Executive Summary

- Geospatial Tools at Geotab
- Examples
Data Fuels Geotab’s Analytics AI Ecosystem

1.8M Gateway Servers

Compute Engine

Cloud Storage

Kubernetes Container Engine

Google BigQuery

5-10 second delay
Data Science Package

- A turn-key Data Lake for customers in Google BigQuery
- Query across thousands of vehicles and years of data in seconds
- Easily connect line of business applications and industry-leading BI tools
- Sample queries and python notebooks in GitHub
- Updated via daily batch
Custom Tool: Big Query Visualizer

- Built in-house!
- Google’s BigQuery GeoViz allows for SQL to be run on BigQuery data on a map; amount of data that is viewable is limited
- Visualize millions of data points at once with fast zoom-in/out
- Users can run SQL queries against BigQuery datasets and view results on a WebGL
- Gradual data loading for large datasets (and more!)
Custom Tool: Real-Time Tracking App

Open Source Real-time Tracking App

- Plan: Open-source on Github
- Useful for visualizing real-time movement of vehicles and associated status and exceptions
- Examples: temperature-tracking, snow plow, etc.
- Partners can take the code and embellish
Analysis Using Geohashes

- Currently using Geohash for analysis with great results
- Geohash is a public domain geocode system which encodes a geographic location into a short string of letters and digits. It is a hierarchical spatial data structure which subdivides space into buckets of grid shape
- Plan is to shift to ‘snap to road’ soon
Oakville: 20
Las Vegas: 32
Boston: 20
Chicago: 29
Orlando: 32
Houston: 30
Los Angeles: 27
Vancouver: 18
Phoenix: 34

Welcome to our office in Oakville!
Polar vortex during last winter

Hyper-Local weather insights!
data.geotab.com

Urban Infrastructure
- Hazardous Driving Areas
- Searching for Parking
- Areas of Idling
- Cell Coverage Dark Spots
- Road Impediments
- Intersection Insight

Weather
- Hyper Local Temperature
- Hyper Local Barometric Pressure
- Hyper Local Precipitation

Location Analytics
- Fuel Station Metrics
- Service Centre Metrics
- Truck Parking Locations

Our team of data scientists and engineers have curated our data repository and Urban Infrastructure and Location Analytics.

Weather
You wouldn’t believe it, but many of the vehicles in our data ecosystem are equipped to report outside air temperature and barometric pressure. We essentially have a fleet of temperature stations reporting hyper-local weather data from across the globe. This series of intelligence data contains a range of datasets curated to showcase near real-time and historical weather patterns.

Urban Infrastructure
From looking at hazardous driving areas and areas where drivers are searching for parking to rating road impediments in a city, our near real-time and historical data surrounding urban infrastructure allows for detailed data-driven decisions to be made, and innovative technology applications to be developed.

Location Analytics
Are you interested in finding the repair shop with the quickest services times? How about the most popular gas stations in an area? Our location analytics dataset is positioned to extract business demographic data to help our customers optimize their business operations.

One hour of Geotab temperature data in the United States

Tracking City Temperature by Hour
A simple use case for this data is to determine the average temperature of a certain city per hour. For average temperature in Charlotte, North Carolina over the last 24 hours, you could write a simple query of this information (shown below).

```
import matplotlib.pyplot as plt
import matplotlib.dates as mdates
import datetime
import numpy as np
import geotab.getquery as bq
import pandas as pd

SQL = "SELECT Location, LocationType, AvgTemperature FROM "geotab-public-temperature.Temperature" WHERE State LIKE 'North Carolina'"
```
Public Safety - Hurricane Dorian Impact

Time-lapse ground-truth probability of precipitation over the last 24 hours

Time-lapse commercial traffic over the last 24 hours
Intelligent Zoning using AI

By simply driving with a Geotab device, zones should automatically be created for you, and identified by type (i.e. Customer, Distribution Centre, etc).

AI for Zone **Identification**

AI for Zone **Classification**
NYC MVP

- Measure spot speeds and travel times in NYC
- Use the tool to make data-driven safety decisions
  - Road redesigns
  - Traffic calming
  - Lane narrowing
  - Siting speed cameras and humps
Sensor Data + Big Data + AI = Safer Cities

**BQML** - Predict Dangerous Driving via Conditions

Predict Hyper Local Weather Down to **150m**

Predict Vehicle Movement and Traffic Patterns
Air Quality Assessment

- Smart City app to assess requisite vehicle mix for optimal municipal road coverage
- Allows municipal fleets to maximize the use of their vehicles and reduce cost of deployment
- Uses Geohashes to measure number of ‘passes’
Intersection Insights
Aggregated Traffic Patterns in Hamilton
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