

Video Analytics Towards Vision Zero Partnership



*Transportation Research Board
Surrogate Measures of Safety
Subcommittee*

January 8, 2018

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City of Bellevue, WA

City of Bellevue, WA



Google Cloud Platform Live



ENVELOPVR



Smart City Solutions



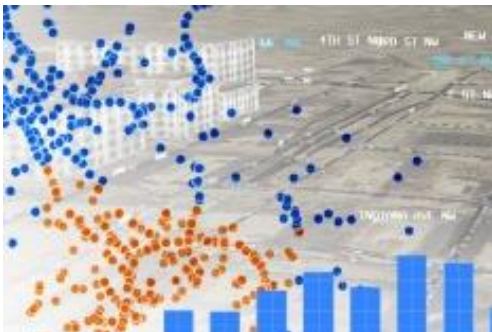
ADAPTIVE SIGNAL SYSTEM



VIDEO ANALYTICS PARTNERSHIP



CONNECTED VEHICLE PILOT



PERFORMANCE MEASURES



TRANSIT SIGNAL PRIORITY



LIGHTING CONTROLS

DNN Architecture

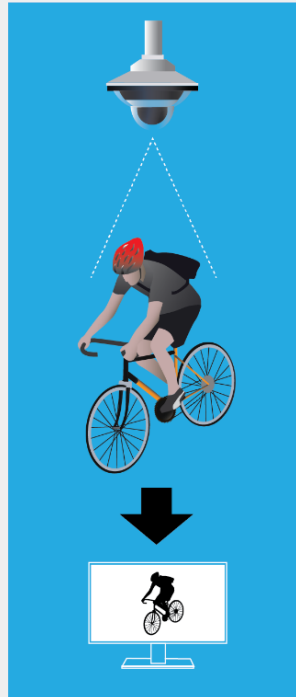
training

during the training phase, a neural network is fed thousands of labeled images of various objects, learning to classify them



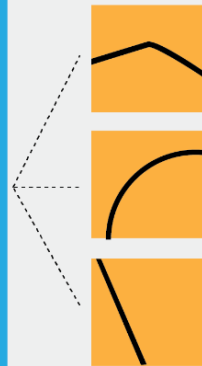
input

new image is shown to the pretrained network



first layer

the neurons respond to simple shapes, like edges



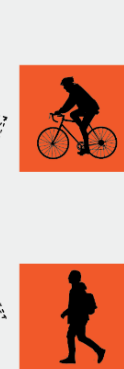
higher layer

the neurons respond to complex shapes



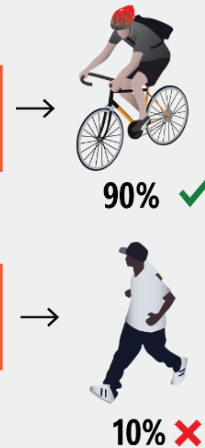
top layer

neurons respond to highly complex abstract concepts that we would identify as different objects

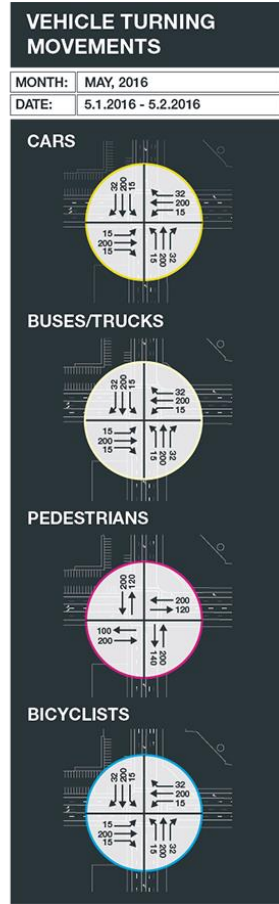
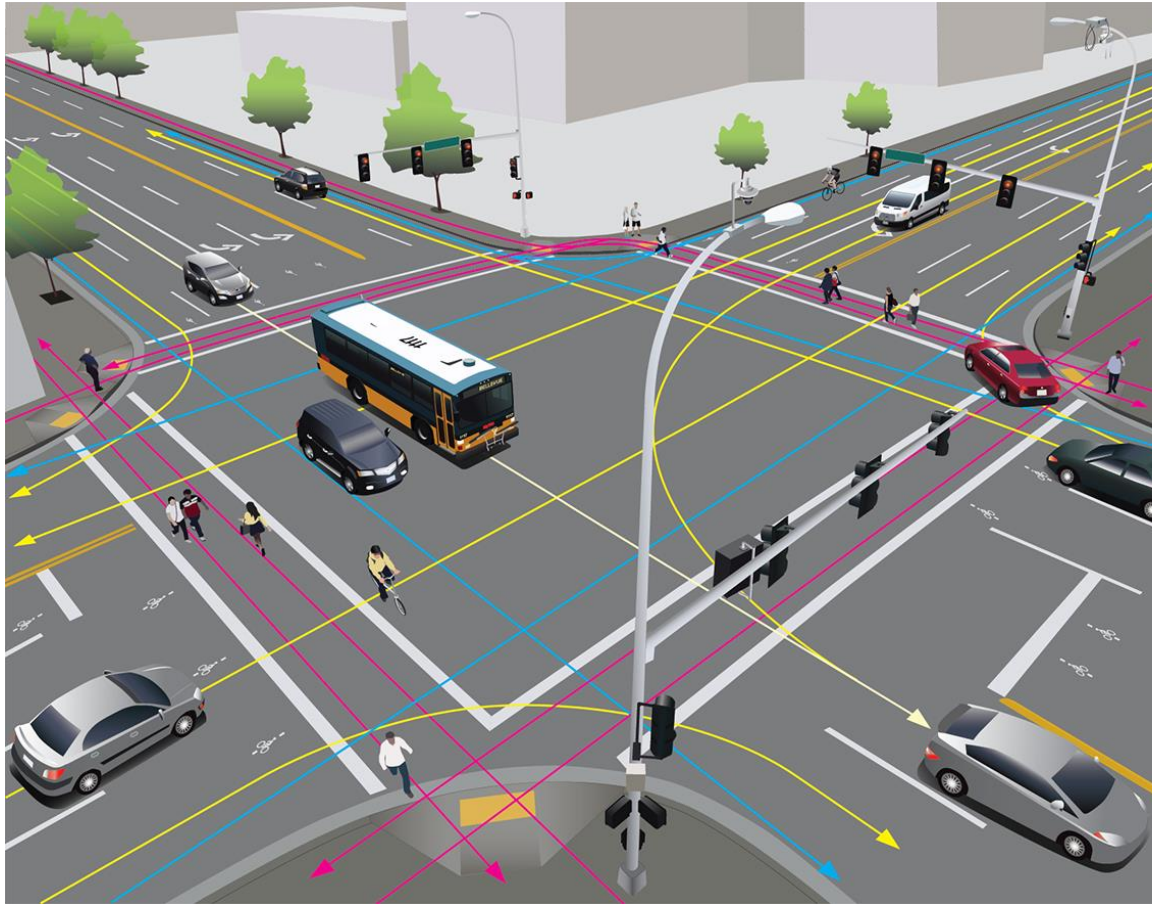


output

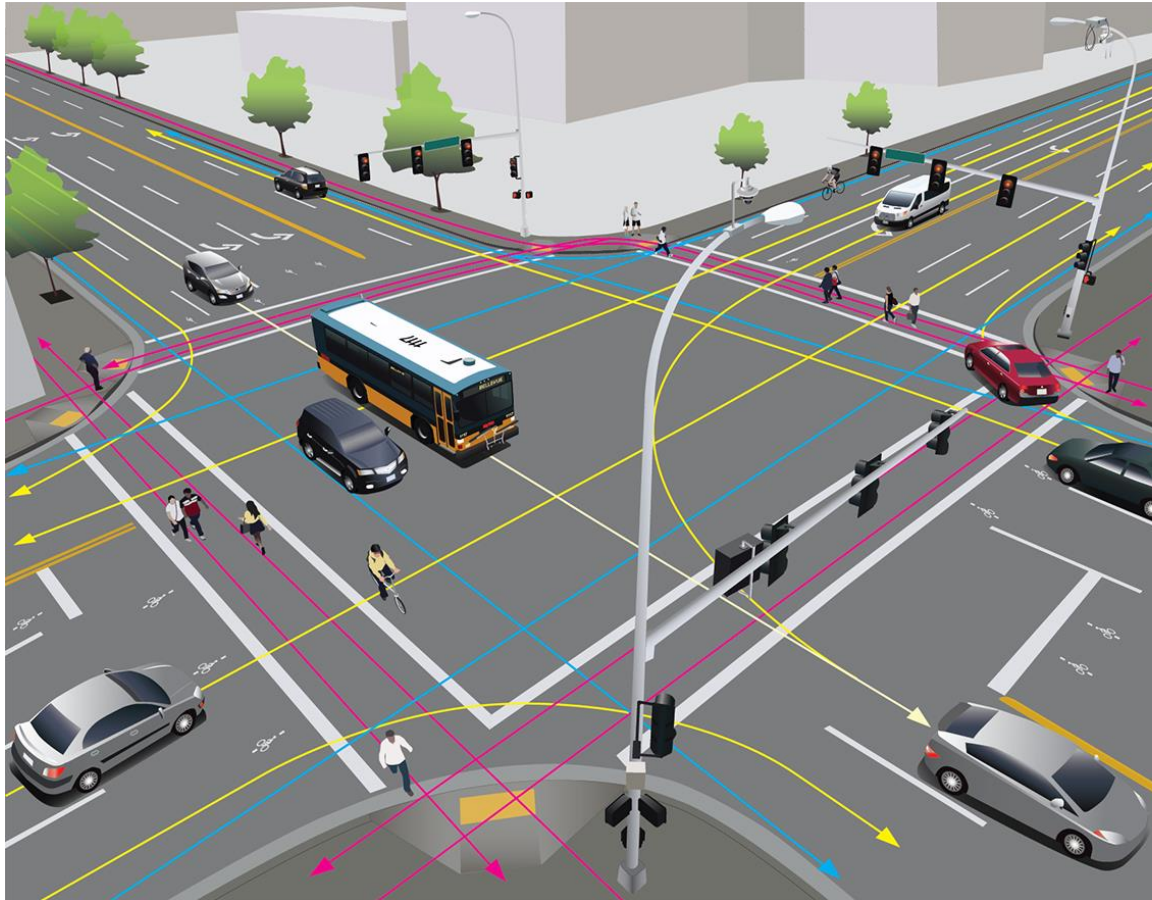
the network predicts what the object most likely is based on its training.



Turning Movements



Volume Charts



VEHICLE DISTRIBUTION CHARTS BY TIME OF DAY

MONTH:	MAY, 2016
DATE:	5.1.2016 - 5.1.2016

CARS



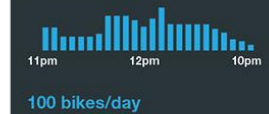
BUSES/TRUCKS



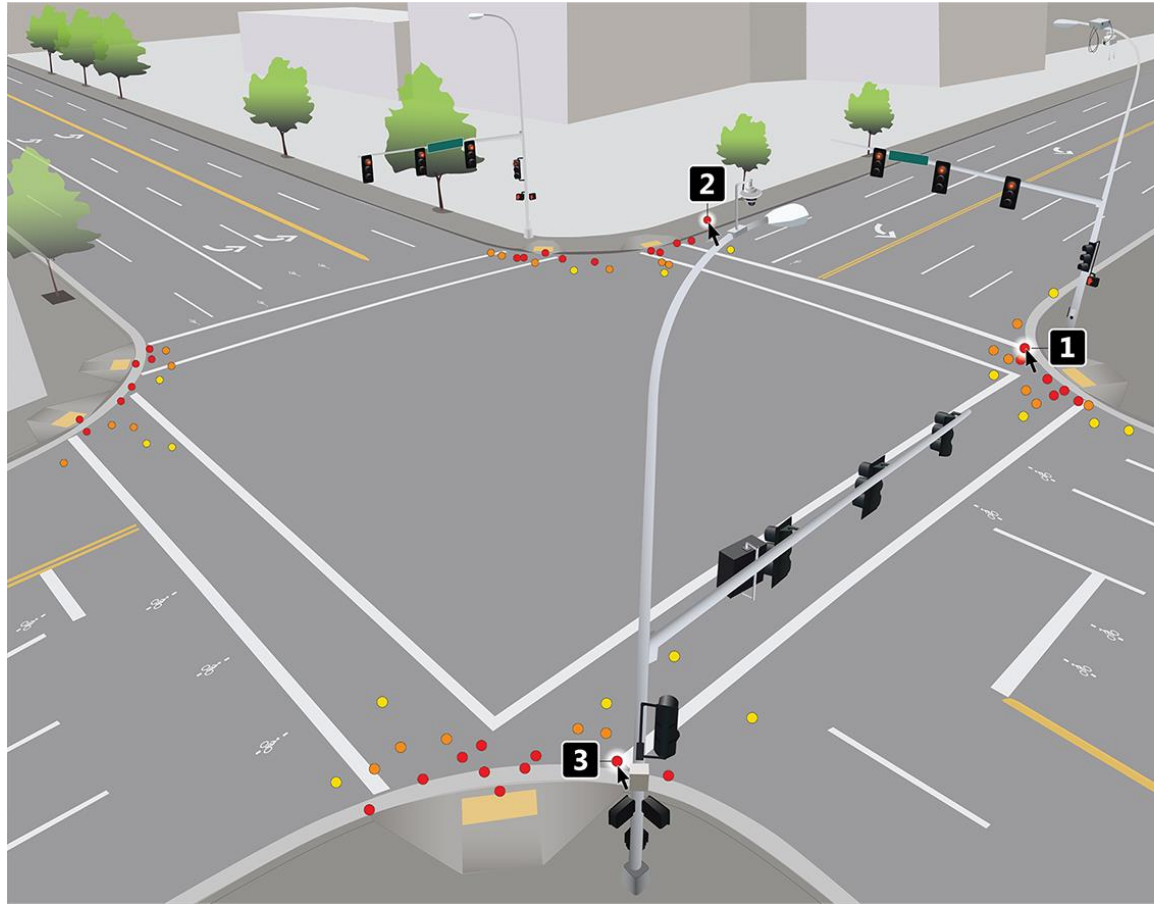
PEDESTRIANS



BICYCLISTS



Traffic Conflict Detection



QUANTITY, LOCATION & SEVERITY OF NEAR MISS EVENTS

MONTH:	MAY, 2016
DATE:	5.1.2016 - 5.31.2016

1

05/02/2016
00:20/02:40

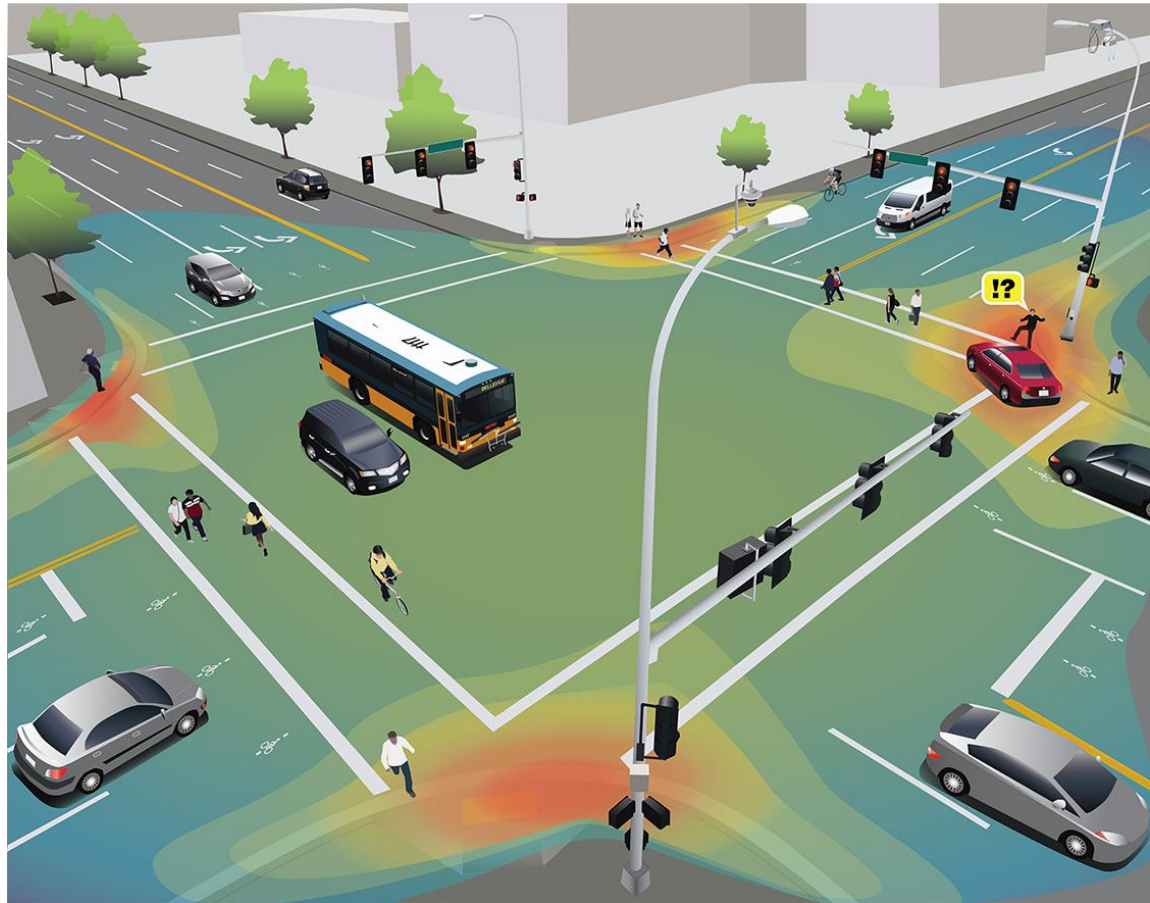
2

05/12/2016
00:07/02:40

3

05/19/2016
01:00/02:00

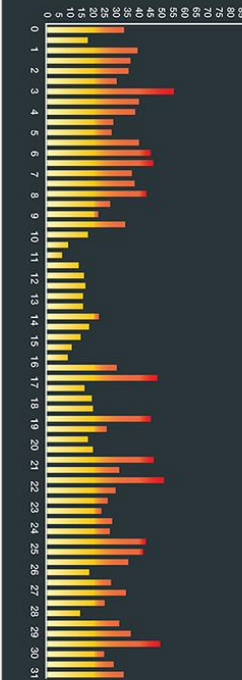
Traffic Conflict Detection



QUANTITY, LOCATION & SEVERITY OF NEAR MISS EVENTS

MONTH: MAY, 2016

DATE: 5.1.2016 - 5.31.2016



Crowdsourcing Initiative

Video Analytics towards Vision Zero

Worldwide problems demands bold action



- Worldwide 1.25 million people are killed annually in traffic accidents
- In 2016, road crashes resulted in 40,000 deaths and 4.6 million injuries in the United States.
- Crashes are preventable and we need not wait for someone to be killed or injured before we take action

Make a difference, teach computers to learn



- Unique opportunity to help prevent traffic crashes and save lives
- "Teach" our computers how to recognize vehicles, people walking and bicyclists
- Cities will be able to rapidly detect road conflicts and traffic engineers can then take preventative action to avoid crashes

Participate starting June →

<http://www.ite.org/visionzero/videoanalytics/>

Crowdsourcing Initiative

✓ Skip and Get Next Task

✓ Submit and Get Next Task

✓ Submit and Exit

✓ Exit

📄 Instructions

+ New Object

Annotate all objects of interest, moving, stationary, or obstructed, for the entire video.

2015-Sep-10 08:49:30.867 AM (PDT)



What type of object did you just annotate?

- Pedestrian
- BiCycle
- PedestrianWithStroller
- MotorBike
- Car
- Bus
- Truck
- WheelChair

Pedestrian 2

- Outside of view frame
- Temporarily not visible
- Crossing Road

Pedestrian 1

- Outside of view frame
- Temporarily not visible
- Crossing Road

In this video, please track all of these objects:

- Pedestrian
- BiCycle
- PedestrianWithStroller

⏮ Rewind

▶ Play

Disable Resize

Hide Boxes

Hide Labels

Slower

Slow

Normal

Fast

Media Coverage

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Human and computer vision unite to help Microsoft engineers stop traffic deaths

BY LISA STIFFLER on June 1, 2017 at 6:00 am

2 Comments | Share 801 | Tweet | Share 159 | 1800px | Email

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This special series focuses on important community issues, innovative solutions to societal challenges, and people and non-profit groups making an impact through technology.



Computer analysis of traffic videos could be used to create heat maps identifying dangerous intersections.

In the U.S., car crashes kill roughly 40,000 people a year. That's a loss of life equivalent to four to five 737 airplanes crashing every week.

"In no other setting would this level of fatality go unnoticed," said Franz Loewenherz,

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VIDEO: New traffic tech



KIRO 7 STUDIOS BELLEVUE

NEW AT 6

VOLUNTEERS NEEDED FOR NEW TRAFFIC TECH


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Hamilton partners with Microsoft on Vision Zero traffic initiative

By Sara Cain Reporter Global News



The City of Hamilton is partnering with tech giant Microsoft in a bid to improve road safety.

The company has jumped on board Hamilton's Vision Zero initiative as it has in other jurisdictions across Canada and the U.S.

WEATHER Toronto, ON 24° H: 25° L: 19°

Weather Overview

Traffic Travel times & Incidents

ADVERTISING

The 5 Most Influential Data Visualizations of All Time

DOWNLOAD NOW

VISION ZERO PROJECT



5:17 53°

KOMO NEWS 4

NATIONAL

STAY CONNECTED

TODAY 72° TONIGHT 49° TOMORROW 71°

KOMONews.com / WEATHER / SPORTS

Traffic Analytics Dashboard: 9/11 (8 – 9 AM)

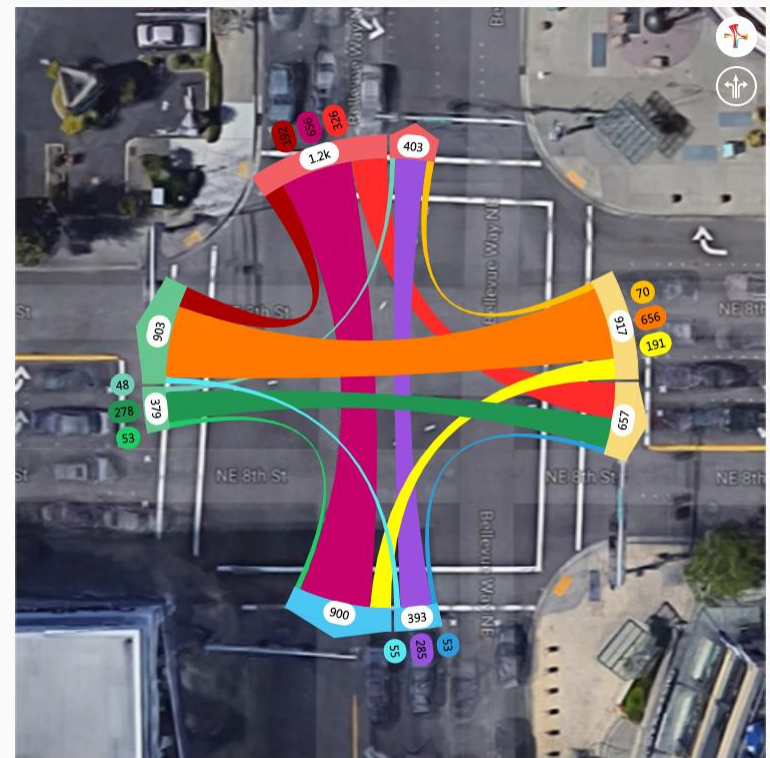
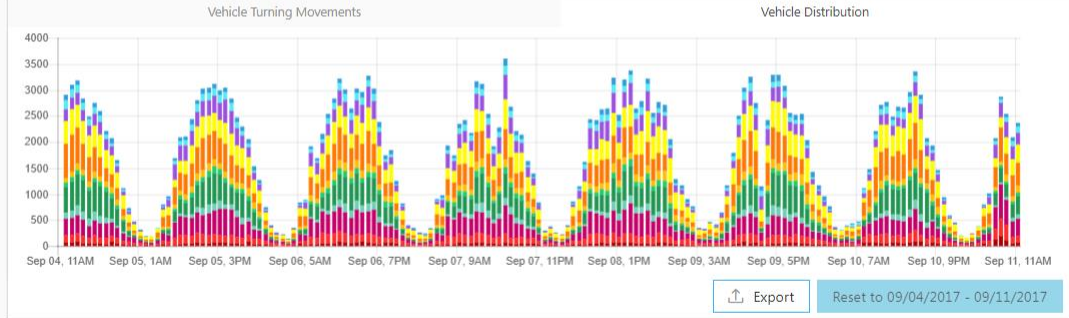
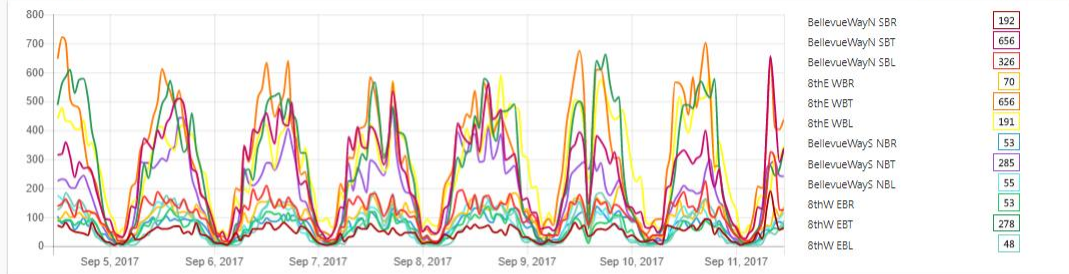


Microsoft Traffic Analytics

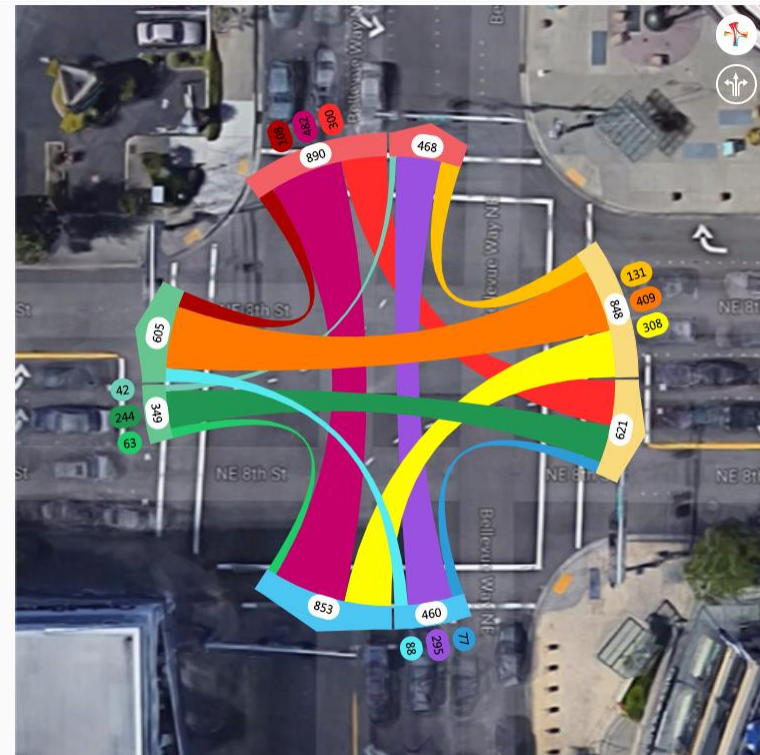
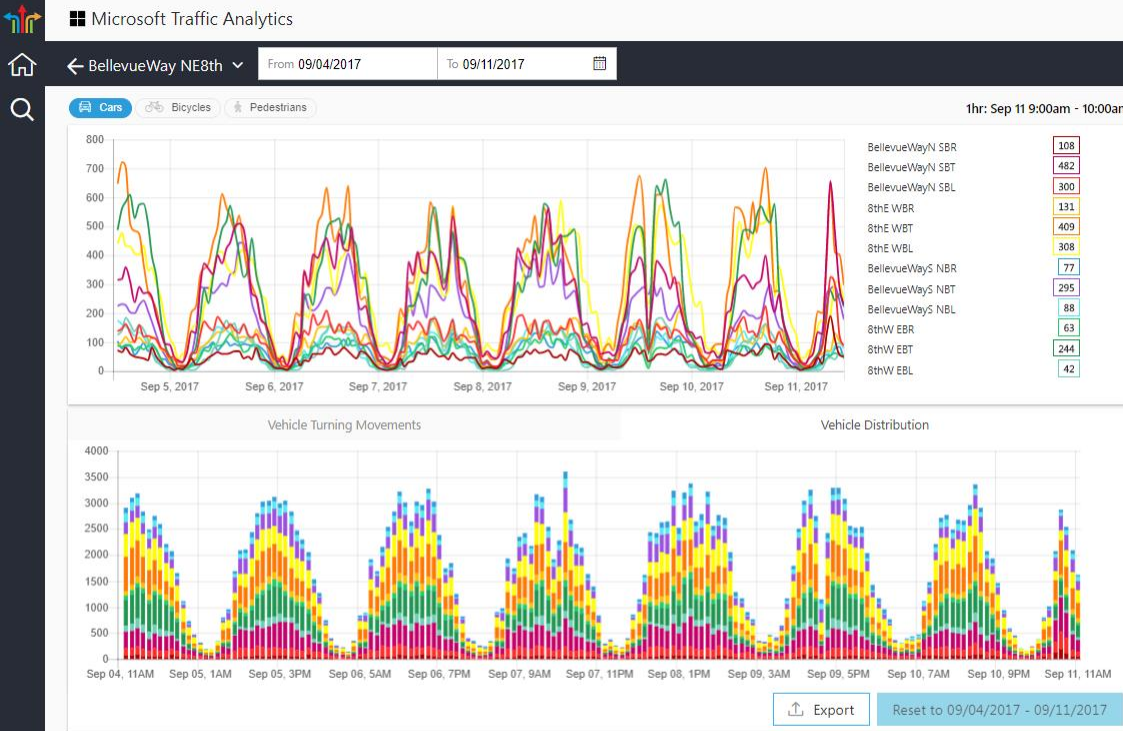
← BellevueWay NE8th | From 09/04/2017 | To 09/11/2017

Cars Bicycles Pedestrians

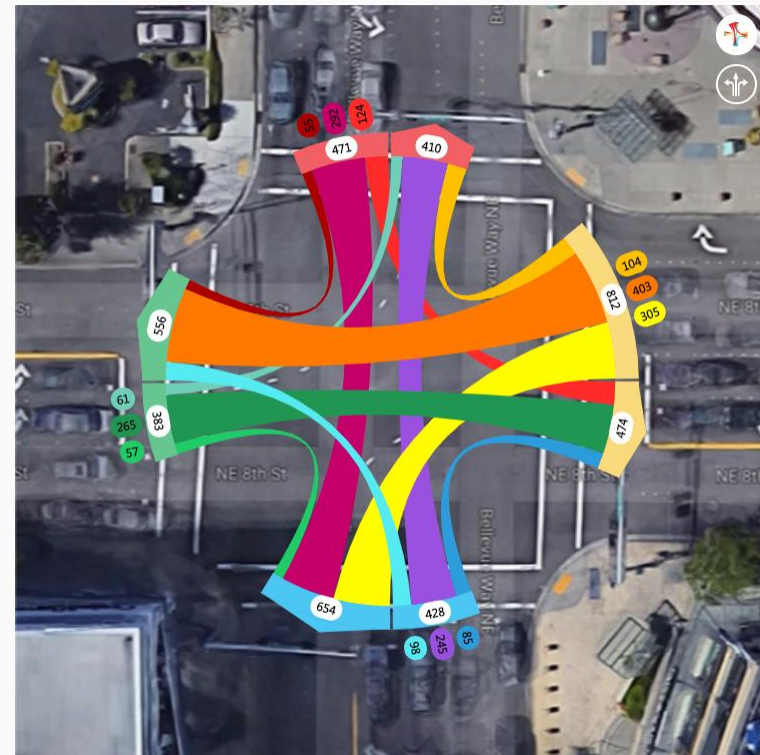
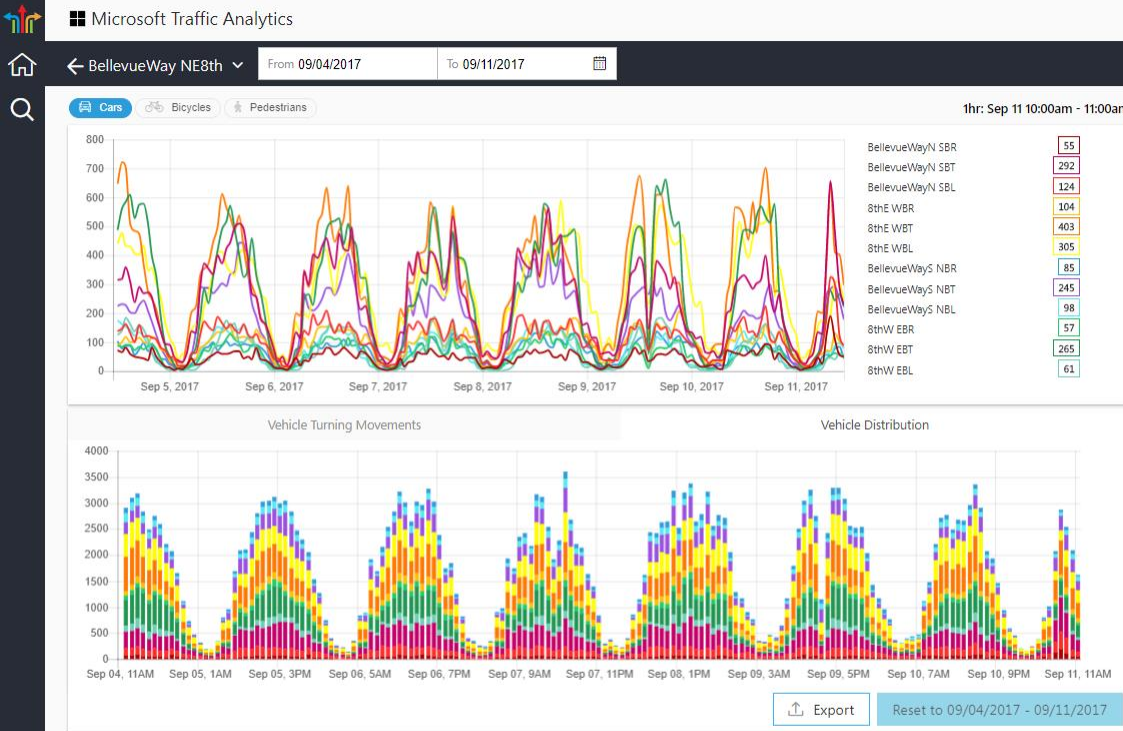
1hr: Sep 11 8:00am - 9:00am



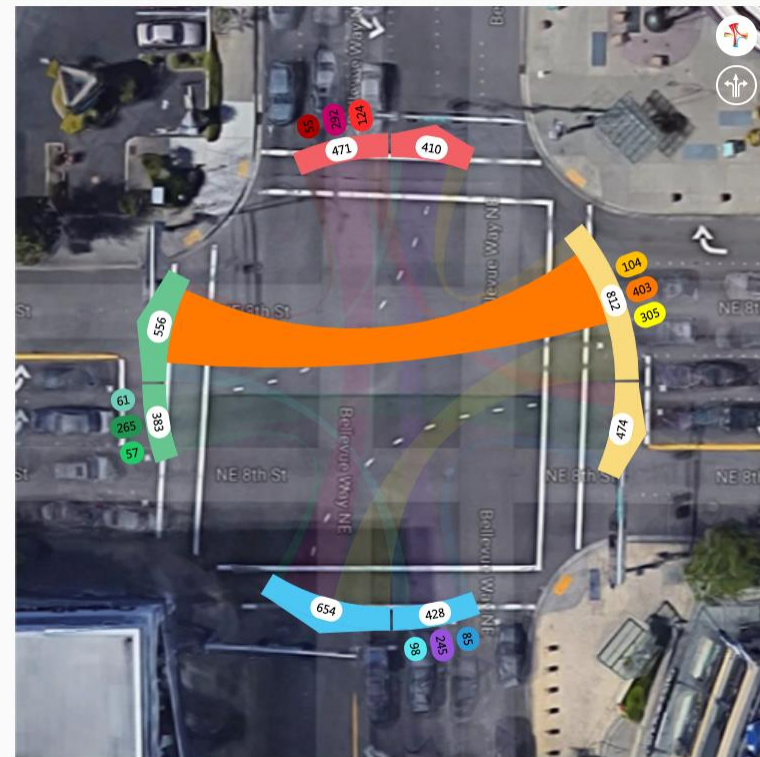
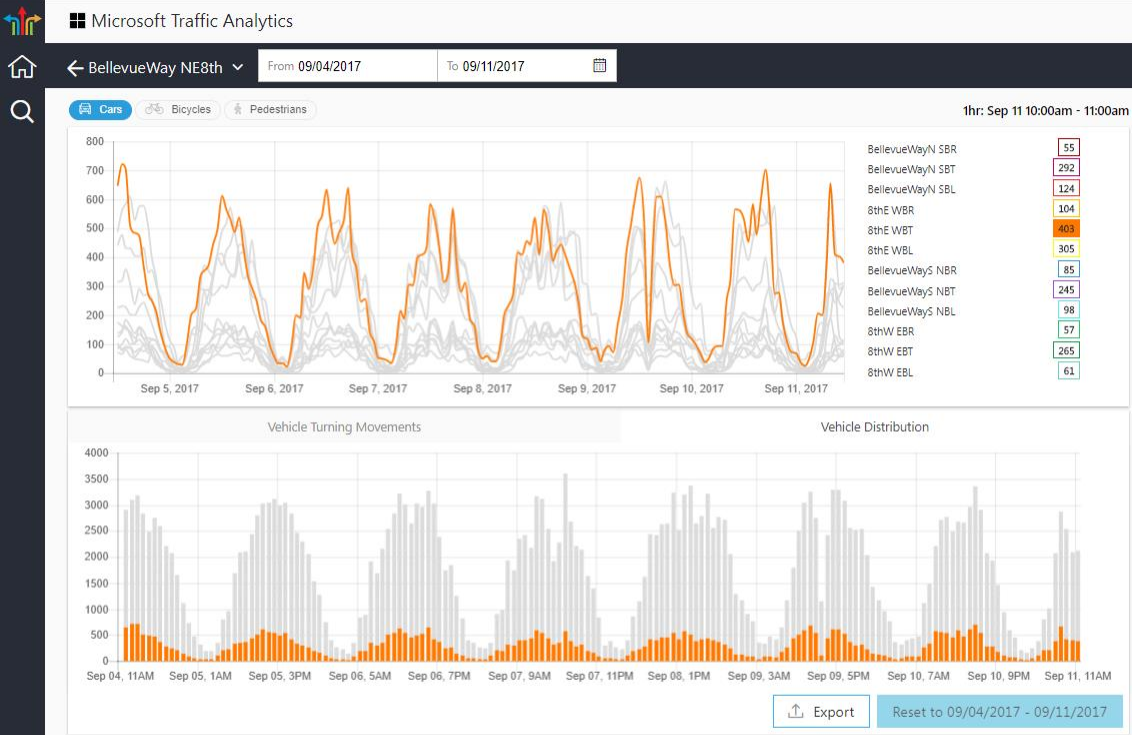
Traffic Analytics Dashboard: 9/11 (9 – 10 AM)



Traffic Analytics Dashboard: 9/11 (10 – 11 AM)



Traffic Analytics Dashboard: 9/11 (10 – 11 AM)



Enhancing Pedestrian & Bicycle Accuracy

**Synthia meets Physically-Based Rendering
(Preliminary Results: Work in Progress)**



December 2017

<https://youtu.be/I0UmWQJiiN8>

Consensus Standards

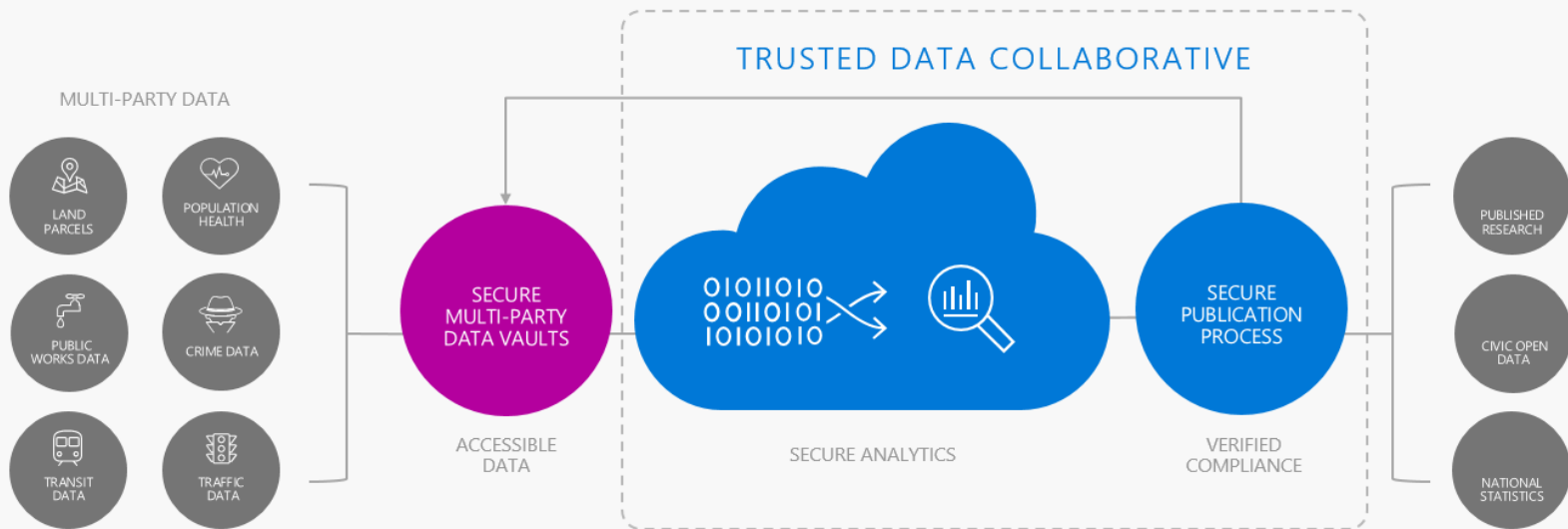


SAE International is creating a committee dedicated to developing open, consensus standards on surrogate (near-miss) measures of safety.

Deployment Strategy



A TRUSTED DATA PLATFORM



NEEDED
BUSINESS MODEL
INNOVATIONS

TRUST FRAMEWORKS | DATA TRUSTEES
DATA VALUE EXCHANGES & DATA MARKETS

Seeking Non-USA Partner Cities

- Continent: South America, Africa, Europe and Asia (except China)
- Number of cameras installed: 1,000-2,000
- Willingness to share video feeds

For More Information



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