



Pedestrian Exposure & Compliance:

Forecasting & Enhancing
Safety

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October 22, 2020





Overview

- Pedestrian Safety in Georgia
- Hazard v. Risk
- Old Data, New Methods
- New Methods, New Challenges
- Summary

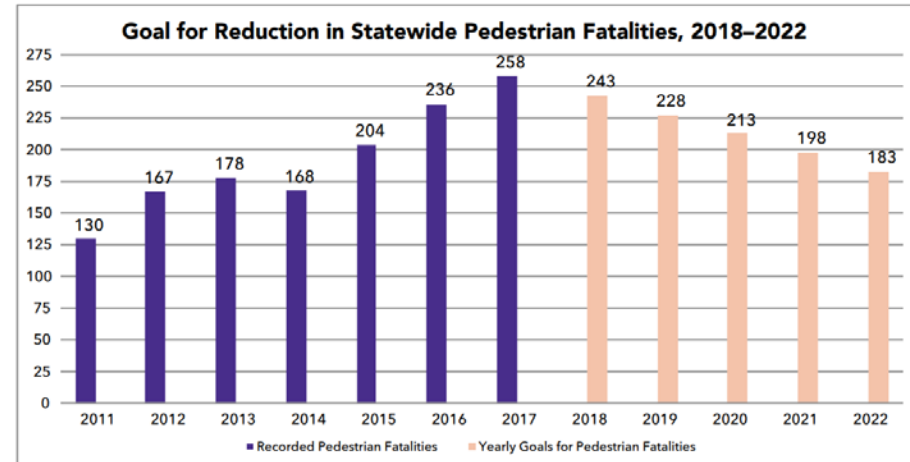
Pedestrian Safety in Georgia

Pedestrian Safety Action Plan (2017)

- Identifies the state of pedestrian safety in GA
- Promotes objective, **data-driven** decision making
- Highlights trend of pedestrian fatalities in GA

See & Be Seen Campaign

- Pedestrian component of “Drive Alert, Arrive Alive”
- Aims to make walking safer in Georgia
- Provides information about pedestrian crash contributing factors




PEDESTRIAN SAFETY IS A SHARED RESPONSIBILITY

33% of ped fatalities are attributed to motorists not yielding to pedestrians
33% are attributed to pedestrians
33% to other multiple factors

SEE & BE SEEN
GDOT

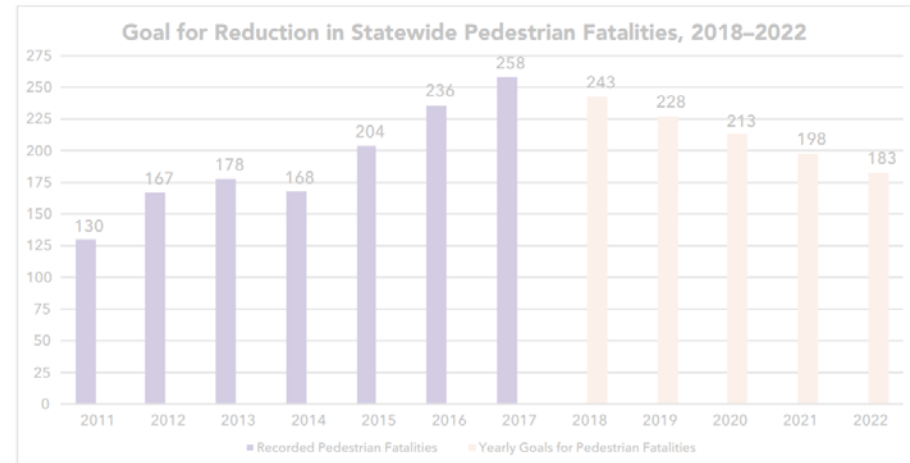
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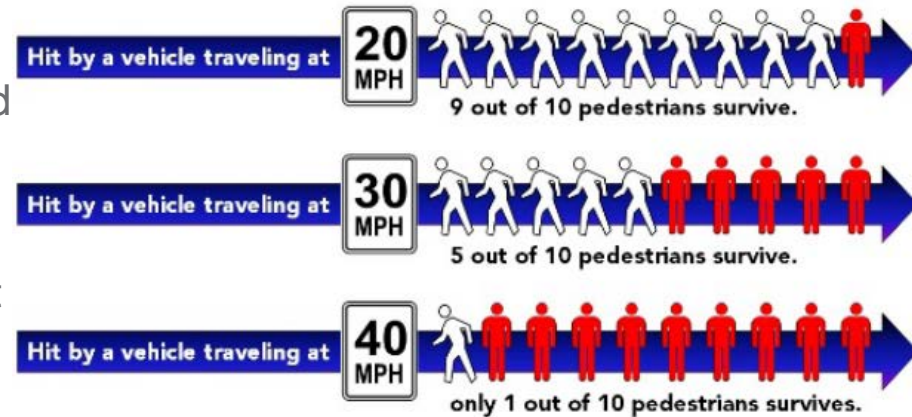
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Hazard Versus Risk

Pedestrian Crashes

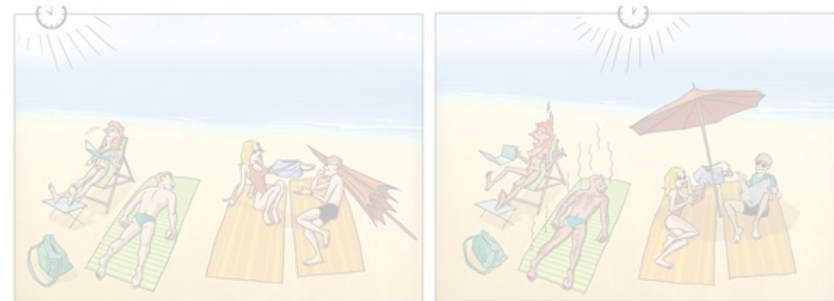
- The **hazard**, continuously studied and analyzed to assess safety
- May not be the whole picture
- How are pedestrians **exposed** to that hazard?



Pedestrian Safety Action Plan

Risk = Hazard * Exposure

- We're missing a piece of the equation
- What is exposure?
- How can we measure it for pedestrians?

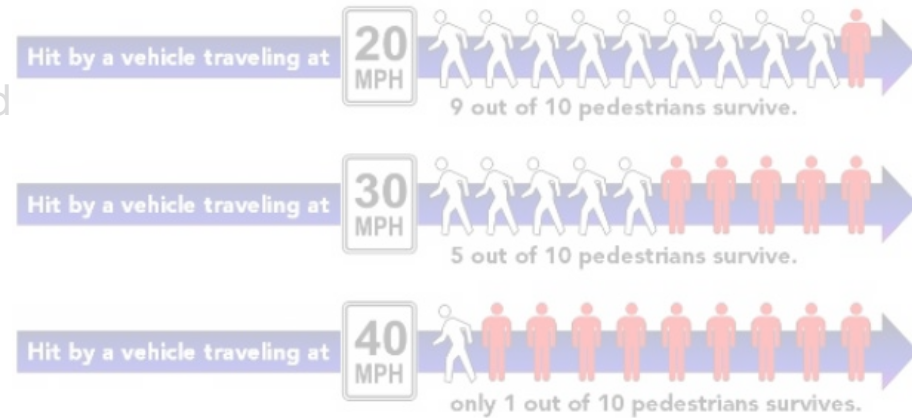


Toxicology Education Foundation

Hazard Versus Risk

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Old Data, New Methods

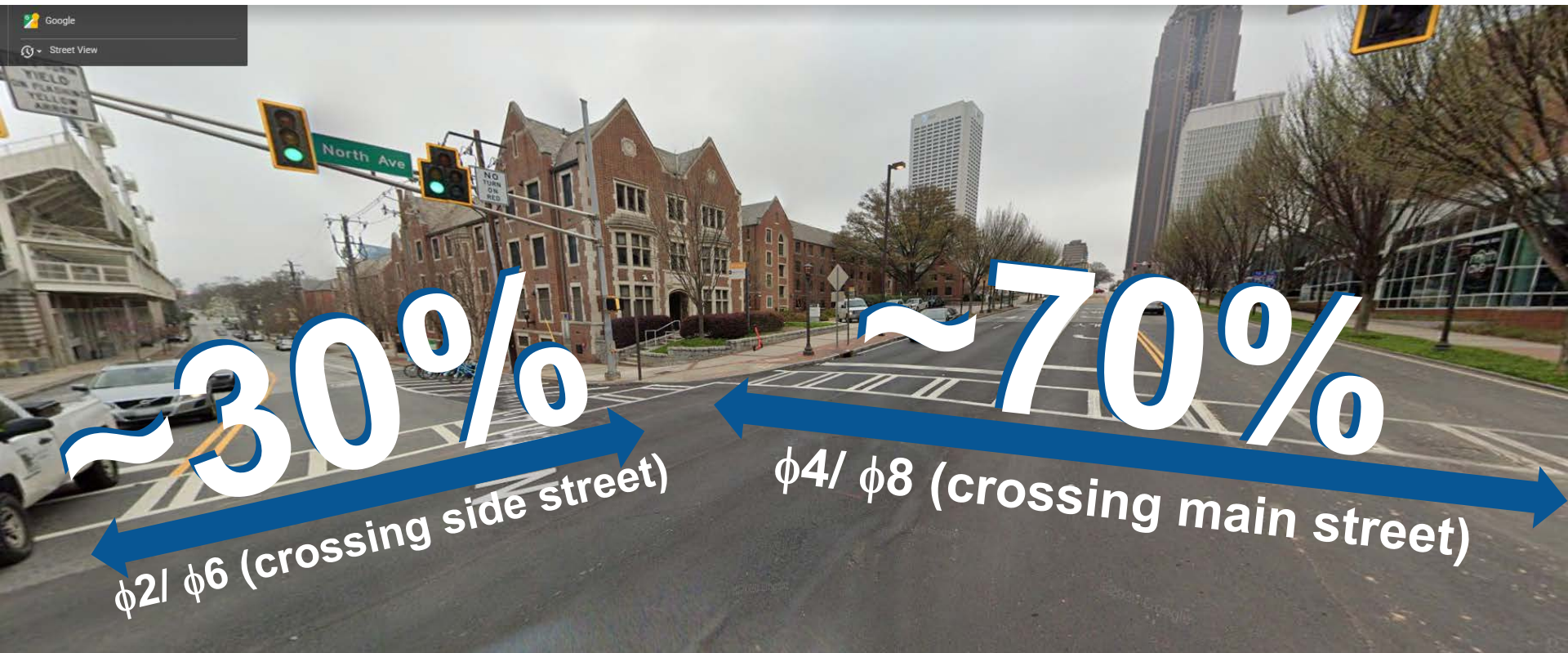
Exposure

- How, when, and where do pedestrians use infrastructure?
- Varies by intersection, time of day, etc.
- Affected by weather, lighting, etc.

Automated Traffic Signal Performance Measures (ATSPM)

- GDOT Database logging information from 9,500 signals statewide
- Includes timestamped detector events including vehicle detectors and push buttons
- 7,000 signals collecting push button data

How do Pedestrian Cross the Road?



At a **statewide** scale, for one year of data, pedestrians **~70%** of activations were for crossing the main street at the intersection

When do Pedestrians Cross?

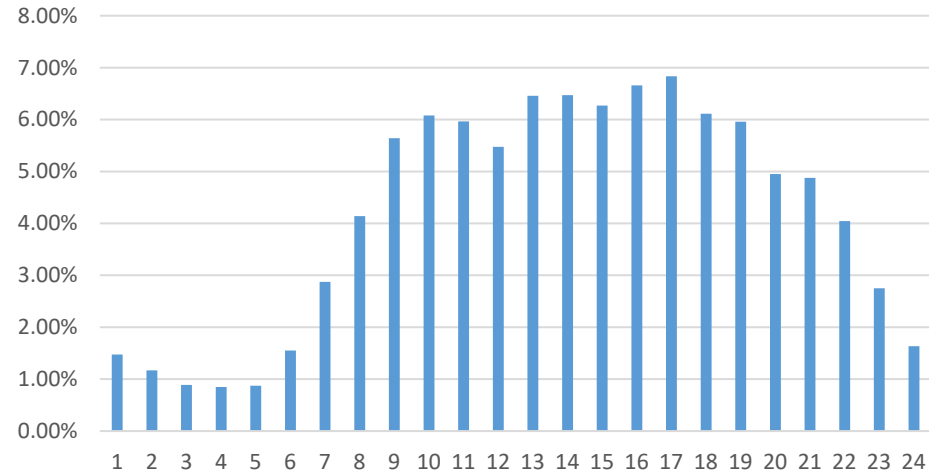
Crossing Times Statewide

- Hour: 3:45-4:45pm (7.39%)
- 15-min: 4:30-4:45pm

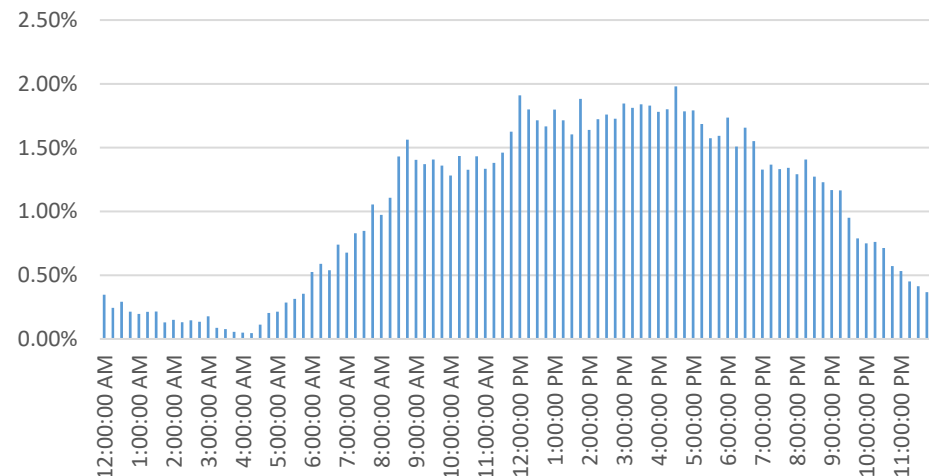
Crossing Overnight (8PM-6AM)

- Hour: 8-9pm w/ 24.2% of nighttime traffic
- 15-min: 8:15-8:30pm

Pedestrian Crossing Hours *



Pedestrian Crossing (15-minute Bins)*



*Data taken from a sample of +1M events in 2018

Where is Pedestrian Activity?

What areas are most Active?

- SR 13 / Buford Hwy
- SR 42 / Moreland Ave
- Peachtree Rd. in Buckhead
- Northside Dr. near GWCC



New Methods, New Challenges

Moving Forward with the Data

- Deduplication
- Coverage
- Group Crossings
- Button Pushing
- Actual Counts

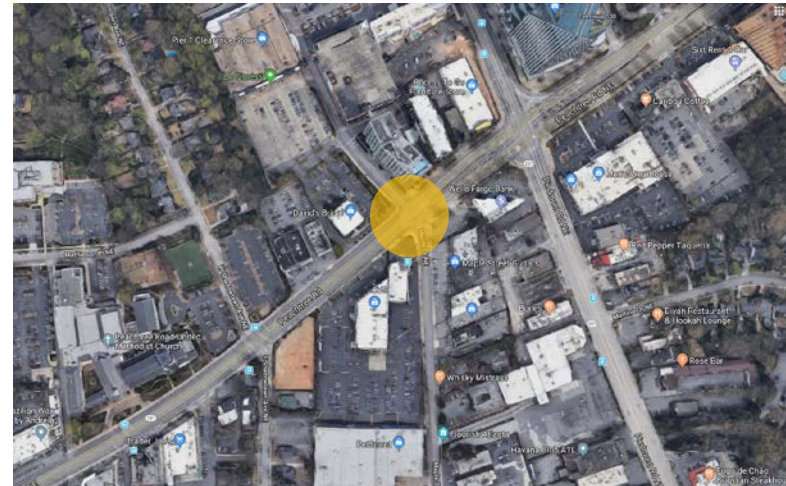
New Insights

- Estimate pedestrian activity
- Which intersections have the highest pedestrian activity between 8PM and 6AM?
- Which roads, with speeds >40mph, have the highest activity?
- Warn drivers of pedestrian activity through CV Technology

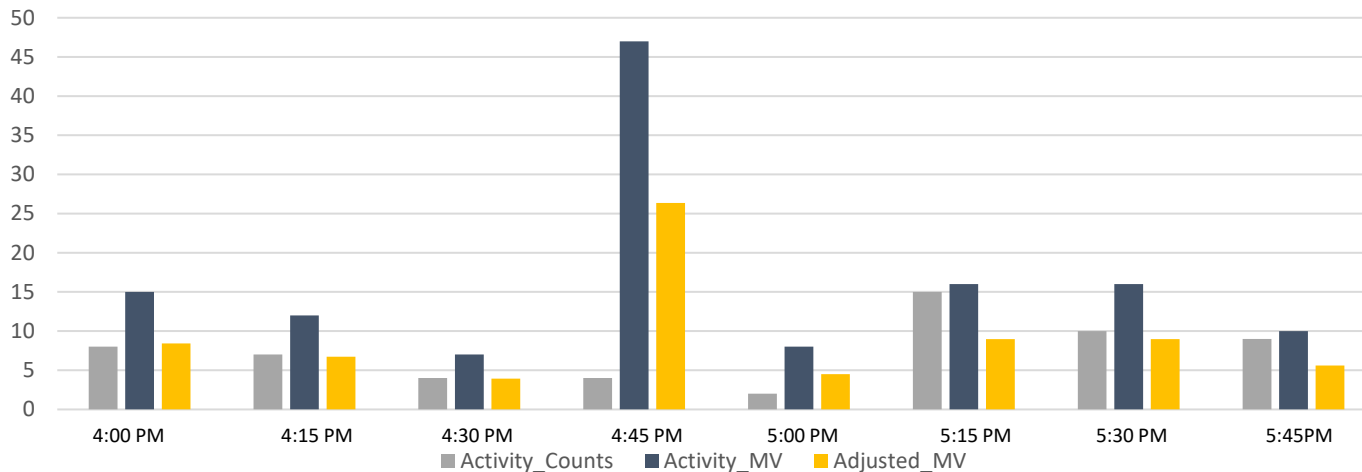
New Methods, New Challenges

Data v. Reality

- SR 141 @ Maple Dr. in Atlanta
- 1 Day
- Phases 4&8 from 4:00-6:00pm
- $(\text{Counts} / \text{Total MV Events}) = \sim 0.56$



102_ SR 141 @ Maple Dr Actual Counts vs Push Button Activity



Summary

- Pedestrian **exposure** helps provide context around pedestrian safety and can be estimated using ATSPM
- Because of data **volume** and **complexities**, the data must be processed to extract useful information but...
- Through refining data, we can discover more about **how, when, and where pedestrians are active**
- This requires **no new infrastructure**, only processing of currently collected and historic data
- This data can be combined with other data sets to **gain new insights** beneficial to pedestrian safety

Thank You!

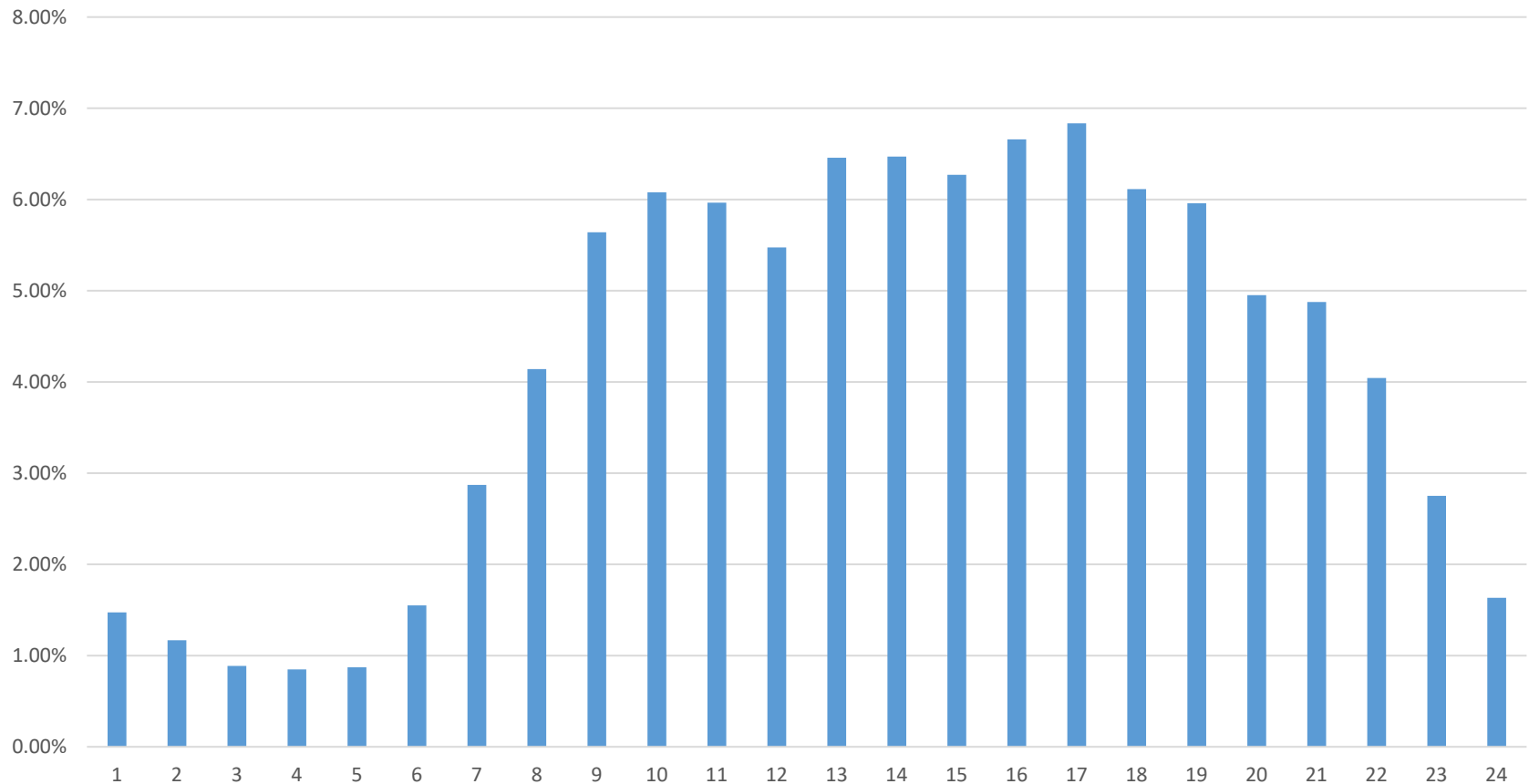
Questions?

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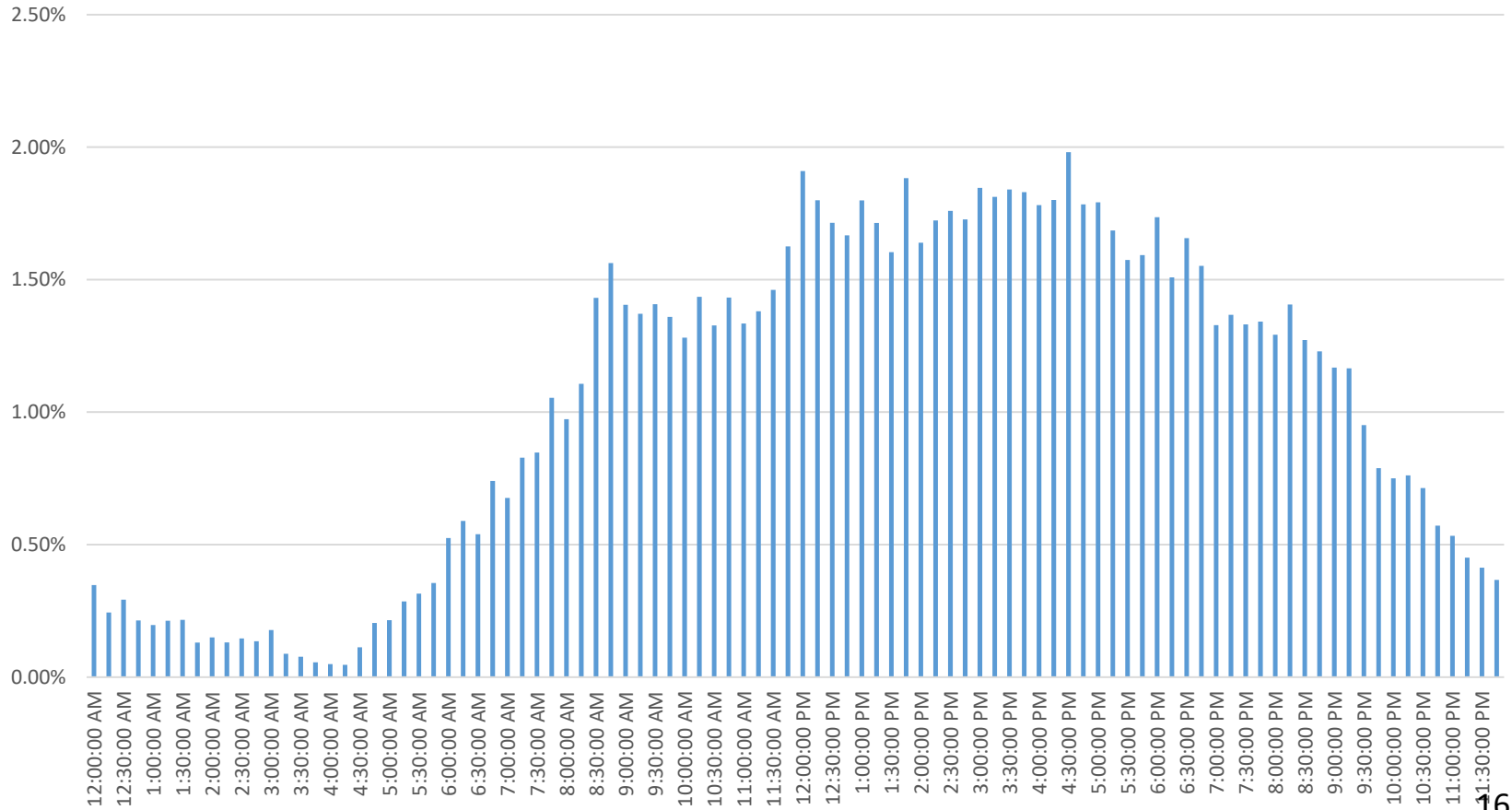
Statewide Hourly Data

Data from 1.1M Events in July 2018



Statewide Hourly Data

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ATSPM Data

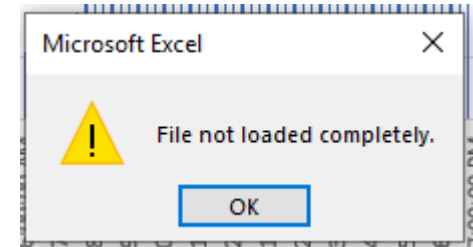
	A	B	C	D
1	7/2/18 8:30 AM	8	90	4
2	7/2/18 8:30 AM	8	89	4
3	7/2/18 8:30 AM	8	90	4
4	7/2/18 8:30 AM	8	89	4
5	7/2/18 8:45 AM	8	90	8
6	7/2/18 8:45 AM	8	89	8
7	7/2/18 8:45 AM	8	90	8
8	7/2/18 8:45 AM	8	89	8
9	7/2/18 8:49 AM	8	90	4
10	7/2/18 8:49 AM	8	89	4
11	7/2/18 8:49 AM	8	90	4
12	7/2/18 8:49 AM	8	89	4
13	7/2/18 8:49 AM	8	90	4
14	7/2/18 8:49 AM	8	89	4
15	7/2/18 8:49 AM	8	90	4

A – Date and Time (0.1s resolution)

B – Device Id (Location)

C – Event Code (On/Off)

D – Parameter (Phase)



Count: 1048576
=2²⁰ Events

DeviceId	month	day	hour	Latitude	Longitude	main	Activity	Activity_N	Light
831	April	16	6	34.08611	-84.52434	SR 92 @ Woodpark Place	296	162.8	0
831	Sept	28	5	34.08611	-84.52434	SR 92 @ Woodpark Place	237	130.35	0
478	August	14	7	33.89032	-84.75127	SR 6 @ Lake Road / Depot Drive	227	124.85	0
841	Nov	24	22	34.08542	-84.55164	SR 92 @ Concord Road	219	120.45	0
837	July	24	10	34.08786	-84.47141	SR 92 @ South Cherokee	213	117.15	1
852	Jan	9	21	34.08773	-84.48456	SR 92 @ Trickum Road	206	113.3	0
528	Sept	9	14	33.91138	-84.82603	SR 61 @ Thomas B. Murphy Drive	202	111.1	1
842	June	5	14	34.085	-84.5537	SR 92 @ Downsby Road	187	102.85	1
7388	August	11	0	34.7979	-84.96217	SR 3 / Dalton Bypass @ SR 71 / Cleveland Highway / Glenwood Avenue	184	101.2	0
288	August	16	8	34.17597	-84.79341	SR 61 @ MLK Jr. Blvd	180.5	99.275	1

.55 normalizing factor added
based on Counts Data
comparison

Post Hack-A-Thon Data Cleaning

From 305+ Million (12 months) rows to a more manageable data set

215+ million – Phased 4 and 8

129+ million – ^ de-duped

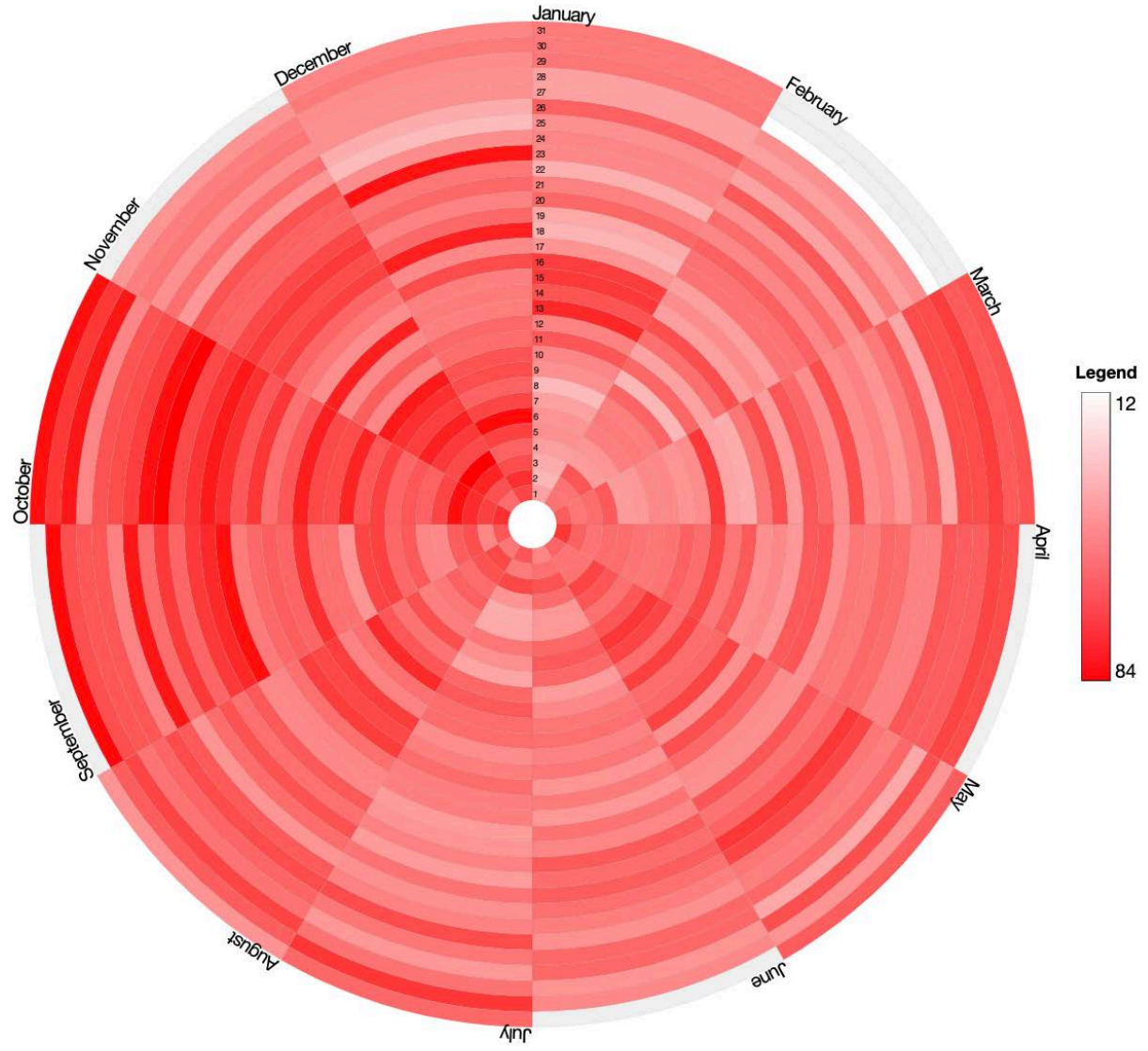
68+ million – April – June 2019

Preparing for new ML

```
SELECT month, weekday, day, hour, minute, COUNT(EventId)
AS activity
FROM `[dataset]`
WHERE EventId = 89 (Off) OR EventId = 90 (On)
GROUP BY month, weekday, day, hour, minute, Parameter ,
DeviceID
```



Ped+Bike Crash Data (5 yr)



Incident count: 79