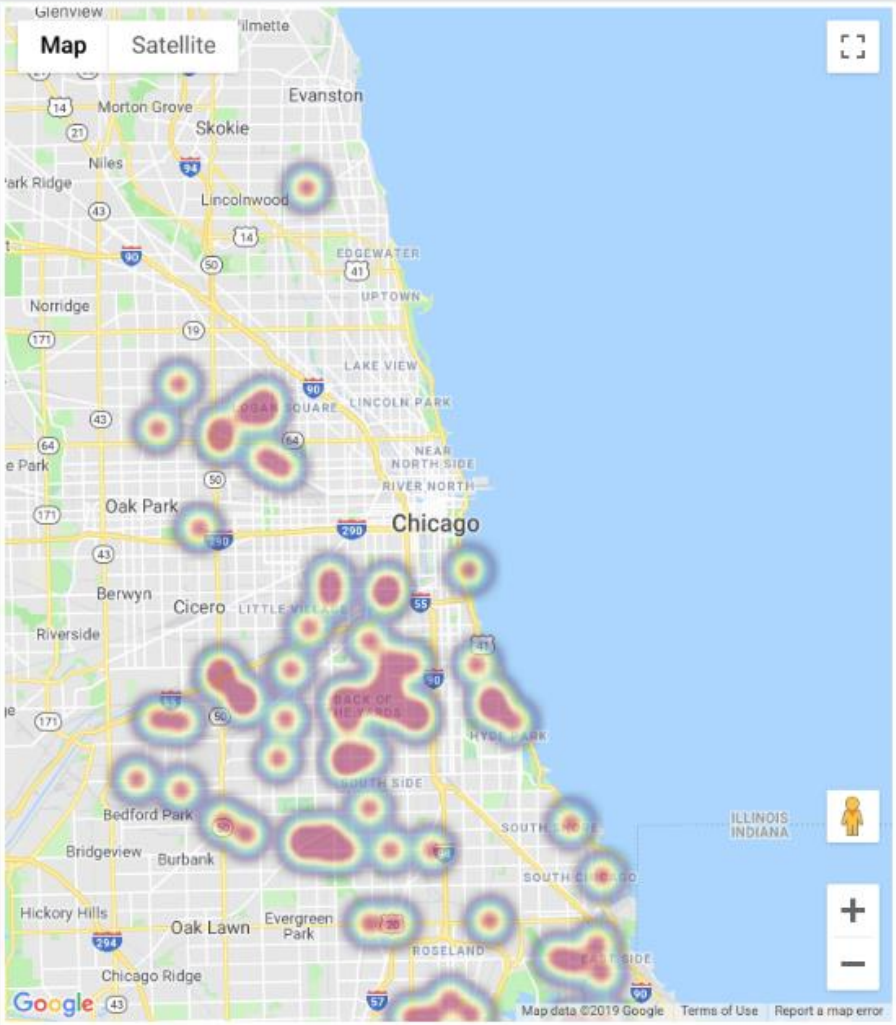
Is there a difference in behaviour by season?
YES!
Lighter = More Hazardous

Groups filter All 0 Notifications

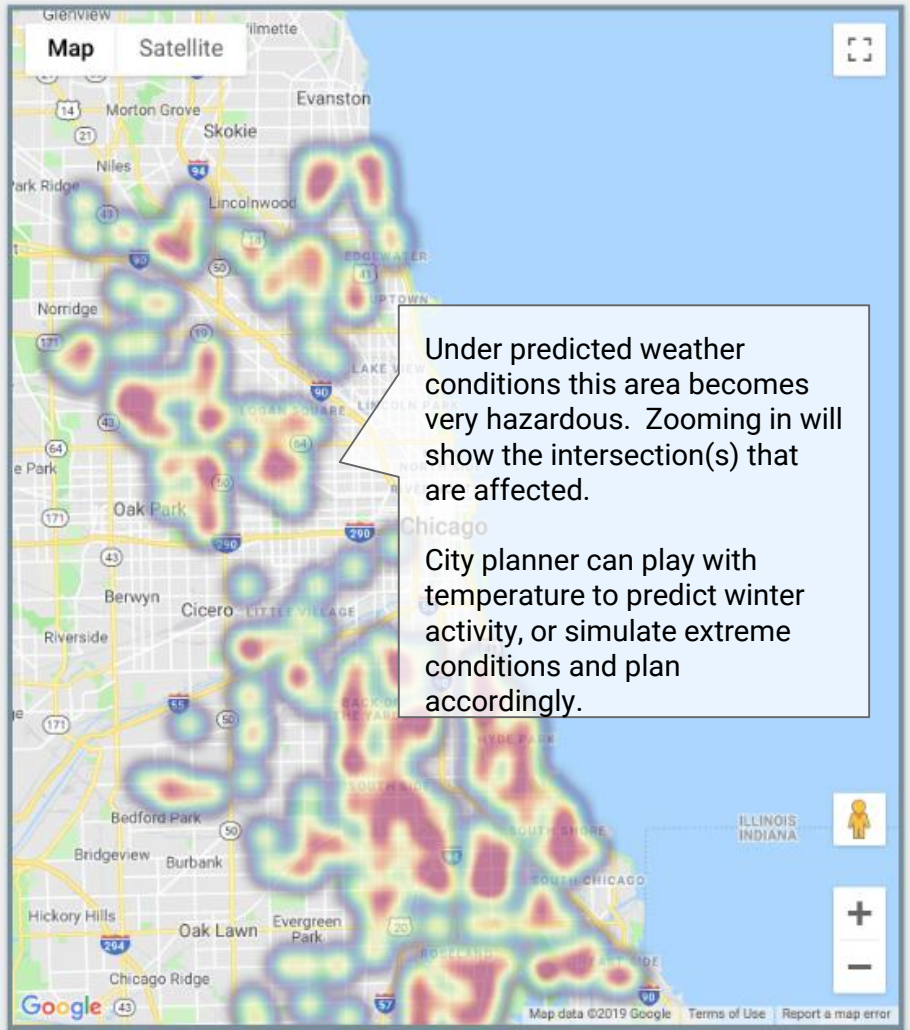
myGEOTAB

- Getting Started & Help
- Dashboard
- Map
- Vehicles
- Activity
- Engine & Maintenance
- Zones & Messages
- Rules & Groups
- Administration
- Geotab Roadside
- Marketplace
- Smart City Insights
- Hazardous Driving Areas
- Traffic Study

Hazardous Driving Areas



Current



Predicted

Under predicted weather conditions this area becomes very hazardous. Zooming in will show the intersection(s) that are affected.

City planner can play with temperature to predict winter activity, or simulate extreme conditions and plan accordingly.

Weather

Temperature: 35 °F

Visibility: 75%

Precipitation

Fog

Rain

Snow

Traffic

Volume: 20%

RUN PREDICTIVE ANALYSIS

IT'S ALL ABOUT SAFETY.

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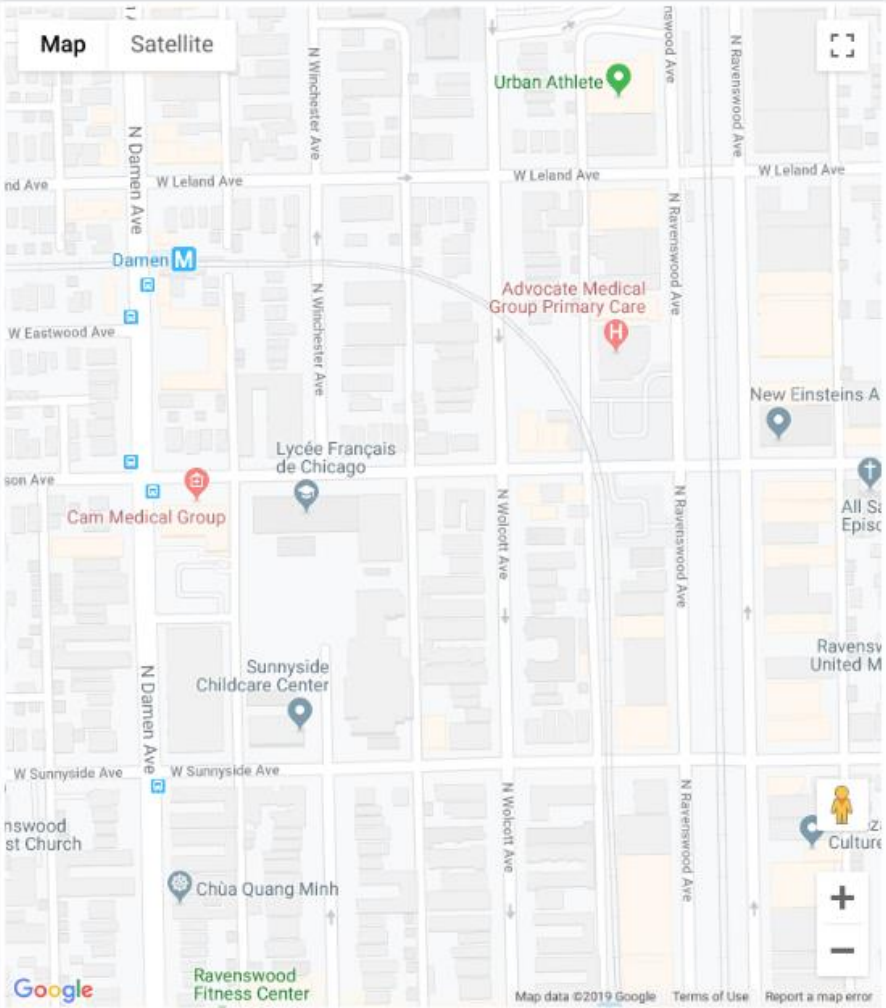

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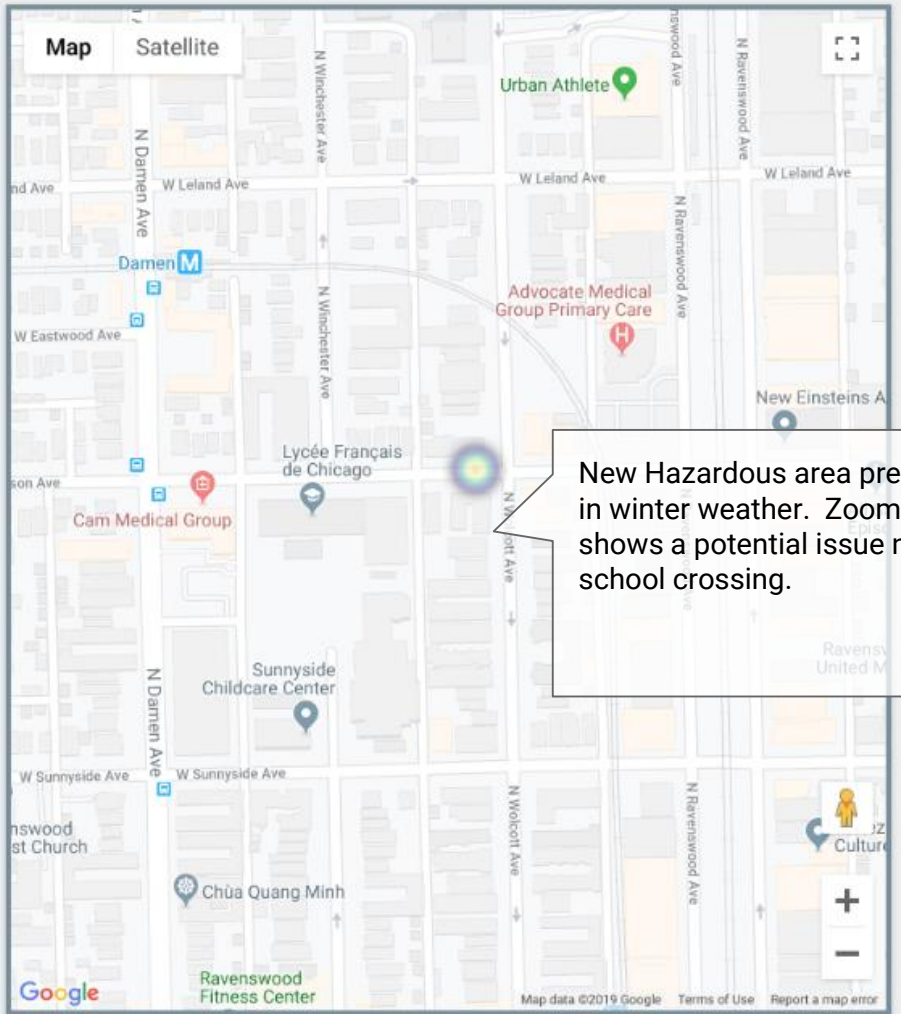

New Hazardous area predicted in winter weather. Zooming in shows a potential issue near a school crossing.

Predicted

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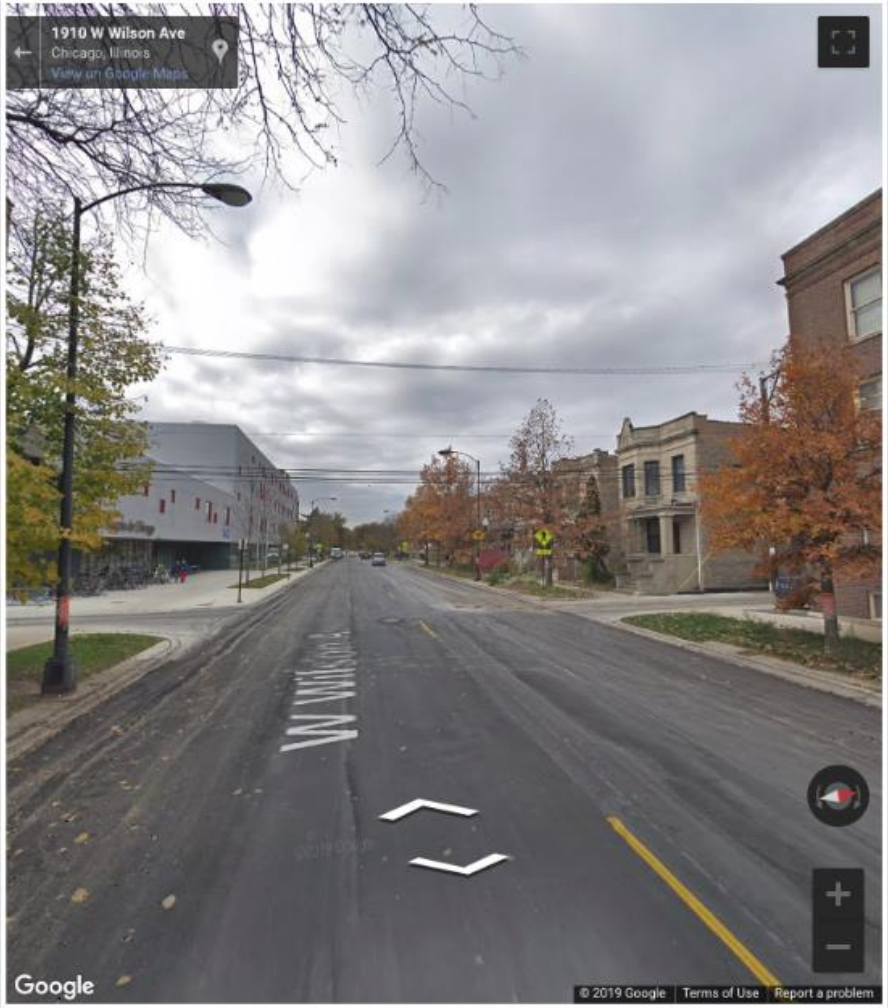
Hazardous Driving Areas



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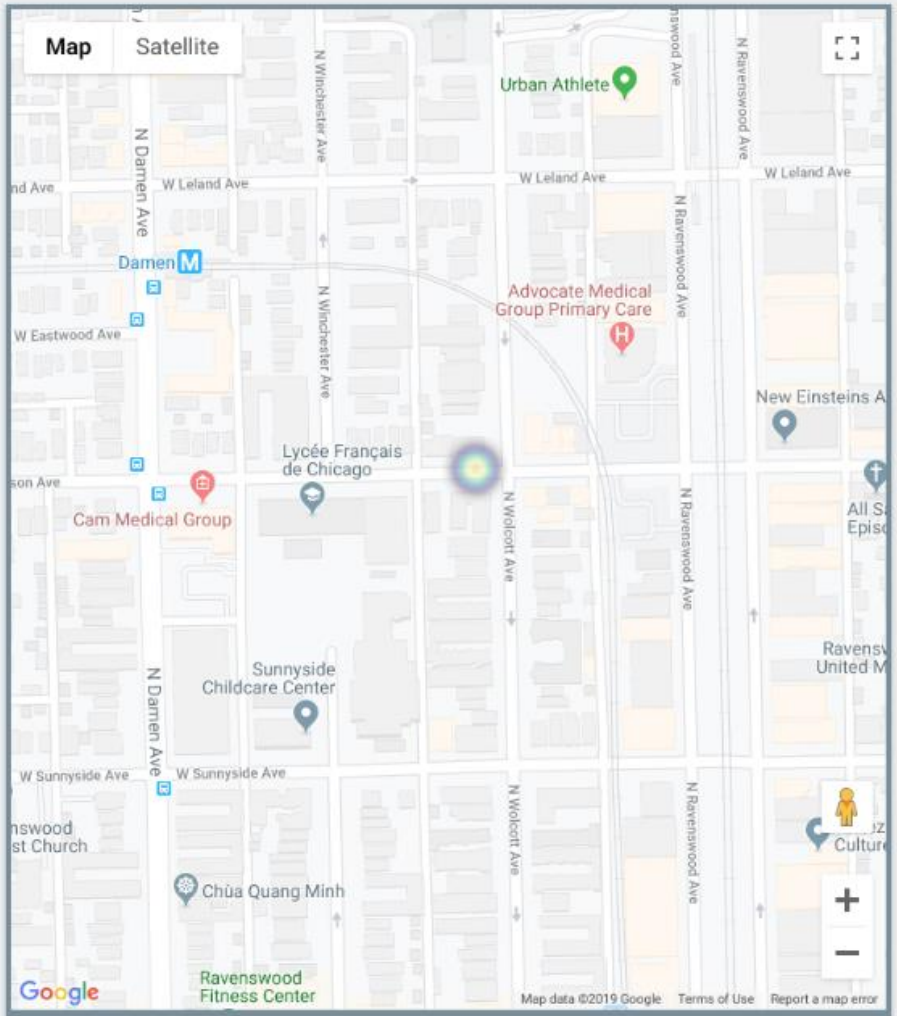

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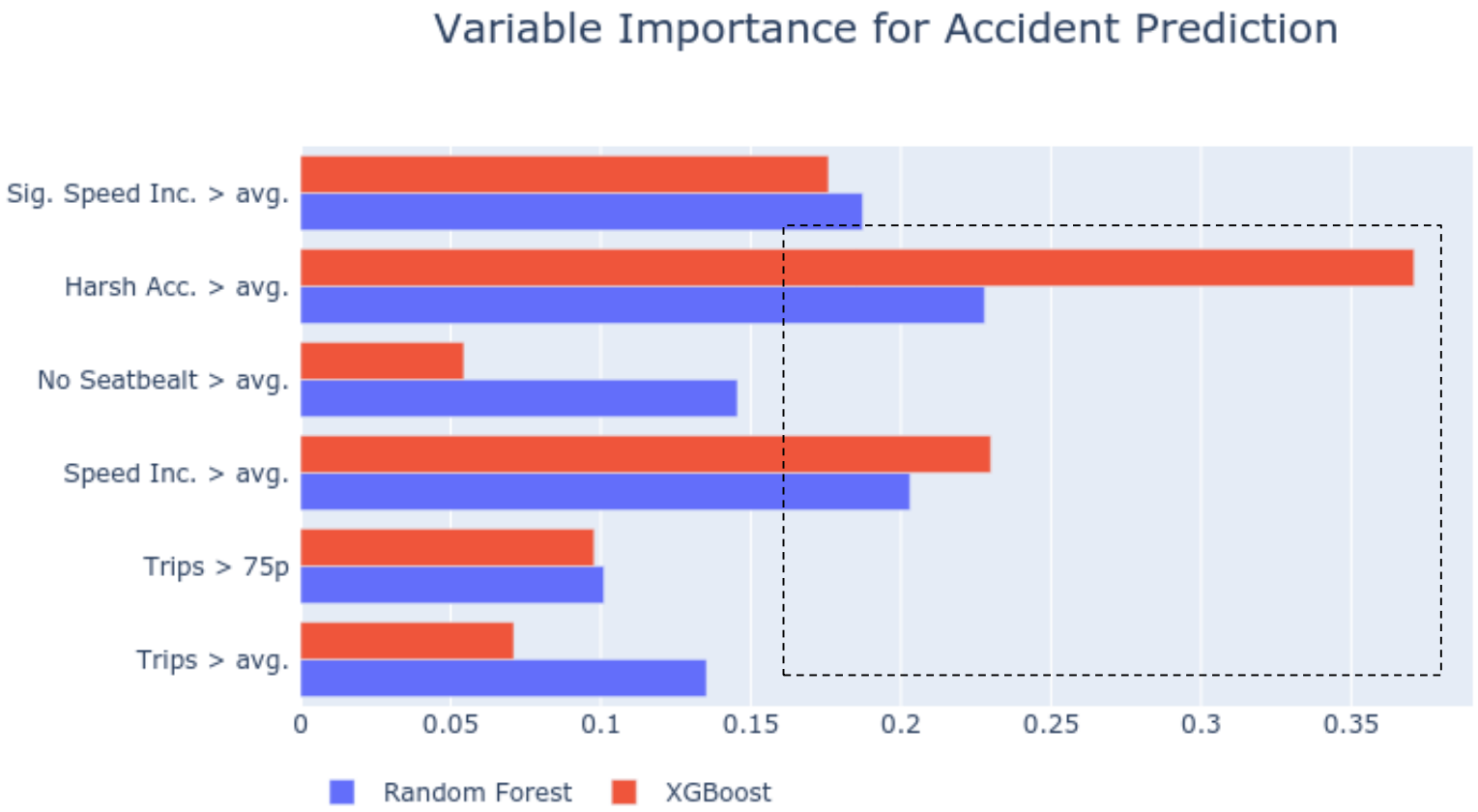
Future Machine Learning Approach to Safety - Detecting and Predicting Risky Behavior

An **accident prediction** model based on **exception rates** was able to achieve a probability of accident prediction of 60%.

Most **predictive** features:

1. **Harsh Acceleration** above avg. rates
2. **City Speeding** above avg. rates
3. **Highway Speeding** above avg. rates



Note: Features expressed as 3-month rolling incidence rates per 100km

Gas Station Fill-ups in the US

Over 60,000 fill-ups in a day
Over 10,000 more gas stations than OSM

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Collected Data + Context = Policy Design

Insights

- Full driver behavior profiling- Speeding, harsh braking, harsh acceleration, etc
  - Impacts of demographics on safety/performance- Ex: tenure, age
- Accident predictions- costs, type, fault type
- Collision- both predictive as well as collision reconstruction

Policy Design

Coaching
Exception rules
Driver Risk scoring

Final thoughts...

- **Set Realistic Expectations**
  - Does your organization have the bandwidth to obtain, analyze and make data-driven decisions?
- **Start Small**
  - Less is more. Start with the basics.
- **Automate**
  - Set up reports so they are emailed daily, weekly, etc. Ensure they focus on driving business decisions.
- **Dive Into Dashboards**
  - Easy method of understanding trends with charts and lists. Every one should have a purpose and drive action.
- **Pick the *Right Partner***
  - One that understands how big data can change business (new and evolving).

Are YouTurning Data Into Knowledge?

GEOTAB
management by measurement

Q & A

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