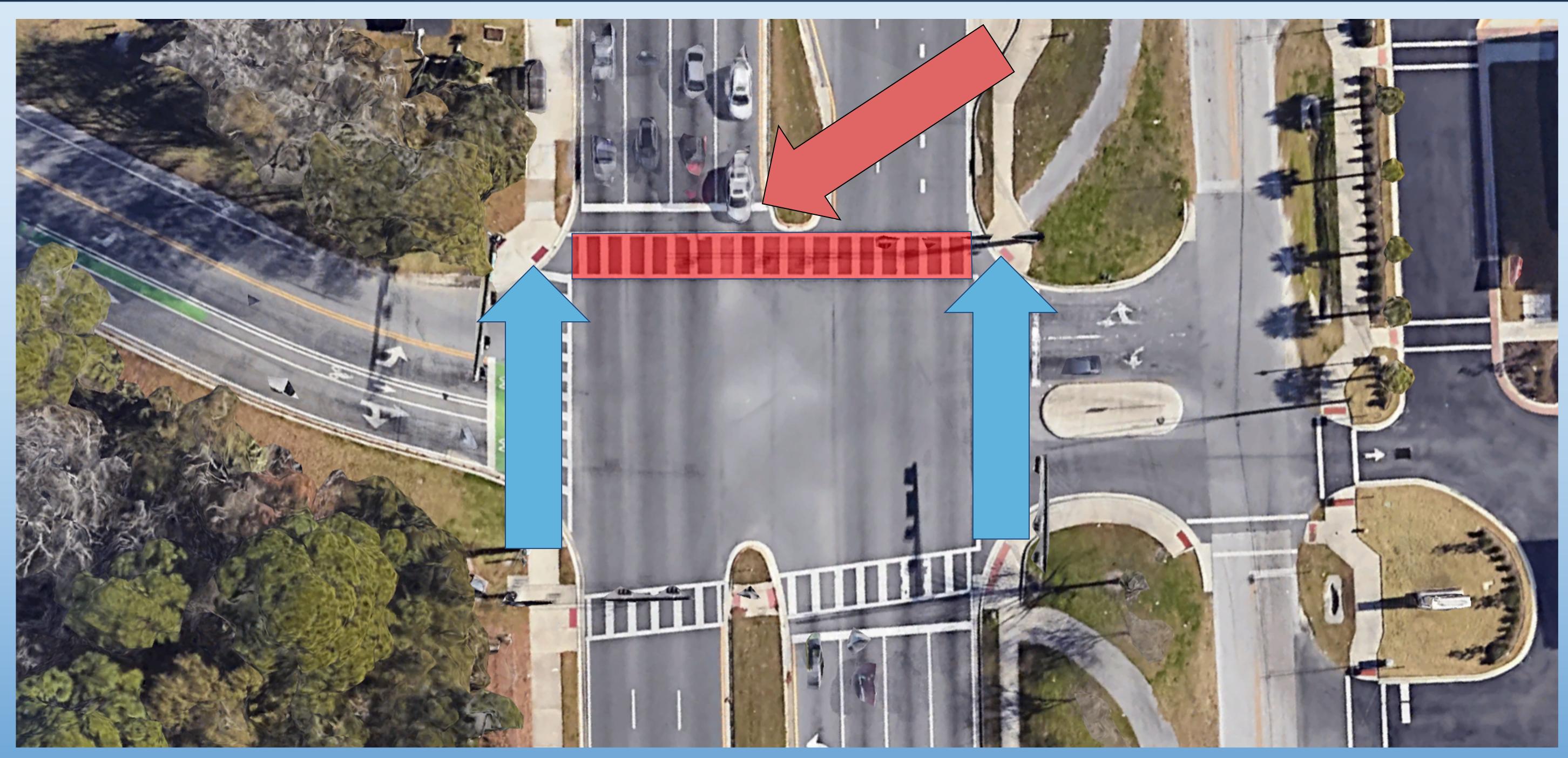


AI IN THE BUILT ENVIRONMENT

Presentation by Ryan Lester
Fall 2023

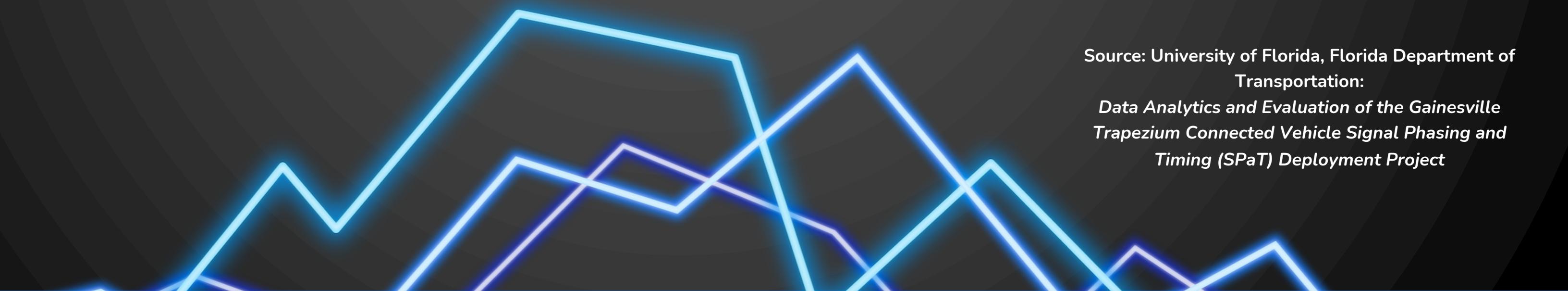
Problem



35,000

Daily Traffic Volume on Archer Rd.

Source: University of Florida, Florida Department of
Transportation:
*Data Analytics and Evaluation of the Gainesville
Trapezium Connected Vehicle Signal Phasing and
Timing (SPaT) Deployment Project*



Year	13th St	34th St	Archer Rd	W Univ. Ave	Total Crashes
2015	1	3	1	8	13
2016	2	1	5	8	16
2017	2	5	9	4	20
2018	2	3	4	3	12
2019	1	3	0	9	13
Total	8	15	19	32	74

Pedestrian Crashes Per Year

Day of the Week	13th St	34th St	Archer Rd	W Univ. Ave	Total Crashes
Sunday	1	2	0	2	5
Monday	2	3	8	4	17
Tuesday	2	1	4	3	10
Wednesday	1	3	1	6	11
Thursday	0	1	1	5	7
Friday	1	2	2	7	12
Saturday	1	3	3	5	12
Total	8	15	19	32	74

Source: University of Florida, Florida Department of Transportation:

Data Analytics and Evaluation of the Gainesville Trapezium Connected Vehicle Signal Phasing and Timing (SPaT) Deployment Project

Pedestrian Crashes by Day of Week

How can the frequency of vehicle-pedestrian interaction be assessed using AI?

OBSERVATION

- Cars regularly invade crosswalk space for pedestrians at this intersection on Archer Rd.
- Typically SUVs and larger vehicles.

Data Preparation

- What is my input and output?
- What are the most relevant AI tools that I can use to analyze this issue?
- When would be the best time of day to conduct this study?

Data Collection

- Decided on using an object detection model.
- Used drone to collect data.



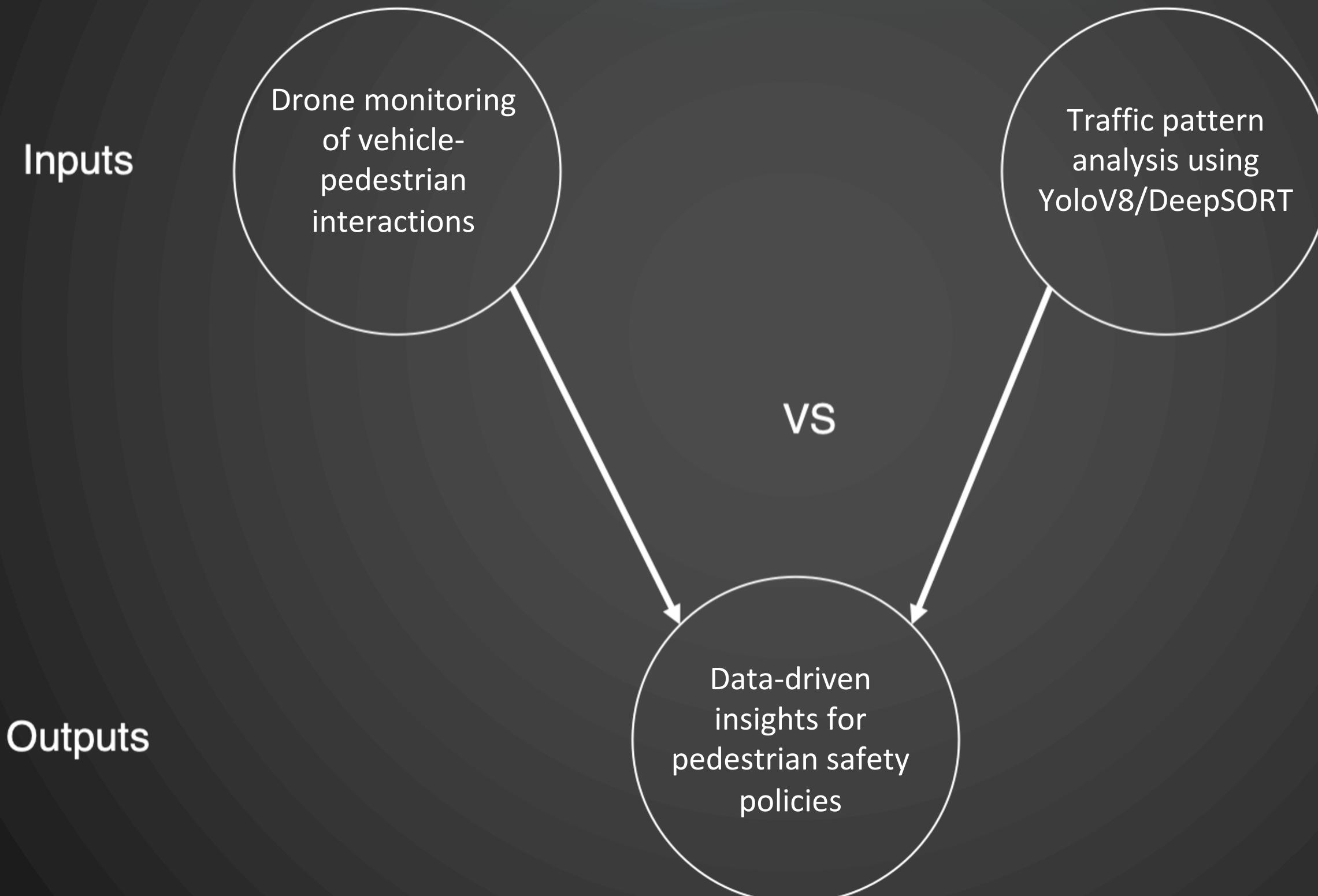
Data Collection

- Technical Specifications:
 - Mavic Air 2S
 - 5K Video
 - 1/500 Shutter Speed
 - 24FPS
 - D-LOG Color

Implementation

- Flew a Mavic Air 2S drone at 5PM on a Monday over the intersection on Archer Rd.
- Positioned the drone as if it was a stationary traffic camera.
- Obtained a 20-minute video of traffic flow.

Objective



Methodology - Code Implementation

YOLOv8 Object Detection

Uses machine learning for real-time, accurate identification of objects in video streams

DeepSORT

Tailors tracking settings to ensure precise object identification and movement analysis

Line Crossing/Violation Detection

Detects and logs instances when vehicles cross into a polygon (crosswalk) under 5km/h for 10 seconds

Speed Estimation

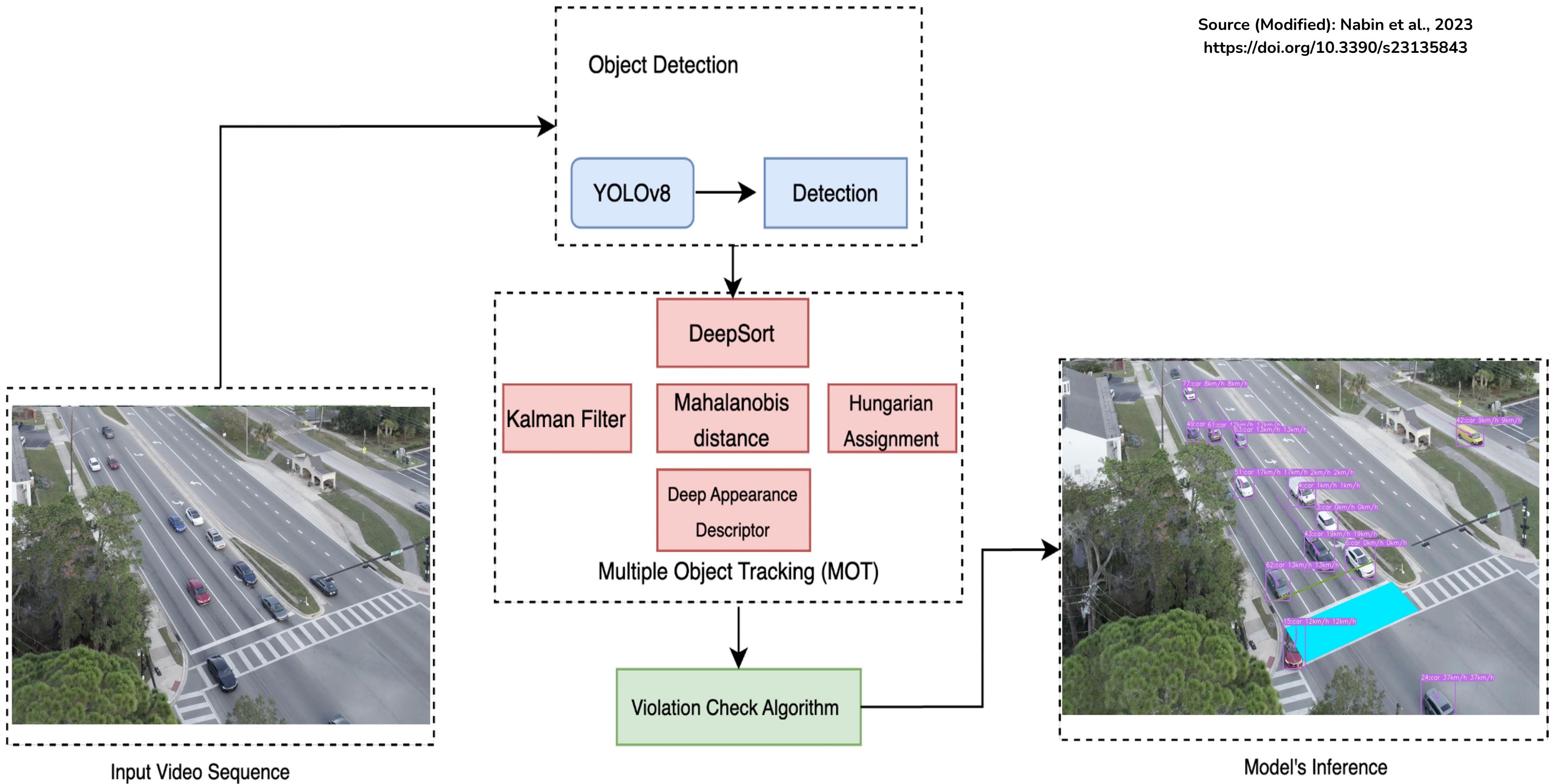
Computes and analyzes the velocity of vehicles for logging purposes

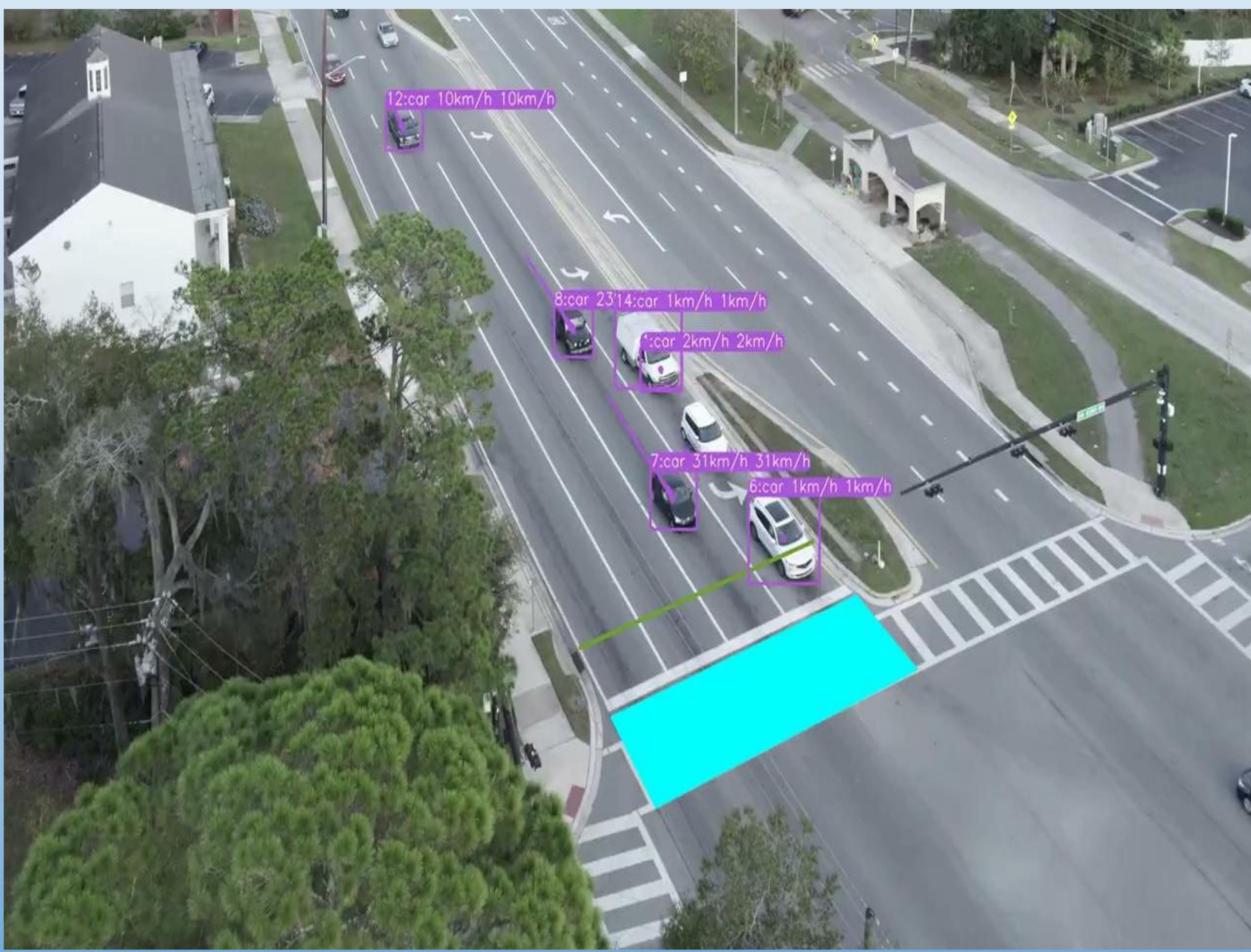
Bounding Boxes

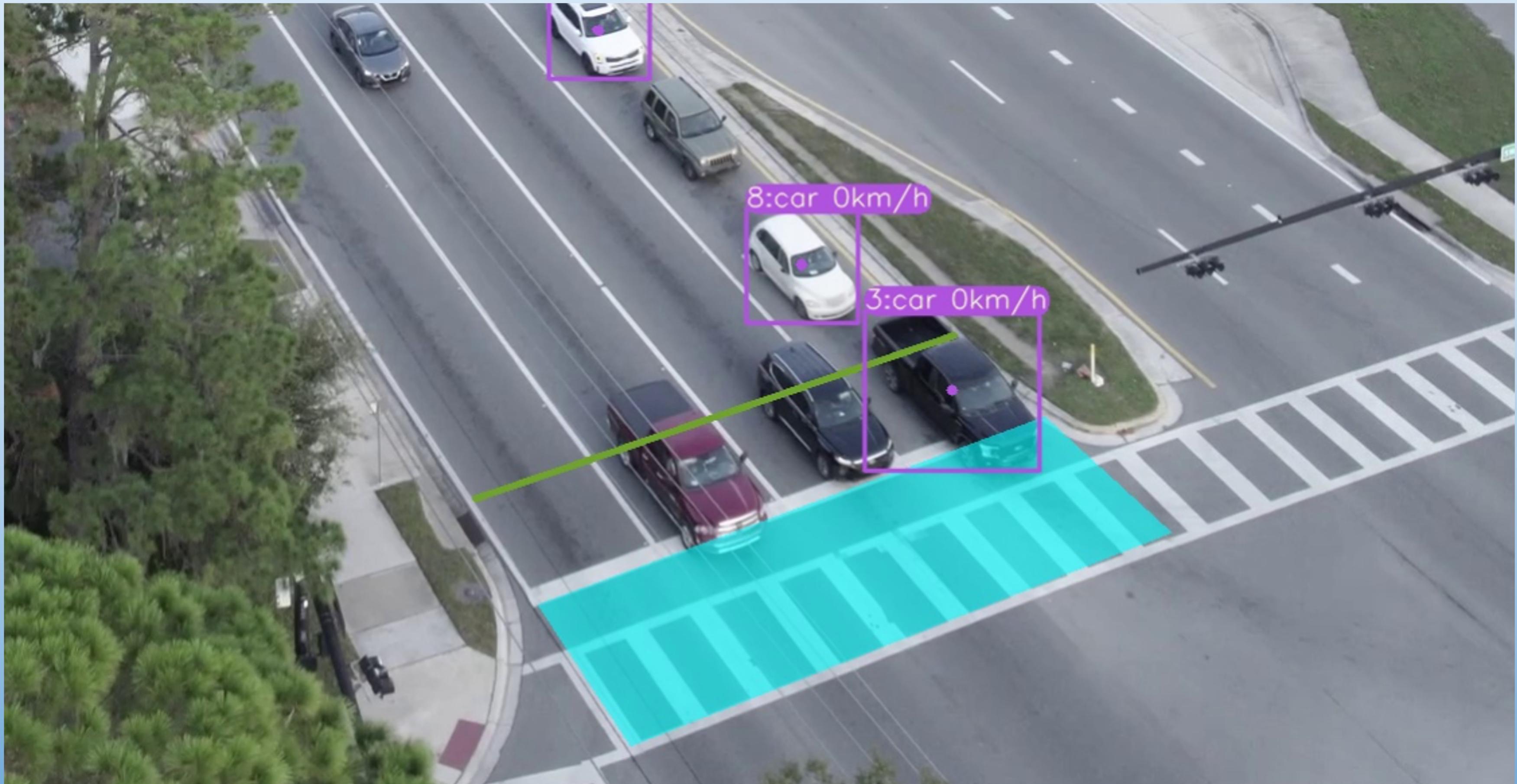
Superimposes interactive annotations on cars for identification purposes during tracking

Automated Incident Logging

Automatically records violating instances, storing evidence in a photo folder

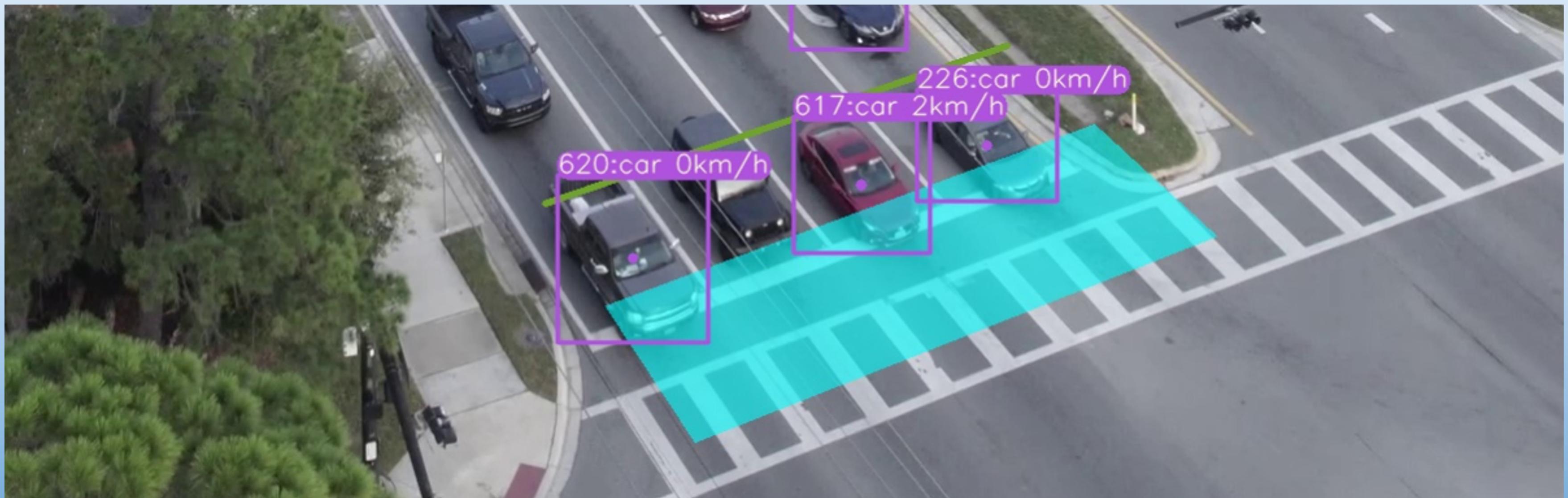






Limitations

1.Drones are not stationary



2. Data was obtained during holiday break



3. No accuracy metrics

4. Confidence Threshold

Conclusion

Research/Policy Opportunities



○ ○ ○

Impact of Vehicle Size on Crosswalk Safety

Develop regulations that require larger vehicles to have advanced safety features to mitigate their likelihood for crosswalk encroachments.



○ ○ ○

Enforcement Through Automated Ticketing

Implement AI-assisted automated ticketing for vehicles that violate crosswalk boundaries to enhance pedestrian safety and discourage infractions.



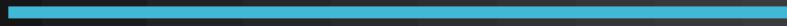
Data-Driven Insurance Adjustments

Collaborate with insurance companies to use traffic violation data for adjusting policy premiums, promoting safer driving habits.

Thank You



Q & A



REFERENCES

Data Analytics and Evaluation of the Gainesville Trapezium Connected Vehicle Signal Phasing and Timing (SPaT) Deployment Project

https://rosap.ntl.bts.gov/view/dot/62708/dot_62708_DS1.pdf

YOLOv8-DeepSORT-Object-Tracking

<https://github.com/MuhammadMoinFaisal/YOLOv8-DeepSORT-Object-Tracking>

Dr. Shenhao Wang - AI in the BE, Lecture 06 Google Colab

https://colab.research.google.com/drive/1krDPuBAwOw39_U65Cd3FKSLklaPpTZJ?usp=sharing

Parking Time Violation Tracking Using YOLOv8 and Tracking Algorithms

<https://doi.org/10.3390/s23135843>

Dall-E 3

<https://openai.com/dall-e-3>

