THIRD EYE

GROW WITH BIG DATA

Third Eye Consulting Services & Solutions LLC.

Connected Cars

– Driving Us to a Better Us - In Real Time

What is a Connected Car?

Connected Car - *Definition*

"A connected car is a car that is equipped with Internet access, and usually also with a wireless local area network. This allows the car to share internet access to other devices both inside as outside the vehicle."

https://en.wikipedia.org/wiki/Connected_car

To that, we may add:

...Connected to a Cloud based system with the ability to display data and notifications for the driver...

Connected Cars - *Are Smarter*

Connected cars draw on the leading technologies in:

- Sensors
- Displays
- On-board and off-board Computing
- In-vehicle Operating Systems
- In-vehicle Data Communication Devices
- Embedded Wireless Systems
- Big Data Analytics & Machine Learning
- Speech Recognition
- Content Management.

Connected Cars - *Business Models*

Challenges the traditional automotive business model. Rather than focusing only on the *sale and maintenance of a vehicle*:

- Car companies can now focus on the *sum of business opportunities* the automobile represents.
- Insurance companies can offer better premiums based on driving habits.
- Lower total cost of ownership of cars with preventive maintenance.

Many More to Come..

Connected Cars - *Saves Human Lives*

Most important aspect of all!

- Safe Road Crossings
- Predictive Maintenance - *fewer unexpected breakdowns*
- Self-Driven Cars

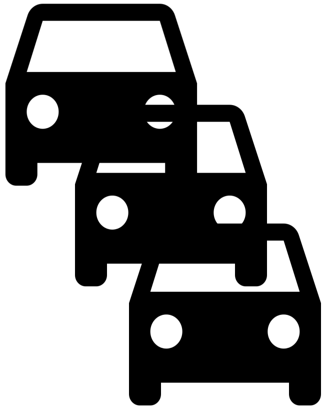
Many More to Come..

What Technology Drives Connected Cars?

Heard about IoT?

(Internet of Things)

How It Works



Big Data Processing
1. Batch
2. Real Time
3. Predictive

Big Data Analytics in the Cloud

Visualization
1. Dashboards
2. Charts
3. Graphs

Business Users

Third Eye has developed a solution for Internet of Things (IoT) named **Eyera** - which is used for “Connected Cars” Use Case.

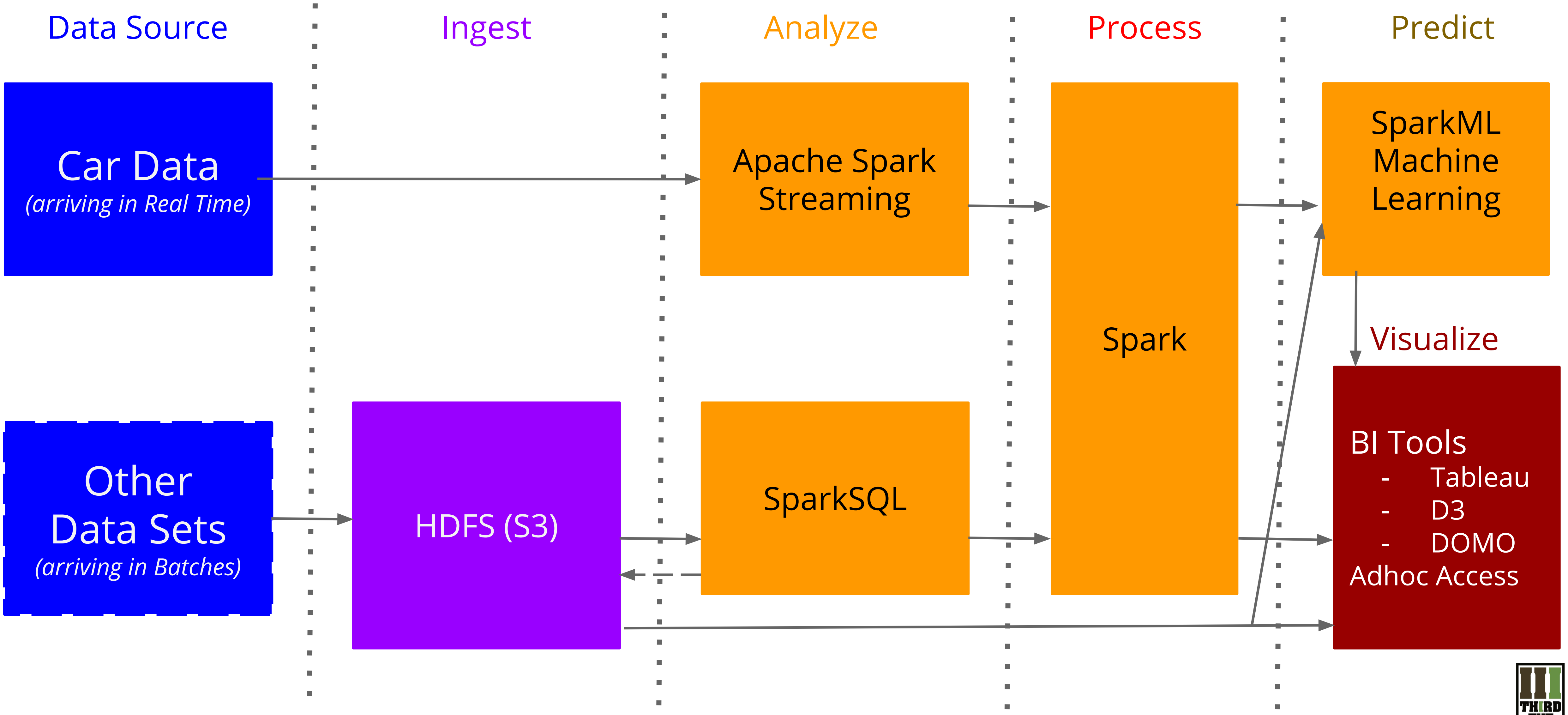
EYERA - for Connected Cars

- Leverages Apache Spark based technologies to harness big data & derive insights on:
  - Driving Patterns,
  - Usage Behavior
  - Vehicle Health.

- Provides best safety and service experiences to car drivers.

- Tracks OBDII data from cars real-time and analyzes them in along with other data sets.

Data Flow



Data Source
Ingest
Analyze
Process
Predict
Car Data
(arriving in Real Time)
Apache Spark Streaming
Spark
SparkML Machine Learning
Visualize
Other Data Sets
(arriving in Batches)
HDFS (S3)
SparkSQL
BI Tools
- Tableau
- D3
- DOMO
Adhoc Access

Work Flow

Step 1

Cars send vehicle signals and diagnostic data at certain time intervals to Apache Kafka.

Work Flow

Step 2

Apache Spark Streaming Analytics:

1. Ingests data from the Kafka queues.
2. Performs a join with the reference data to map the vehicle VIN to the corresponding model
3. Spools them into storage for rich batch analytics.

Work Flow

Step 3

1. Spark partitions raw semi-structured vehicle signals and diagnostic dataset into a year/month format for efficient querying.

2. Stores them in HDFS storage.

Work Flow

Step 4

Machine learning algorithms based on SparkML develops patterns & insights from data stored in HDFS.

Work Flow

Step 5

The results of the batch processing are published to the HDFS for consumption by any visualization tool.

Work Flow

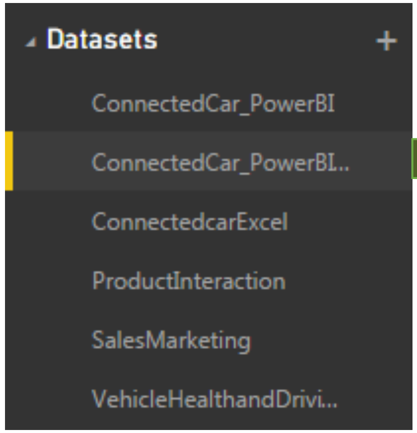
Step 6

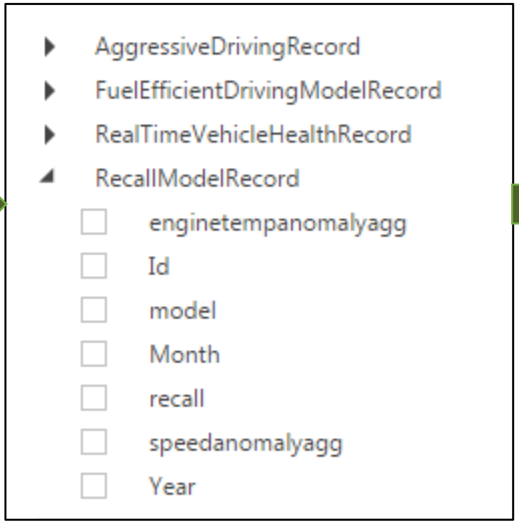
Desktop application uses Power BI Rest API to publish the data to Power BI Dashboards.

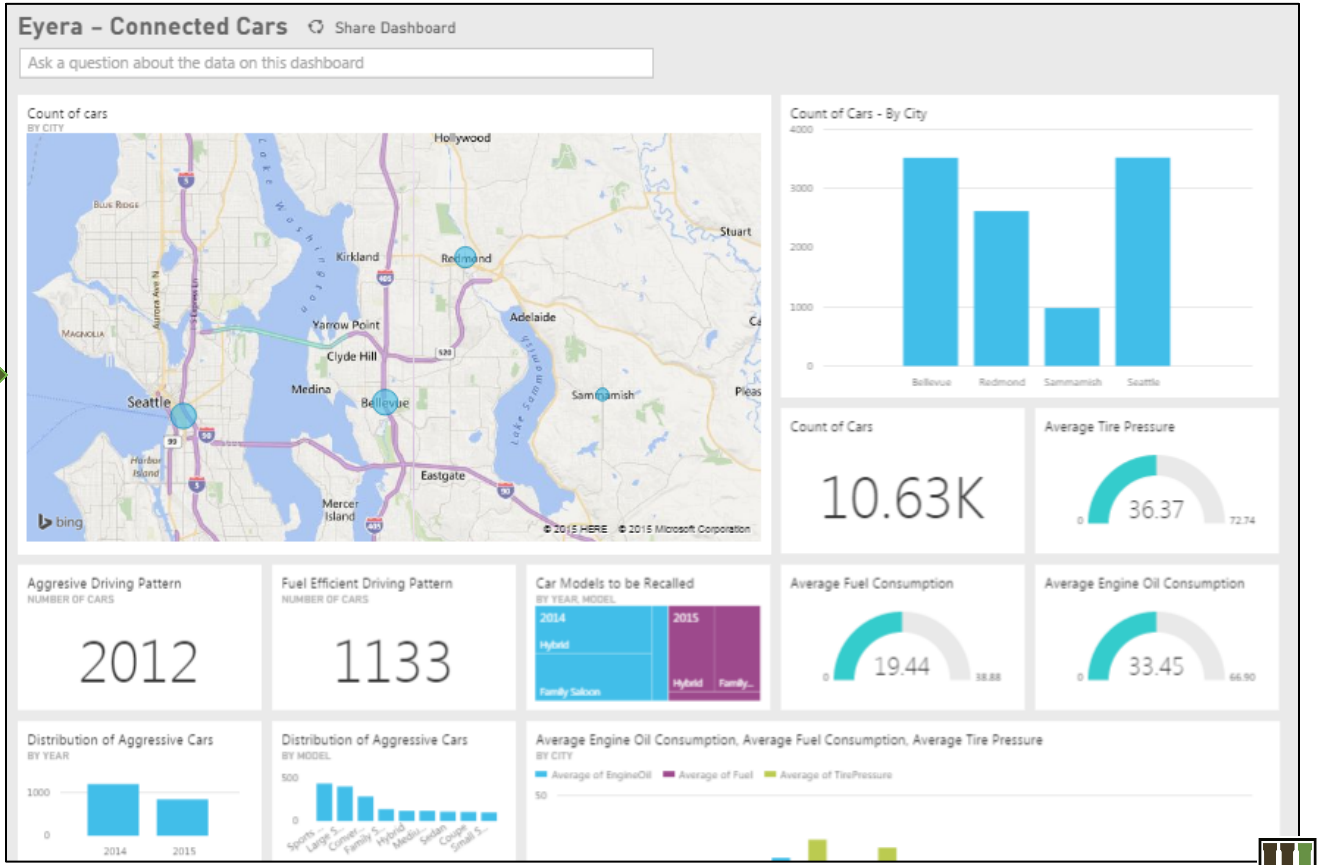
Any other visualization tool can also be used.

Power BI Dashboard

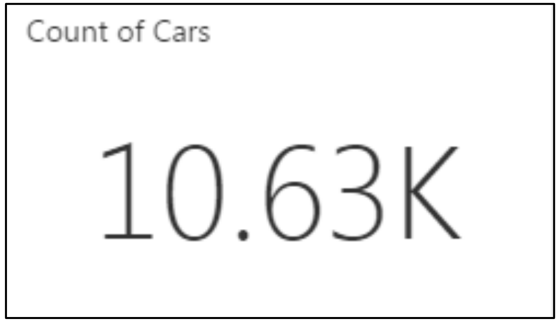
Dataset	Dataset Tables	Power BI Dashboard



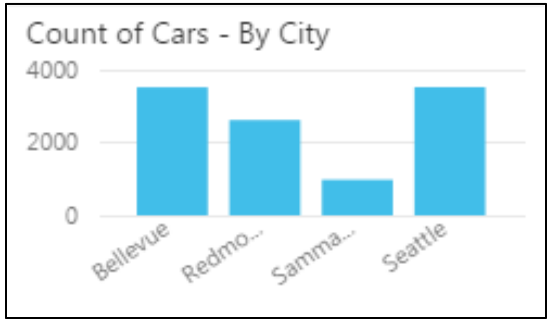




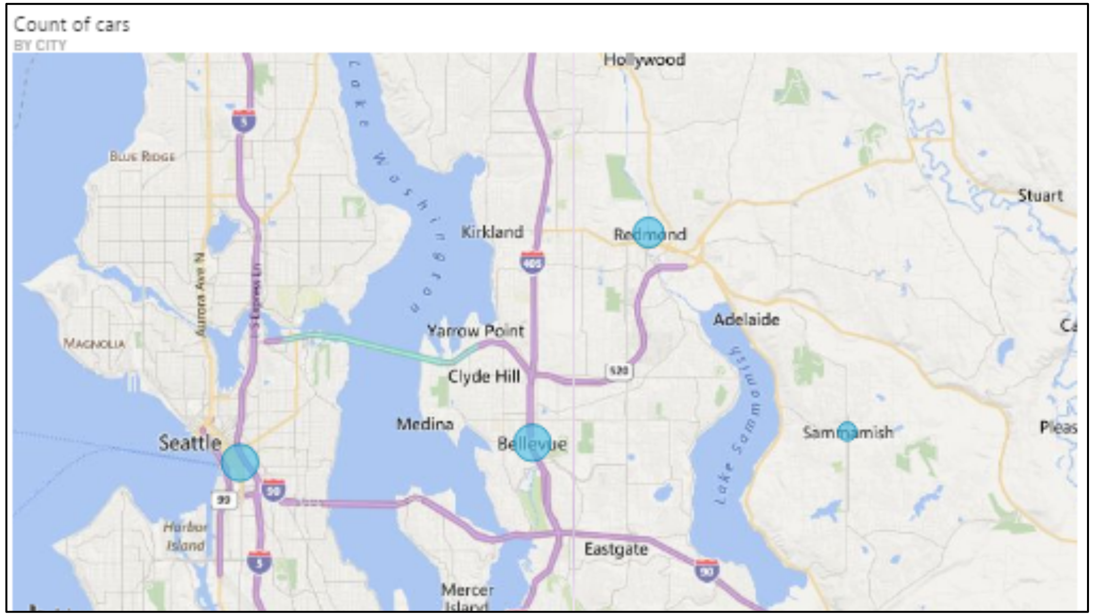
Power BI Dashboard



Displays number of cars which transmitted vehicle signals and diagnostic datasets.



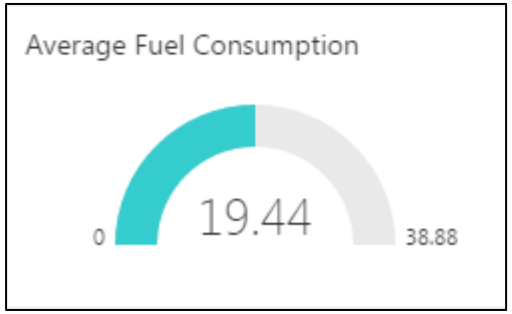
Displays comparison of count of cars by city.



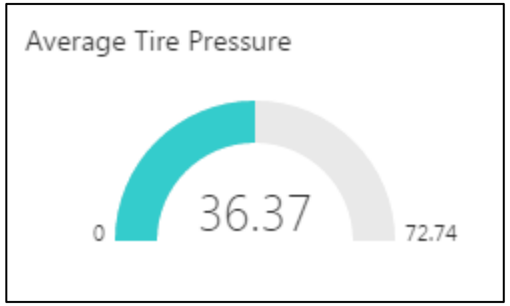
Visualizes the density of number of cars by city.

Power BI Dashboard

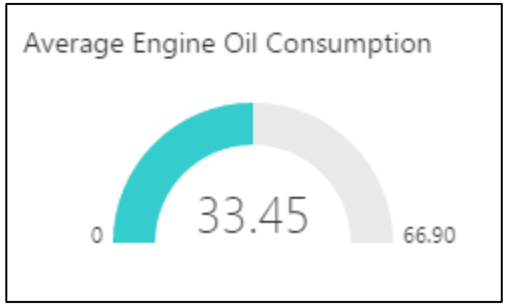
These charts are used to visualize vehicle health statistics



Displays average fuel consumed by car.



Displays average tire pressure required by car.

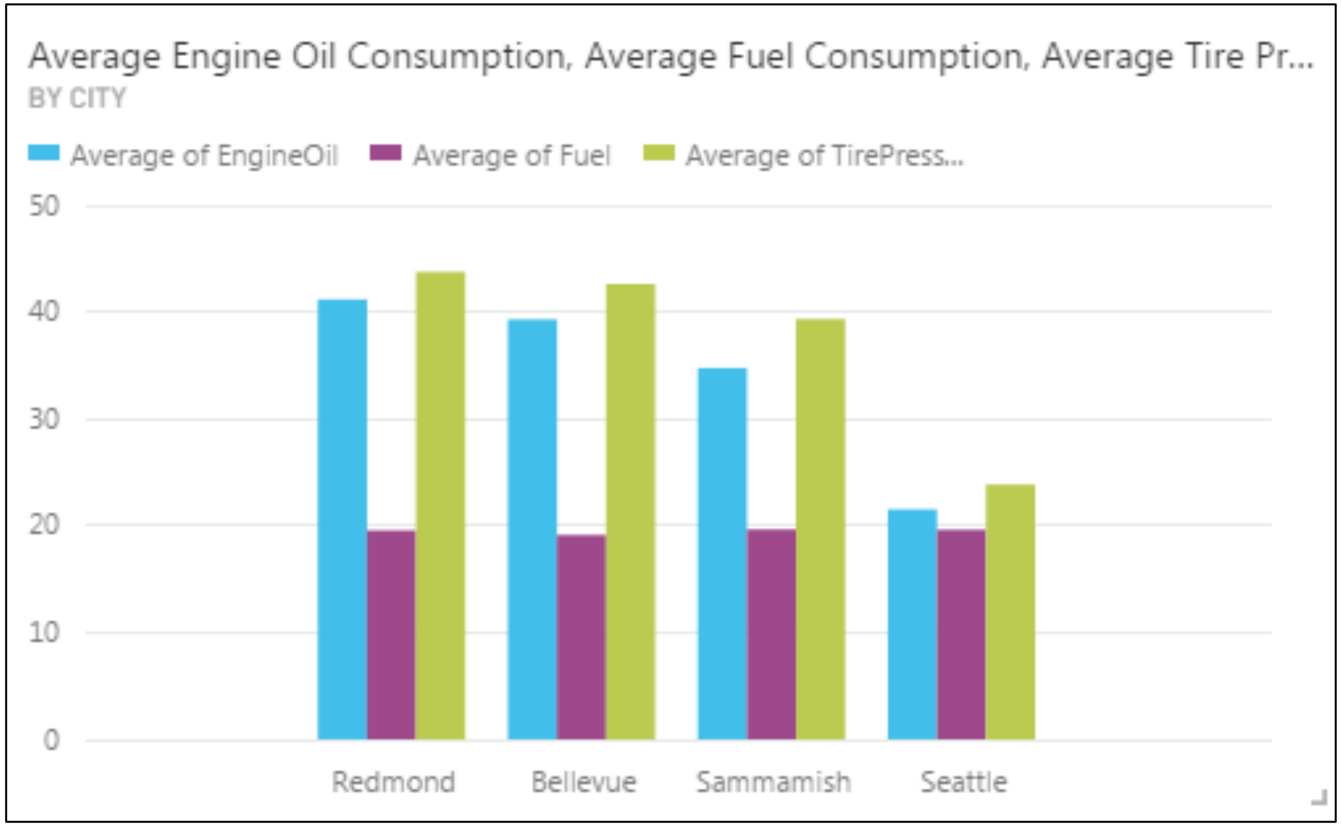


Displays average engine oil consumed by car.

Power BI Dashboard

Visualizes the comparison of following vehicle health parameters by city:

1. Average Engine Oil Consumption
2. Average Fuel Consumption
3. Average Tire Pressure

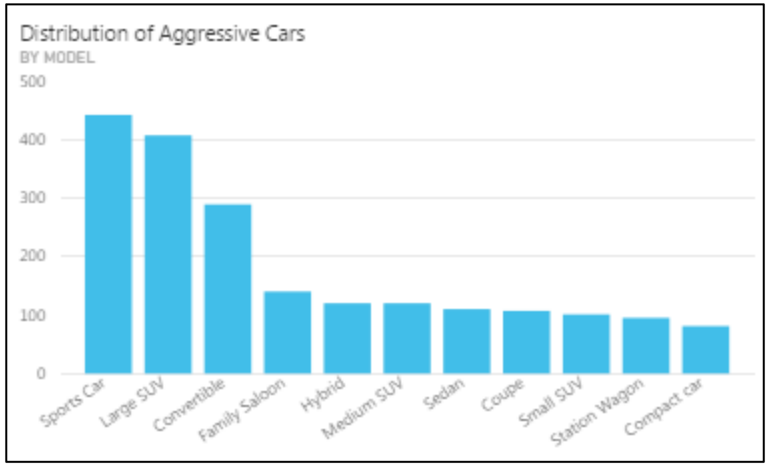


Power BI Dashboard

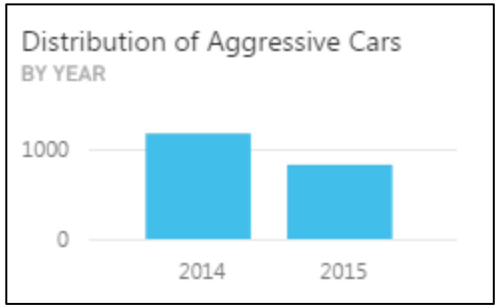
Visualize aggressive behavior of cars.

“Cars which are in greater than third gear position, speed is greater than 60 mph and brakes frequently”

Displays number of cars which exhibited aggressive driving pattern



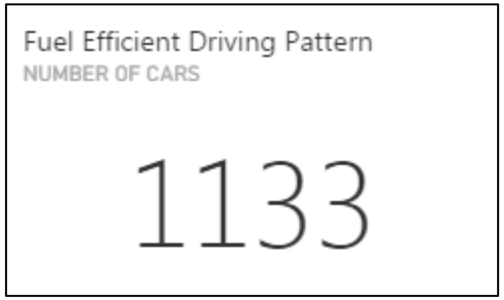
Distribution of aggressive cars by model helps to judge which car models show aggressive behaviour by driver.



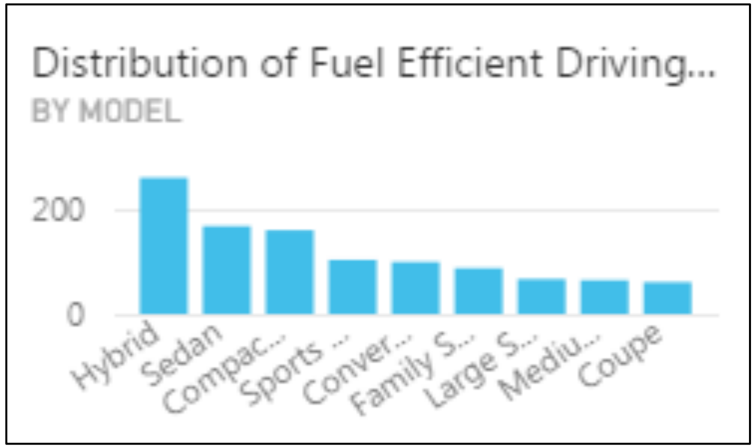
Compares which year cars exhibited more aggressive behaviour

Power BI Dashboard

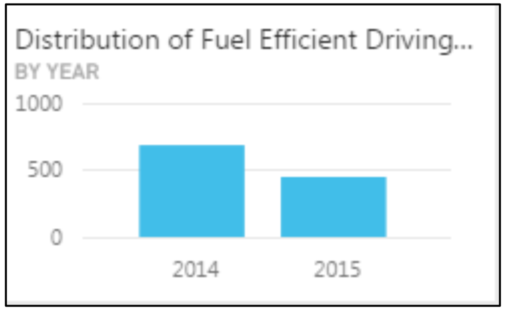
Visualize fuel efficient behavior of cars.
"Cars which are in greater than third gear position, speed is less than 60 mph, does not accelerate much and don't brake frequently"



Displays number of cars which exhibited fuel efficient driving pattern.



Displays the distribution of fuel efficient cars by model helps to judge which model is fuel efficient model.



Compares which year cars exhibited more fuel efficient behaviour.

Business Value

- Derives insights:
  - Performing Predictive Maintenance
  - Providing Proactive Alerting
- Improves the vehicle owner's experience
- Lowers the cost of operating vehicles
  - by providing insights on driving habits and fuel efficient driving behaviors.
- Businesses can learn proactively about customers and their driving patterns
  - Which can help make business decisions to provide the best in class products & services.

THIRD EYE

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Big Data ETL Tool – **Syra.io**