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2021 Fall
Technical Forum
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Internet of Things, Home Networking, Smart Cities, and Emerging Services

Improving Pedestrian Safety using Computer Vision, Machine Learning and Data Analytics

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**VIRTUAL EXPERIENCE
OCTOBER 11-14**

Smart Intersection Solution

Pedestrian fatalities are on the rise, with more than 6,000 pedestrians killed each year in the United States. As per World Health Organization (WHO), approximately 1.3 million people die each year due to road traffic crashes in the world.

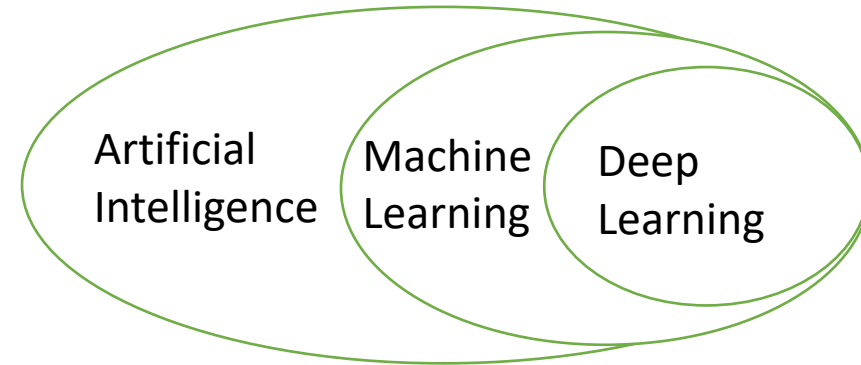
There are several technologies and use cases that can help cities make roads and highways safer. The Smart Intersection proof of concept (POC) deployed by Spectrum is one such example that demonstrates how cities can use technology for protecting pedestrians.

Key Focus Areas:

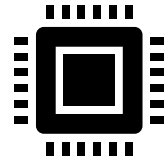
- Computer Vision
- AI/Machine Learning/Deep Learning
- Data Analytics

What makes Computer Vision work?

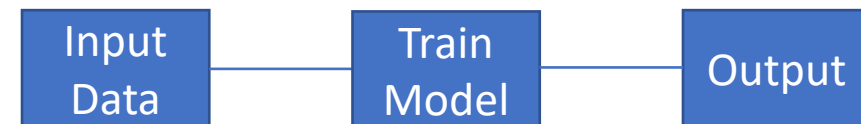
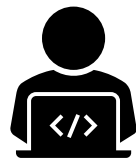
Data



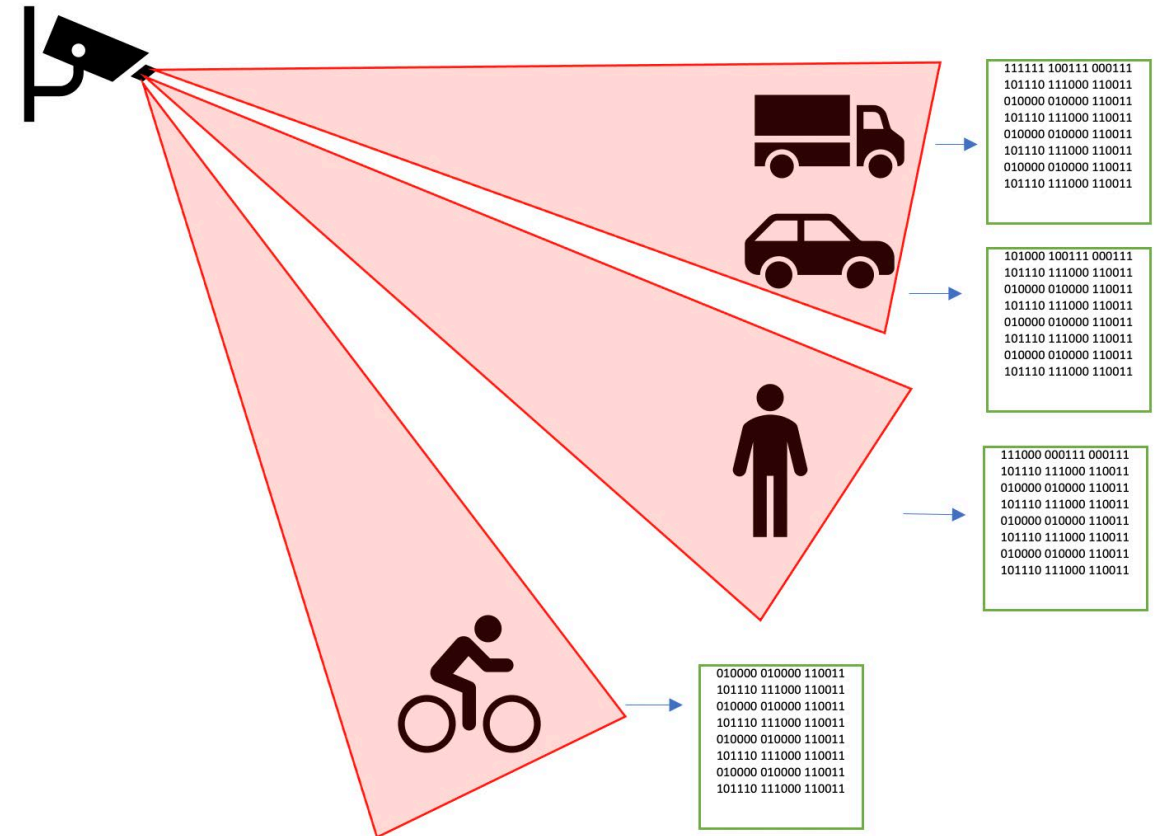
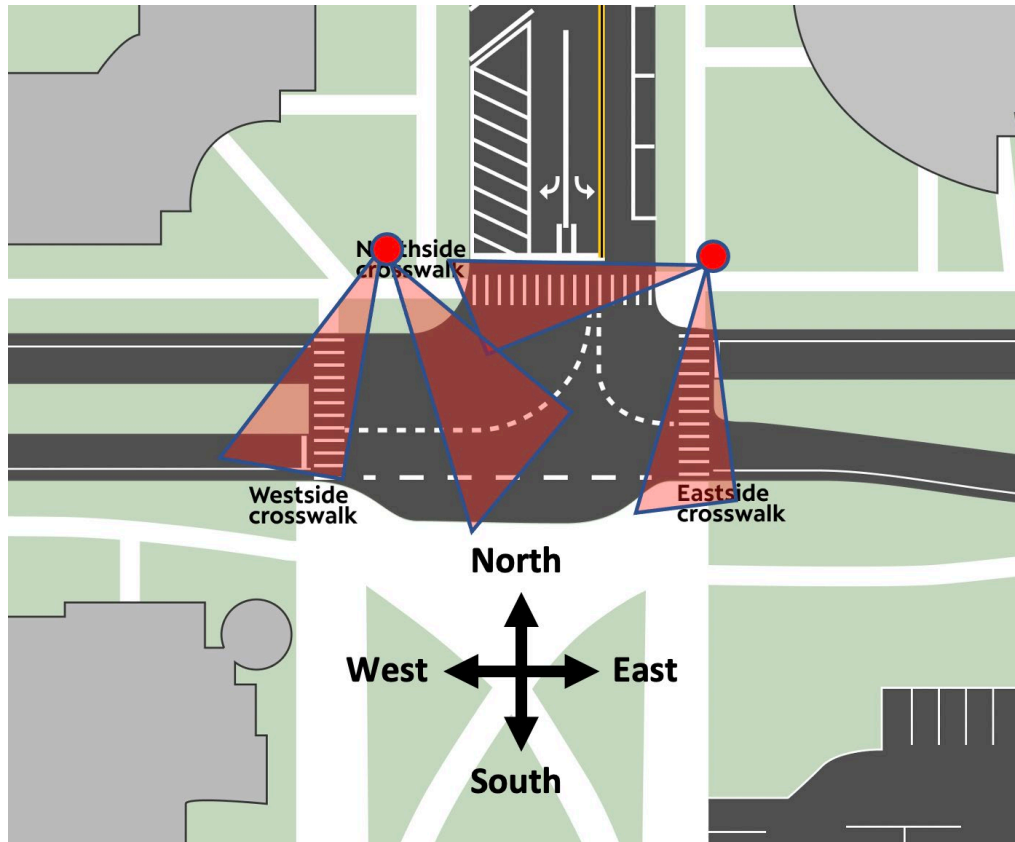
Processing Power



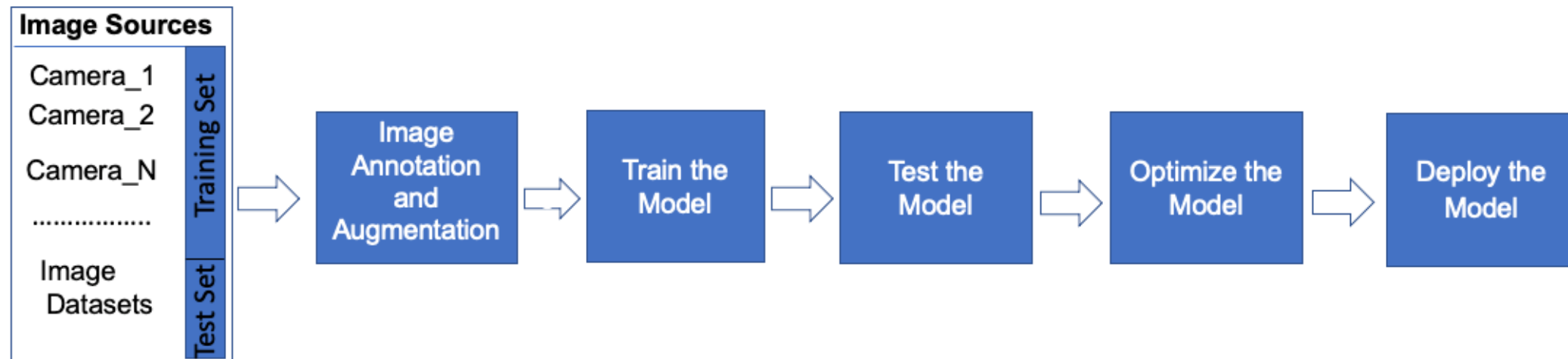
Algorithm



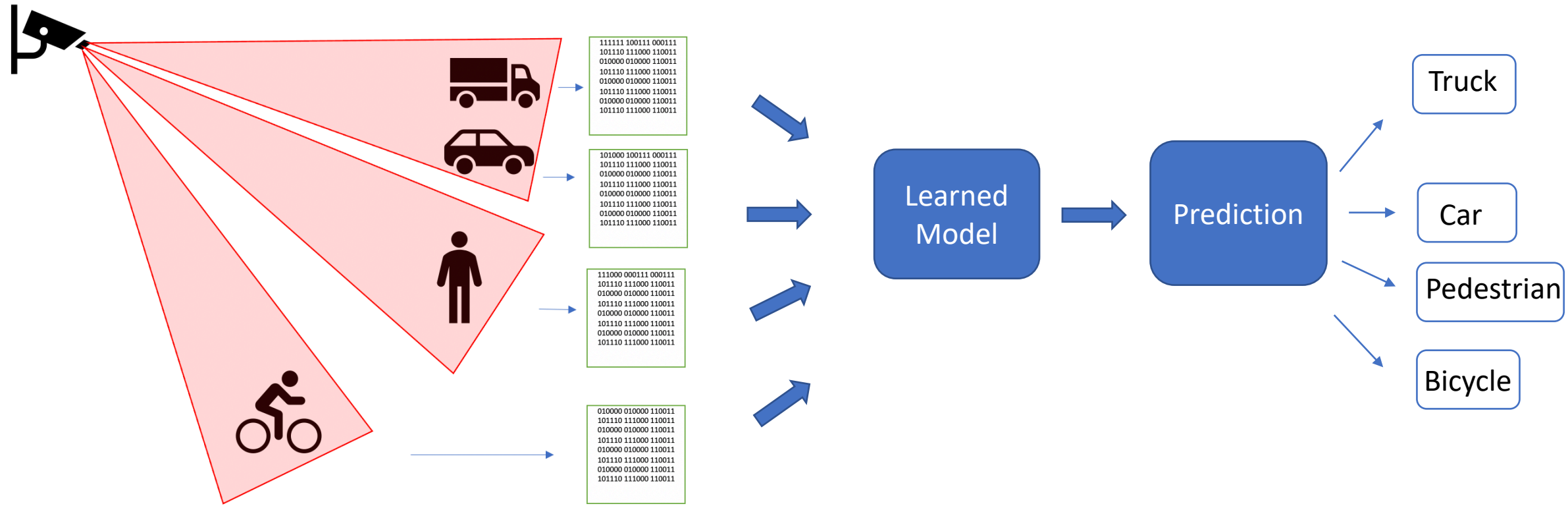
Intersection



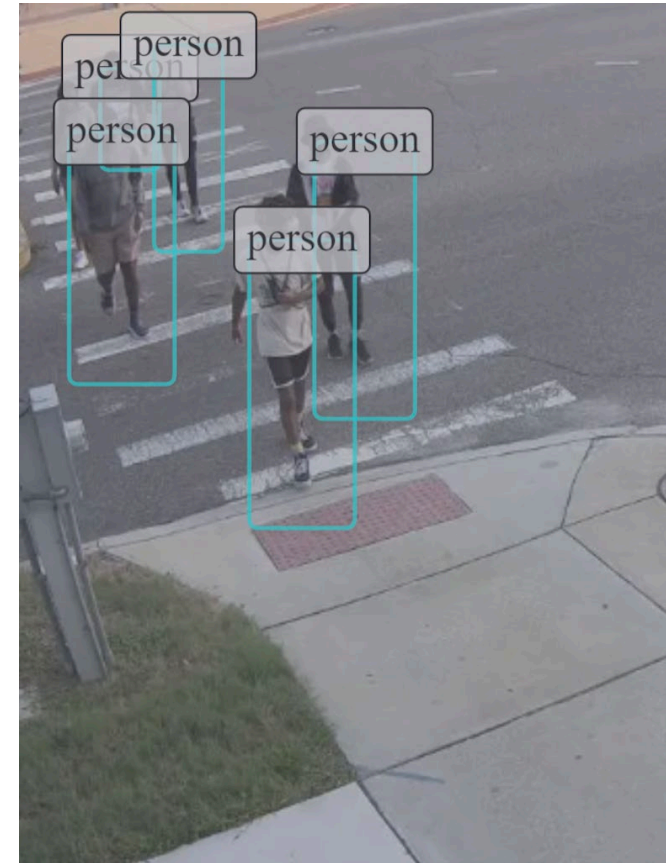
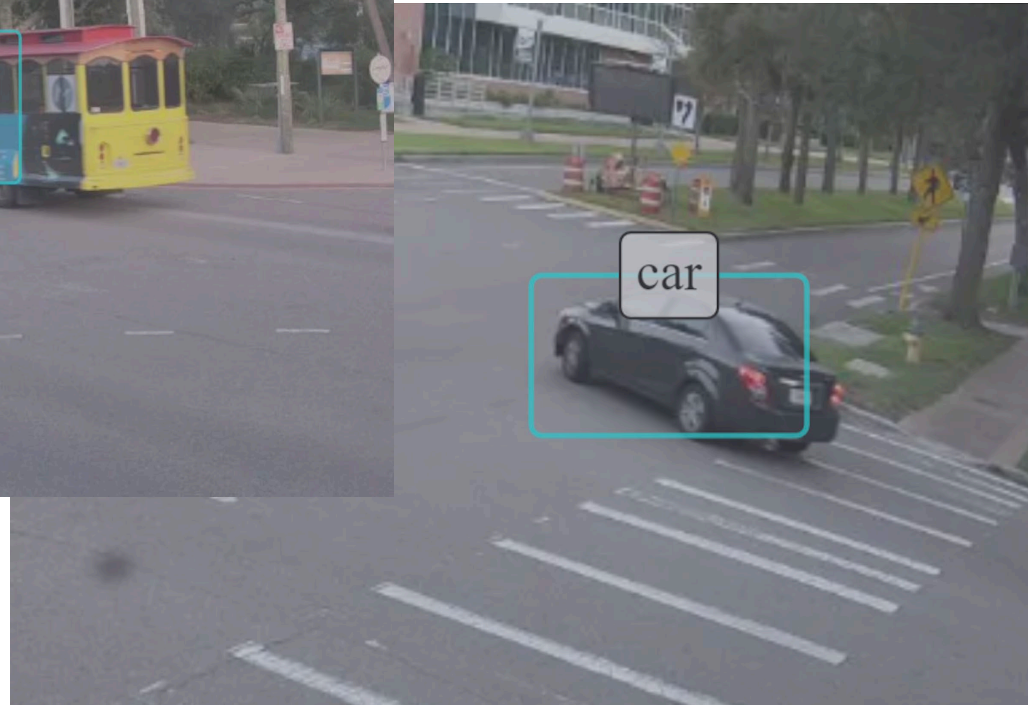
Computer Vision Model Training



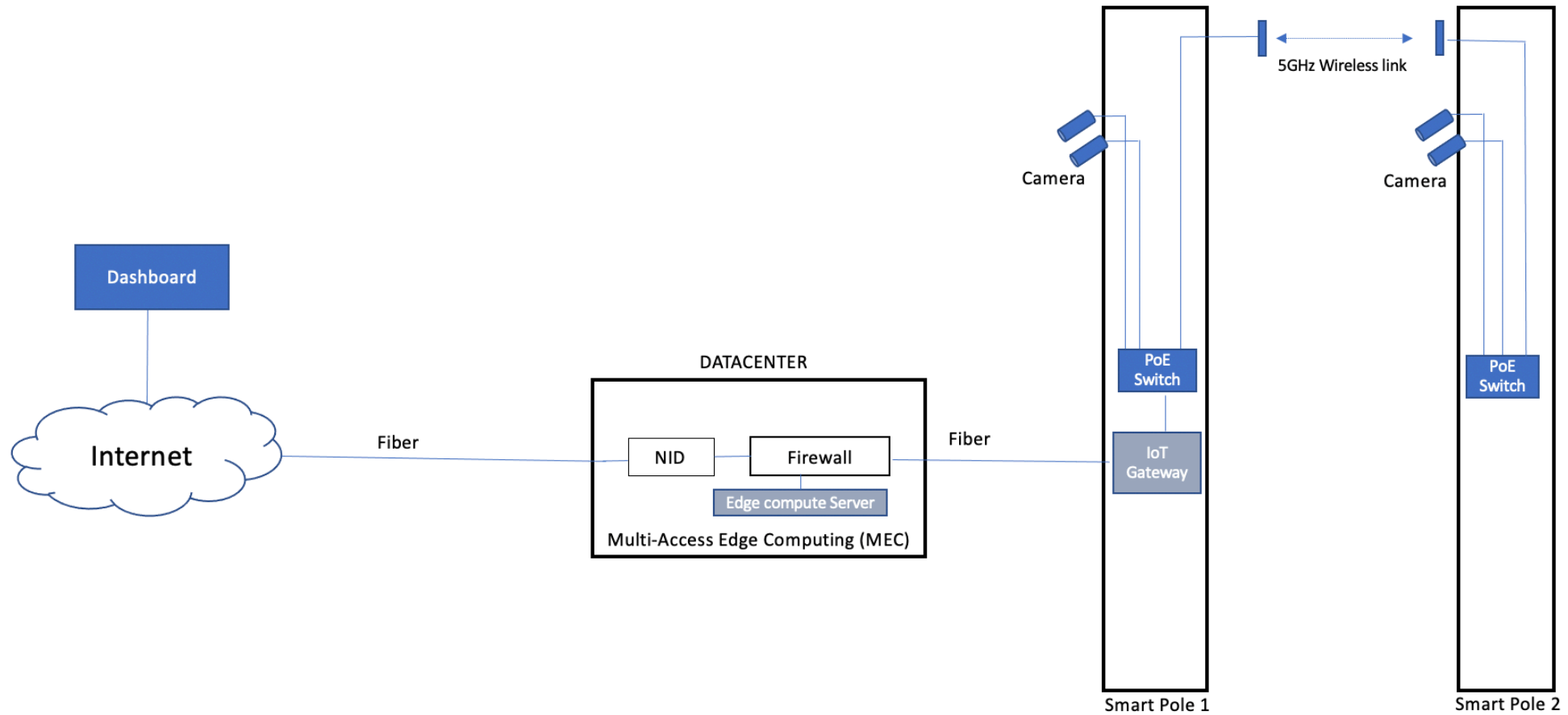
Learned Model Prediction



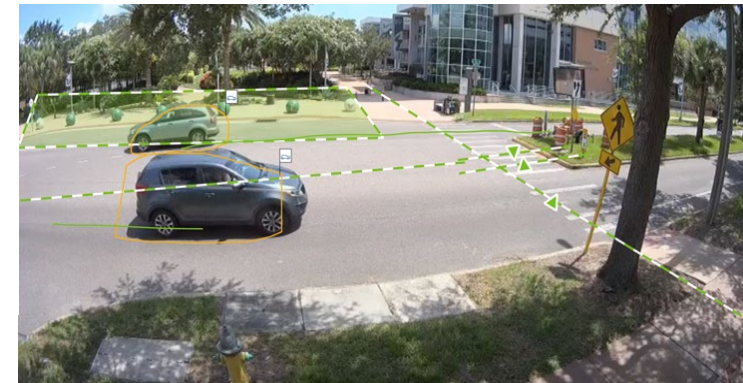
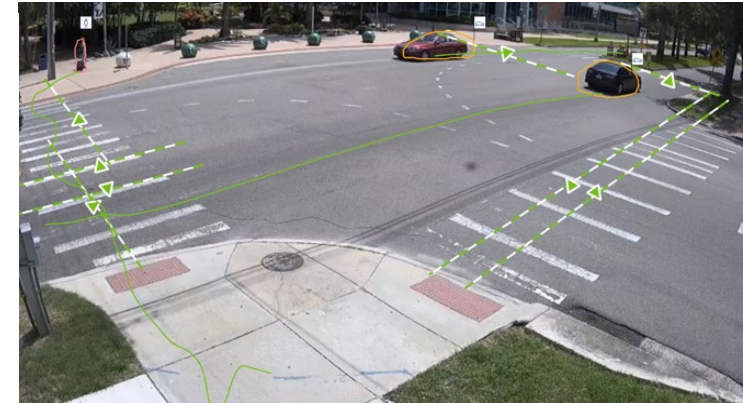
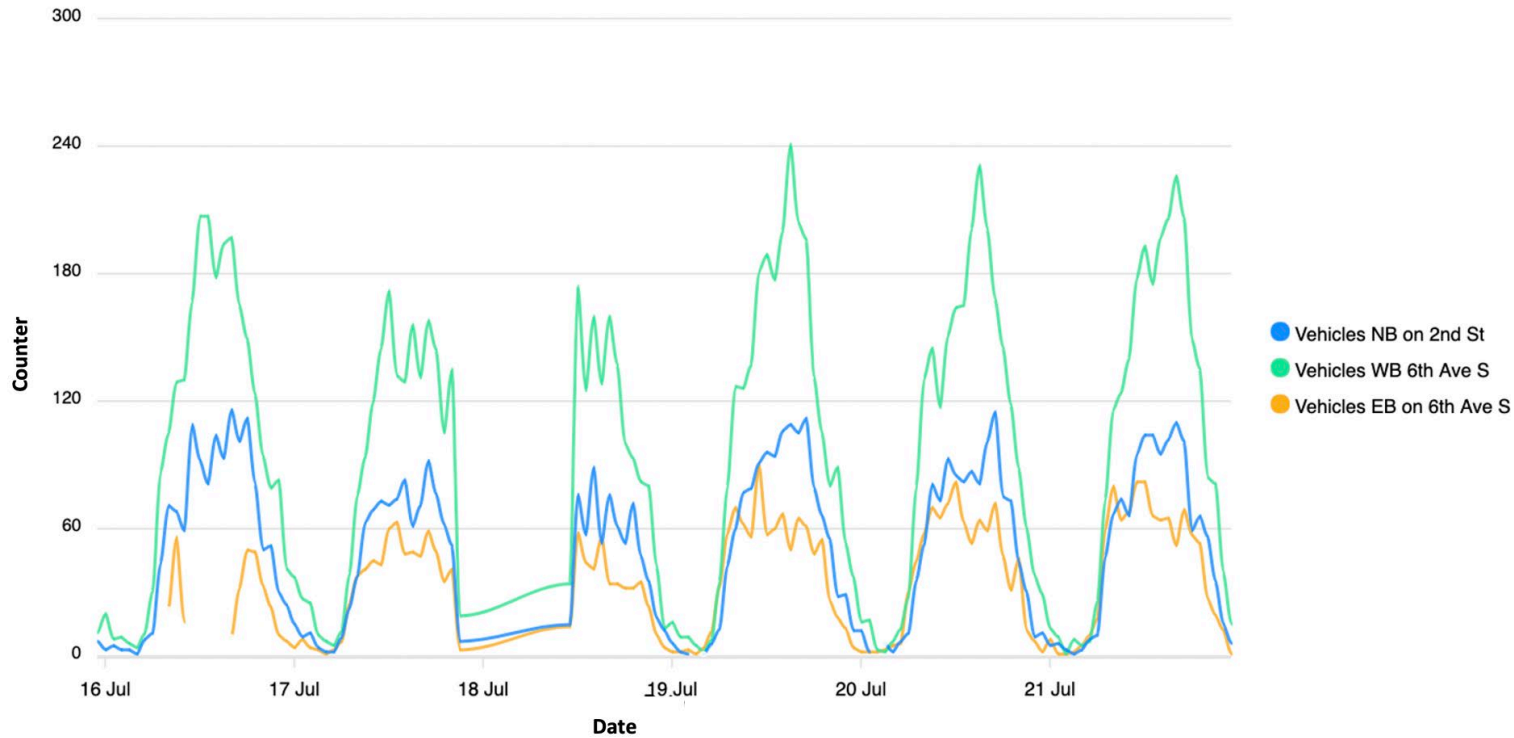
Computer Vision



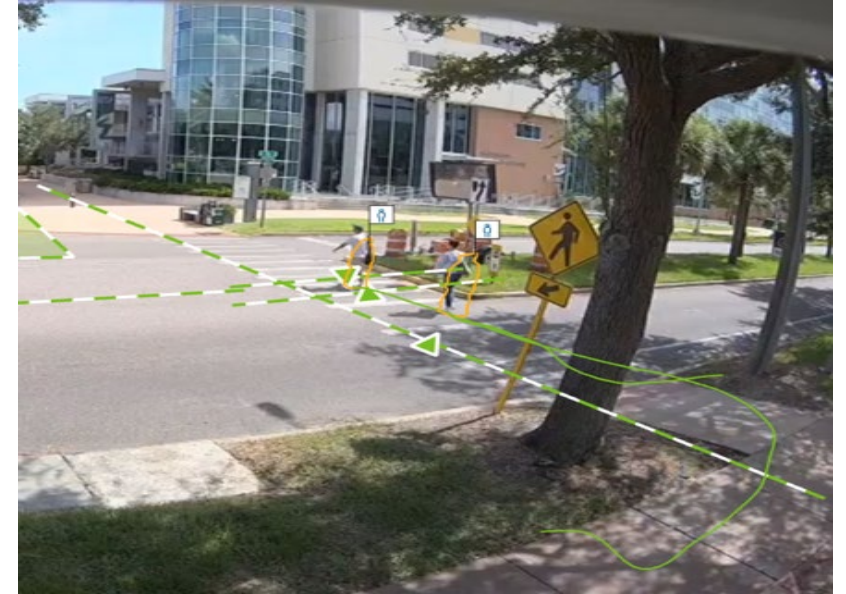
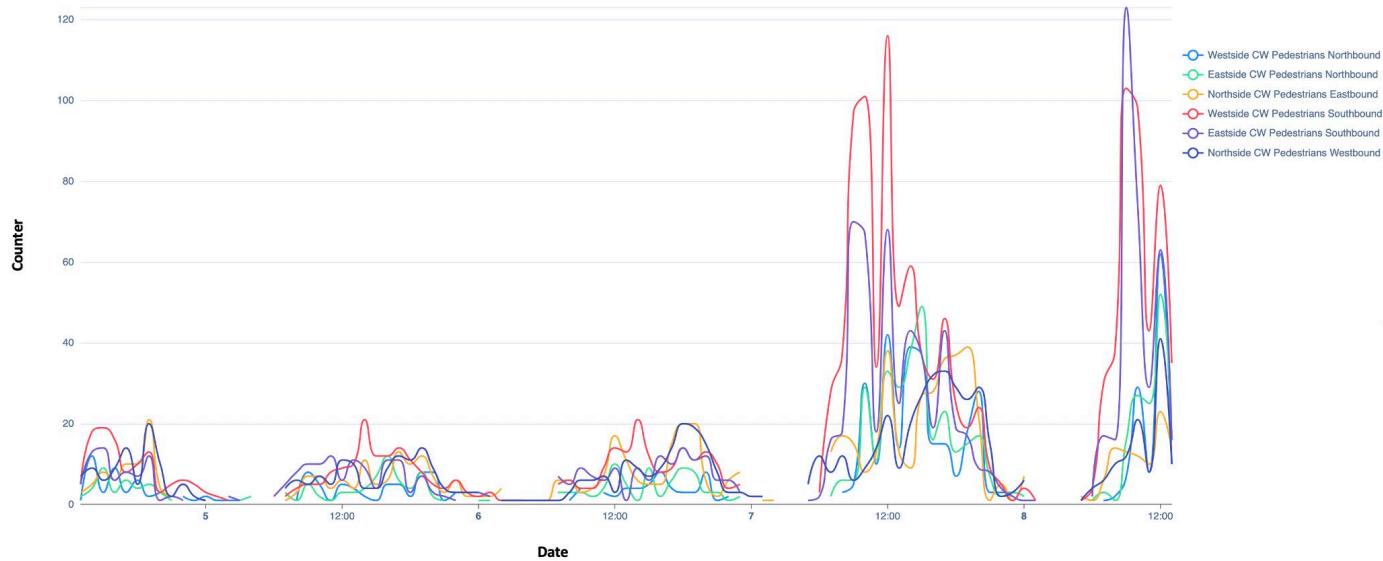
Smart Intersection Equipment



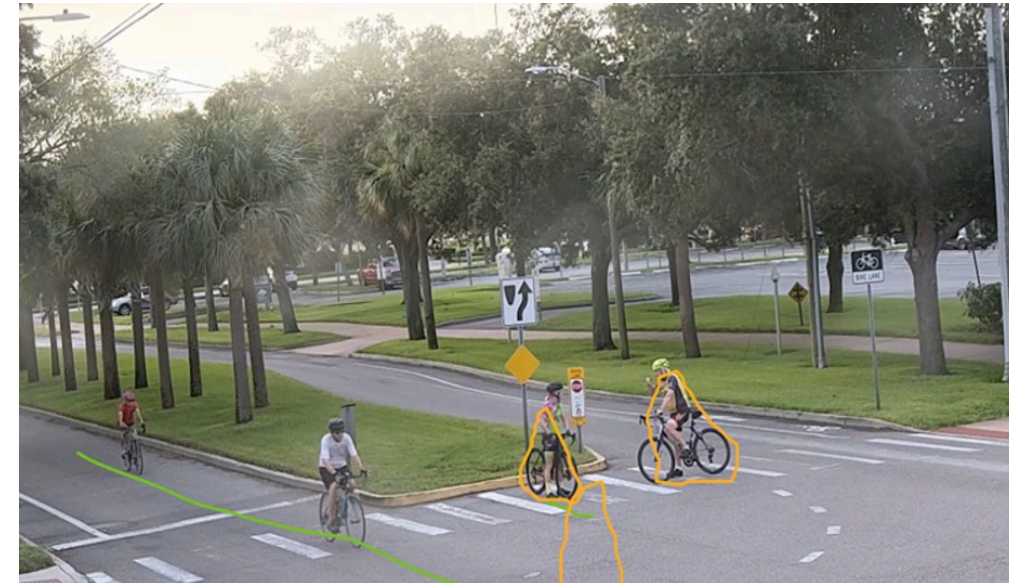
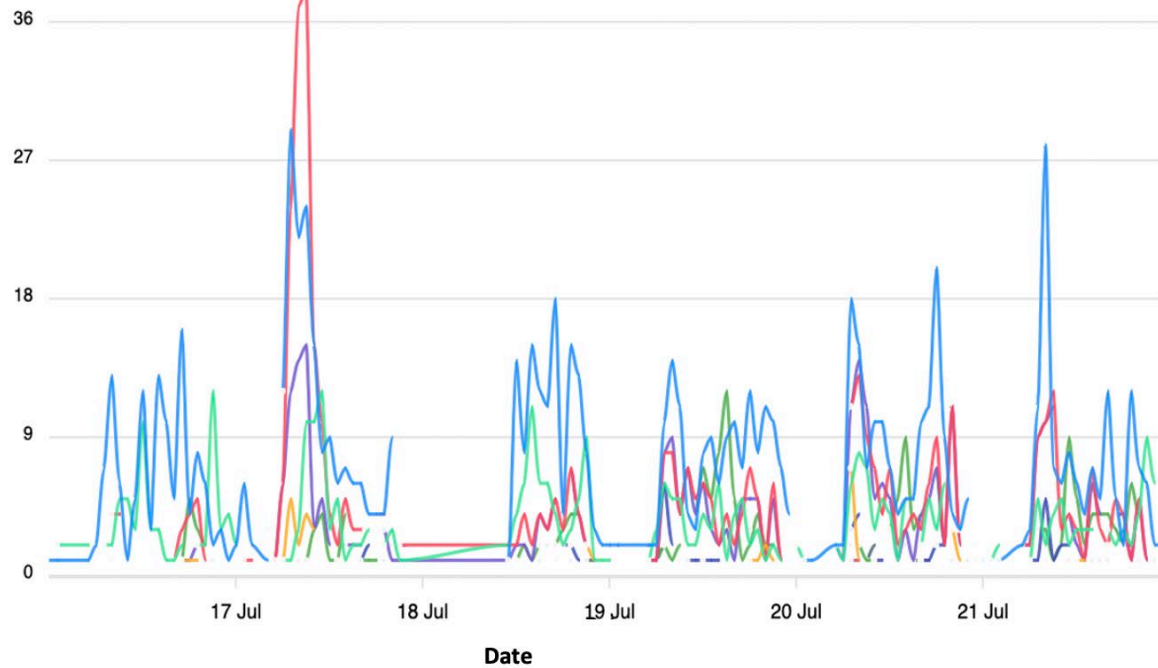
Vehicle Traffic Count



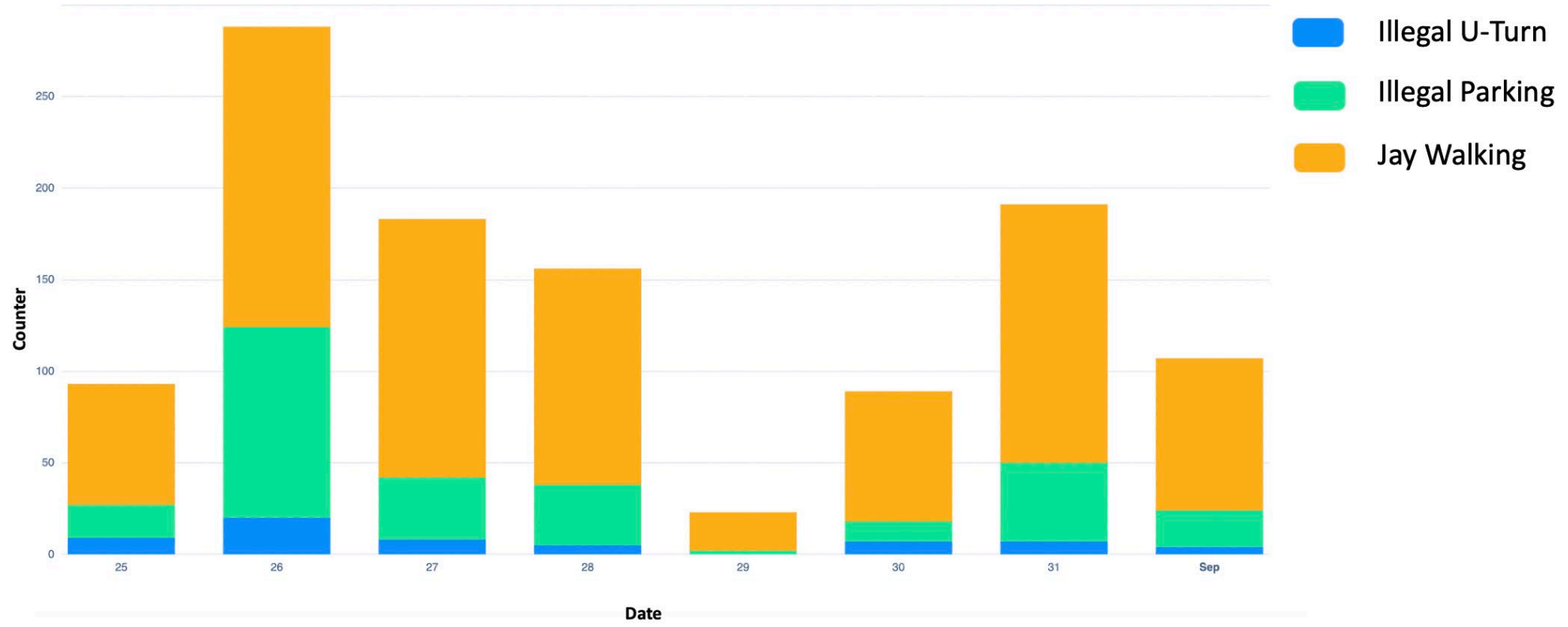
Pedestrian Traffic Count



Bicycle Traffic Count

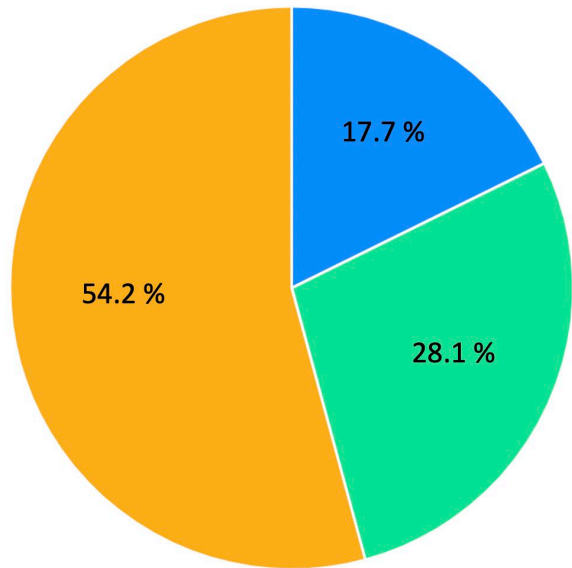


Traffic Safety Meta Data



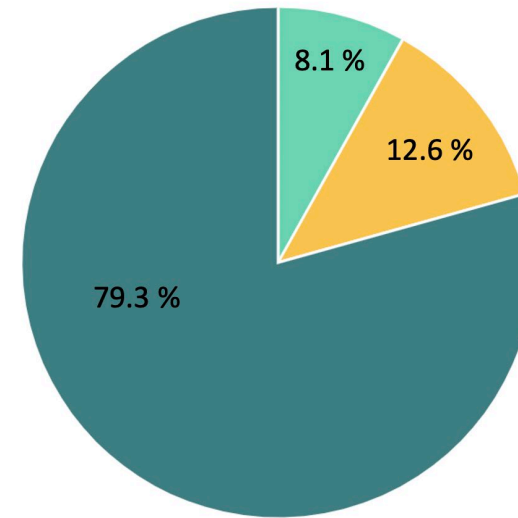
Data Summary

Vehicle Traffic by Direction Flow



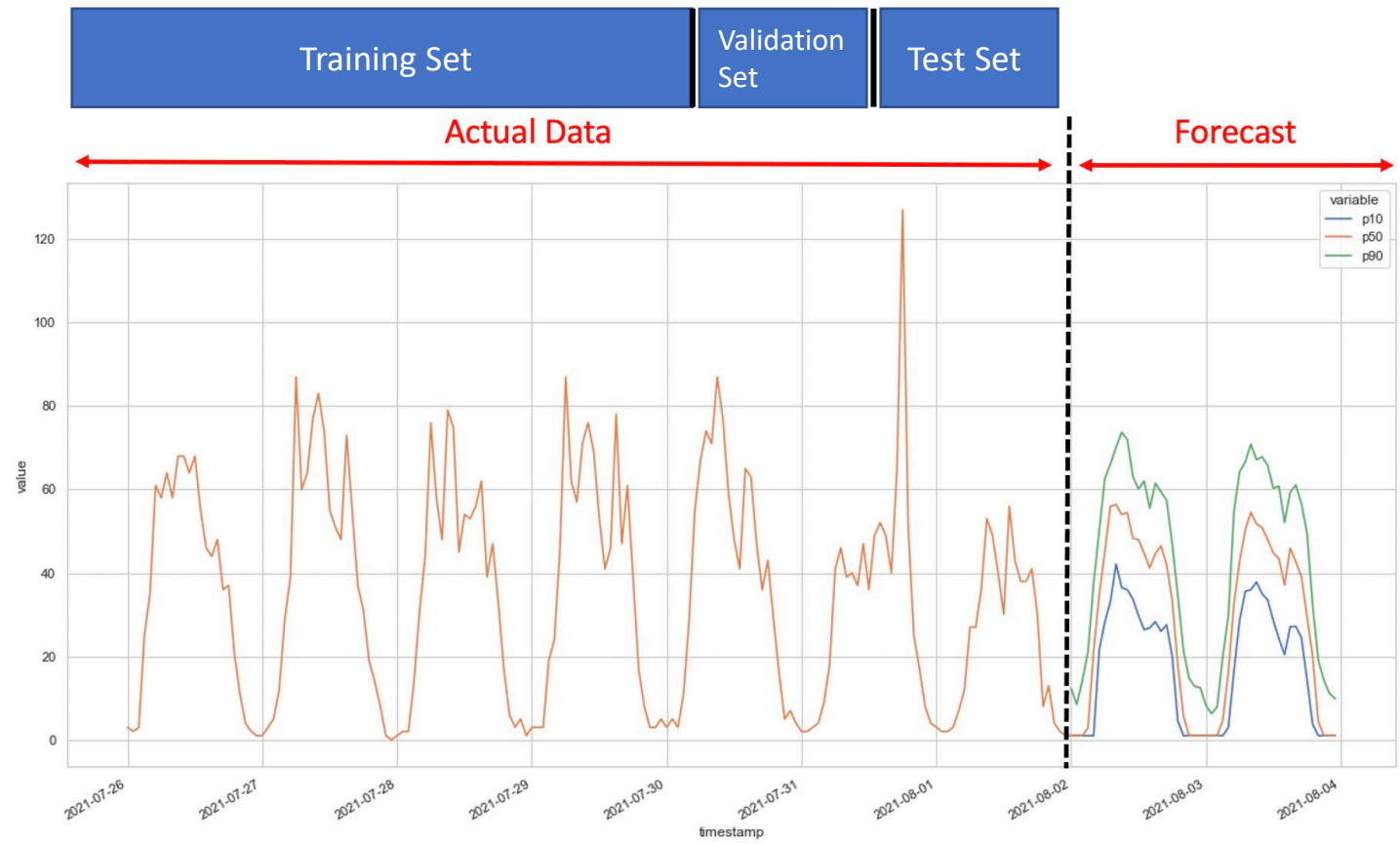
- Westbound Traffic
- Eastbound Traffic
- Northbound Traffic

Vehicle Traffic by Direction Flow



- Bicycle
- Vehicle
- Pedestrian

Traffic Forecast

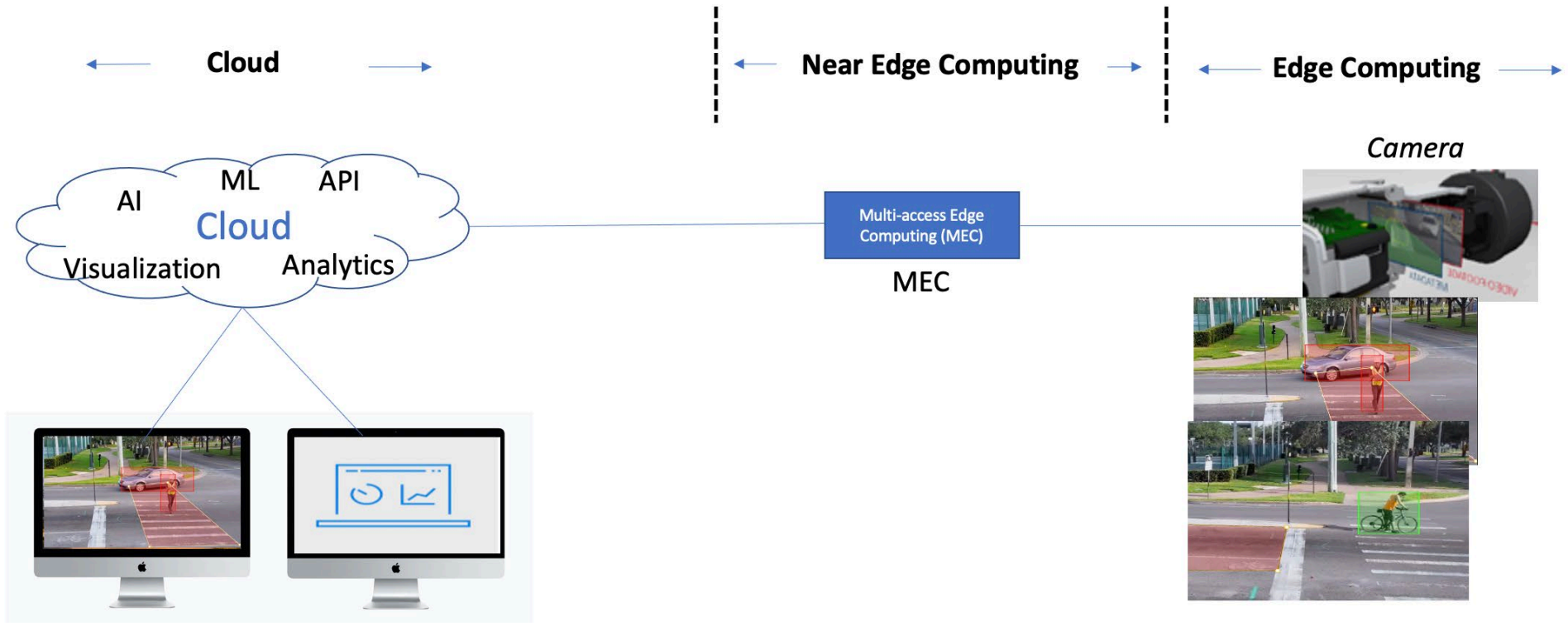


- P90: The true value is expected to be lower than the predicted value 90% of the time.
- P50: The true value is expected to be lower than the predicted value 50% of the time.
- P10: The true value is expected to be lower than the predicted value 10% of the time.

Computer Vision and Data Collection

The smart intersection solution is helping the city collect data crucial for redesigning the intersection to enhance pedestrian safety and improve traffic management. The data collected by sensors includes:

- Number of pedestrians, vehicles, bicycles, jay walking, illegal U-turns and illegal parking.
- The direction of movement, e.g., north, south, east, west



Conclusion

Designing an effective intersection requires an understanding of what activity actually happens within the intersection. The Spectrum Smart Intersection POC exponentially increases that level of understanding over manual methodologies that simply produce a count of pedestrians or vehicles.

The POC is collecting, anonymizing, analyzing and visualizing data sets covering pedestrians, bicyclists, vehicles, direction of travel, time of day, counts of accidents and near-accidents and more. This data is helping the city to design and/or optimize intersections that focus on optimizing pedestrians safety while also streamlining traffic flow through intersections.

As we collect more data and datasets get richer over time, we expect to draw more insights and forecast traffic. Using the training data sets, we can train the computer vision model and capture additional metadata on the type of traffic at the intersection so that cities can have richer insights and move them closer to the goal of Vision Zero.



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Thank You!

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