NYC DOT Street Sensor Pilot: Using Computer Vision to Improve Street Safety

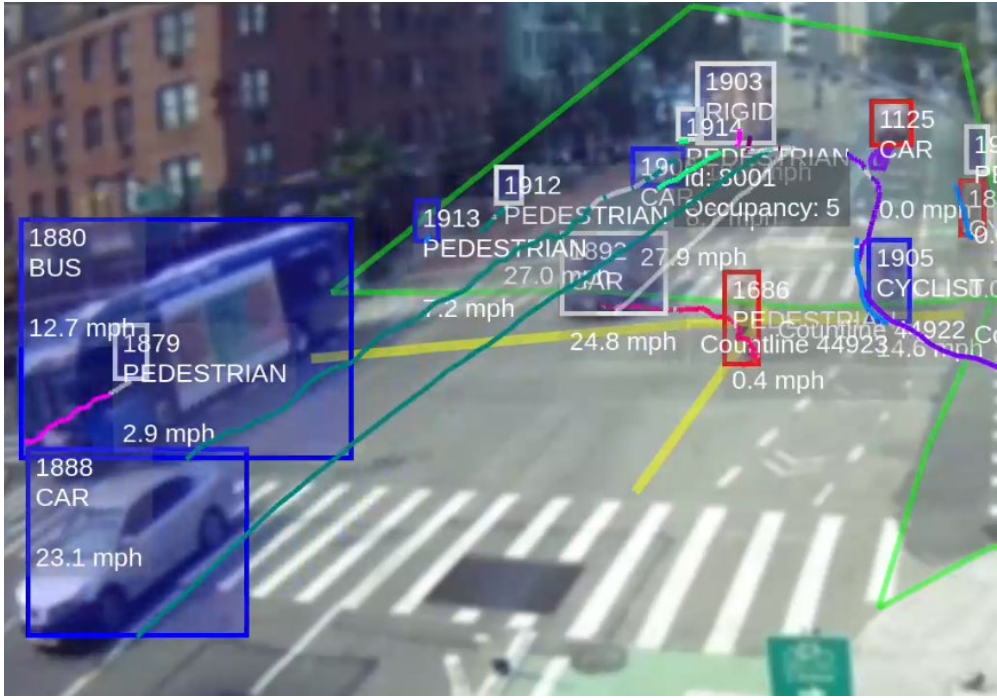
Vision Zero Research on the Road 6

November 29, 2023

Street Activity Sensor Pilot Program

Testing Computer Vision Technology

- Uses a device to view the street via a camera, then classifies and counts roadway users in real-time
- Potential to collect long-term counts while capturing additional rich data
- Complementary to short duration count program



Detection example: 1st Ave & E 59th St

Street Activity Sensor Pilot Program

Notable recent efforts

Fixed device pilots

- Viva (DOT/OTI program)
  focus of this presentation
- Numina (MTA and BGI programs)

Near miss safety evaluation

- MicroTraffic

NYC Traffic Camera analysis

- C2Smart

Sensor installation: Flushing Ave, Brooklyn

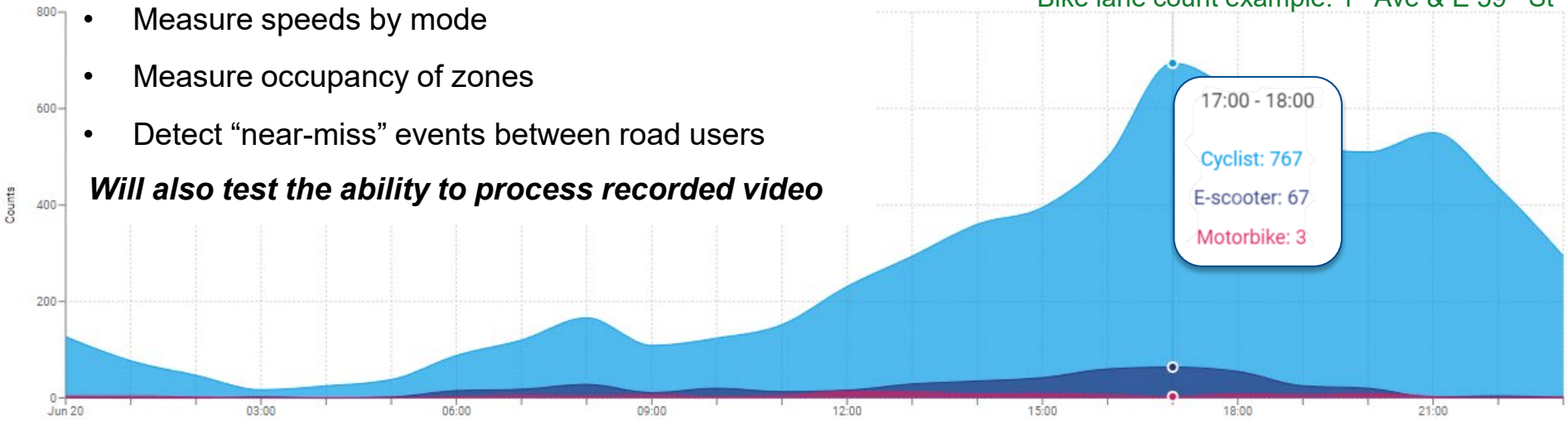
Pilot Datasets

During the Viva pilot, the devices will:

- Classify and count street users
- Count turning movements
- Represent paths of travel (by mode)
- Measure speeds by mode
- Measure occupancy of zones
- Detect “near-miss” events between road users

Will also test the ability to process recorded video

Bike lane count example: 1st Ave & E 59th St

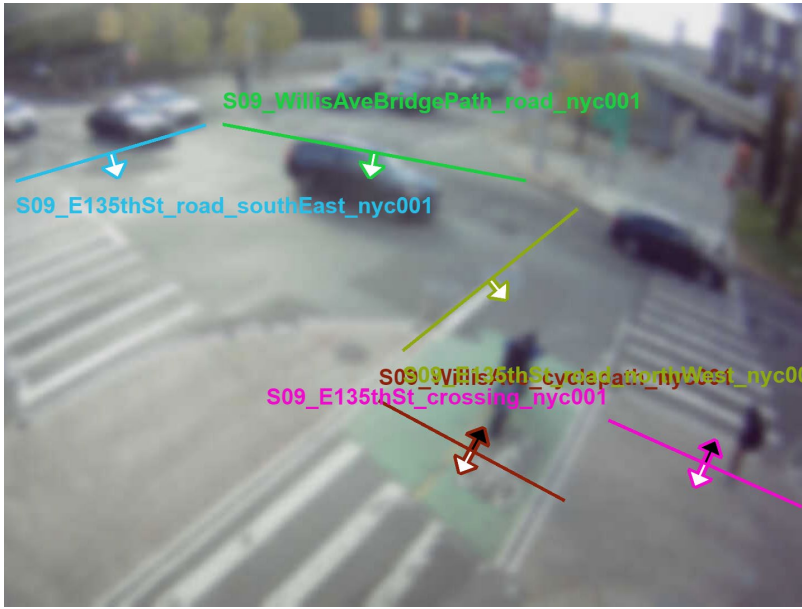


Program Evaluation

Focus on technology and process

Early findings* include:

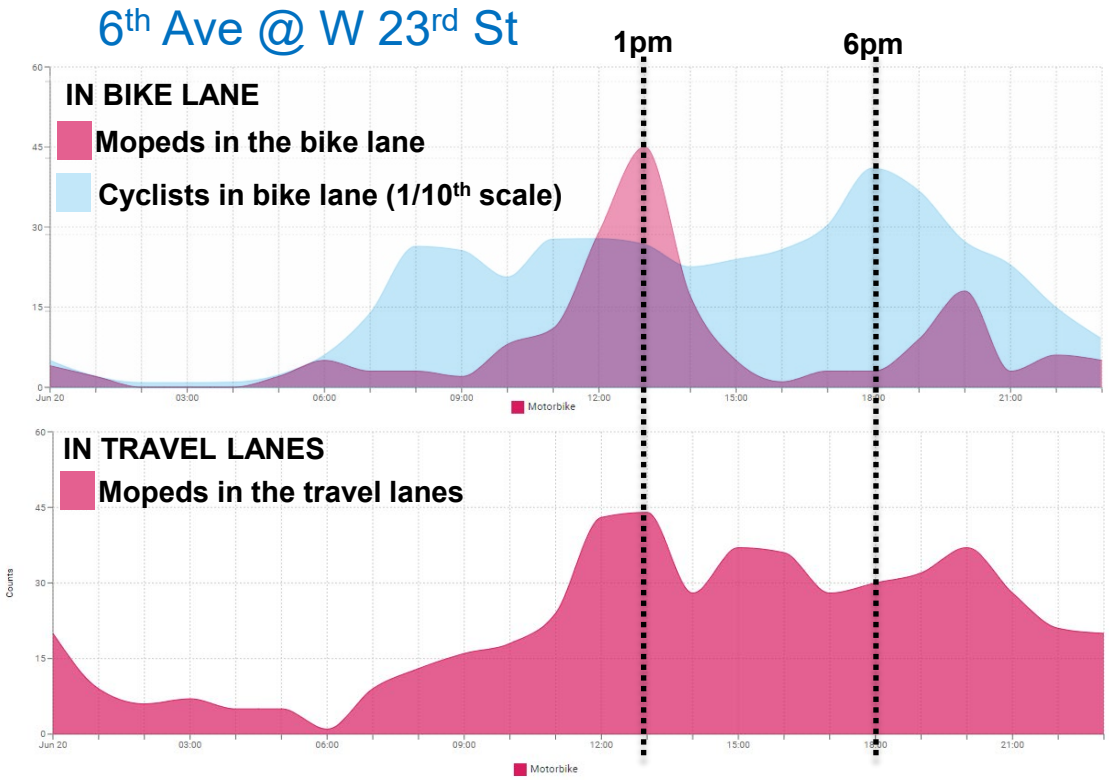
- **Siting:** Placement limitations based on where available poles are located and suitable sight lines exist
- **Countlines:** Requires expertise to place countlines to accurately capture data
- **Features:** Continue to be refined; user-friendly dashboard; API for data integration
- **Downtime:** Reviewing sensor reliability, limited issues so far
- **Accuracy:** Assessing both baseline detection and classification accuracy and conditions that reduce accuracy. Generally high accuracy in day and night, some challenges with crowds of pedestrians

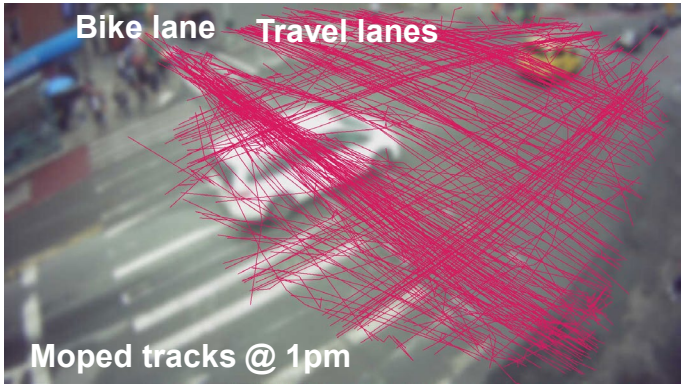


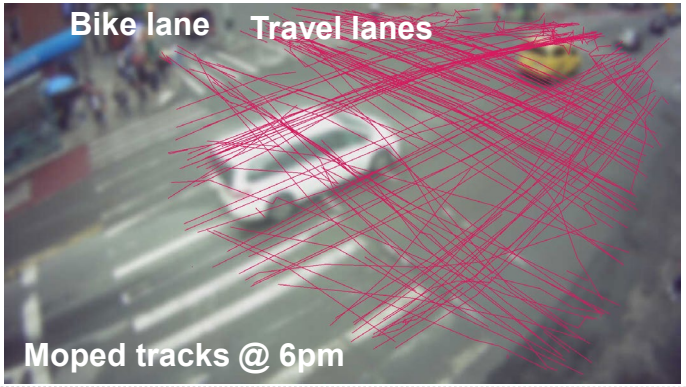
Sensor View: Willis Ave & E 135th St

*demonstration and evaluation is ongoing

Use Case: Moped Volumes and Street Use

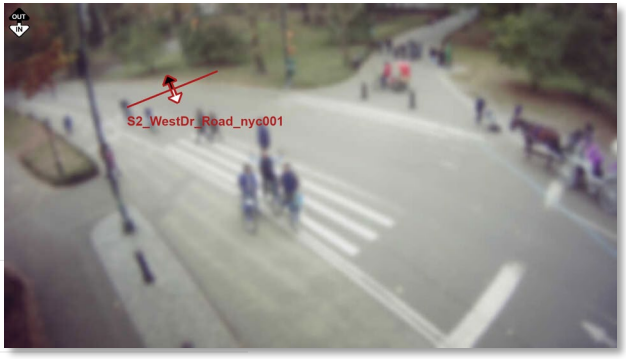


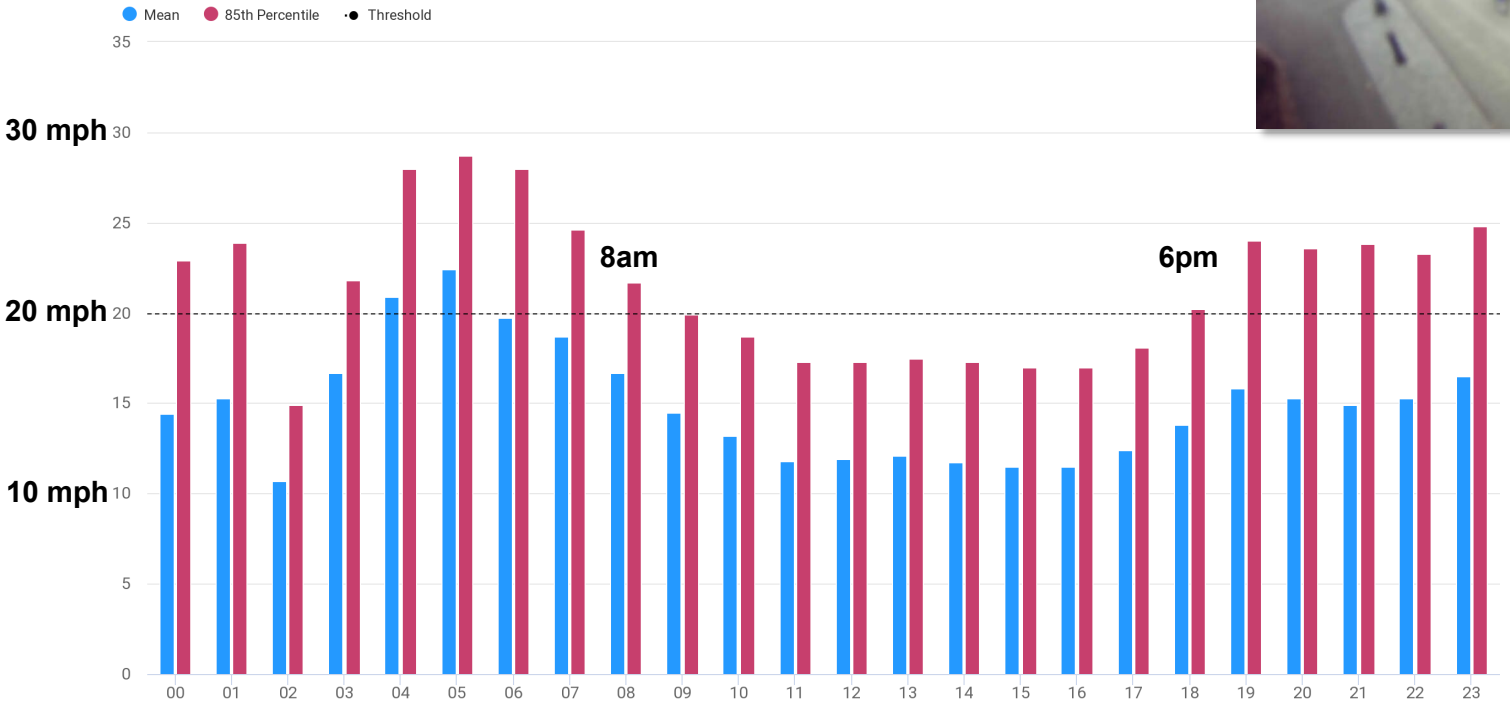




Use Case: Cyclist speeds

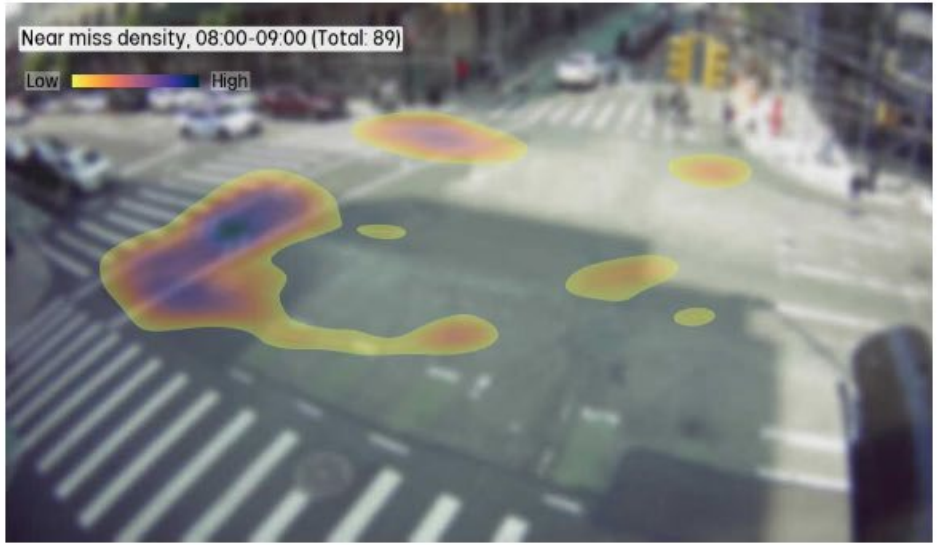
Central Park Drive: Fall weekends

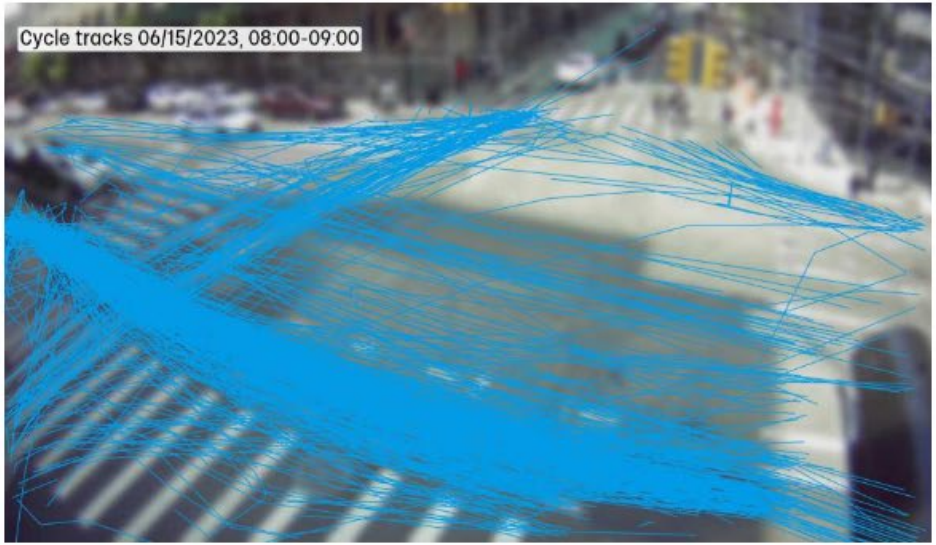




Use Case: Conflict analysis between bike/car

Schermerhorn St & Smith St





Use Case: Measuring Change

Training set for volume estimation models

- Citywide sampling, not project based
- Counts all modes
- Continuous bike counts beyond inductive loop counters
- Added use data outside of bike share zone

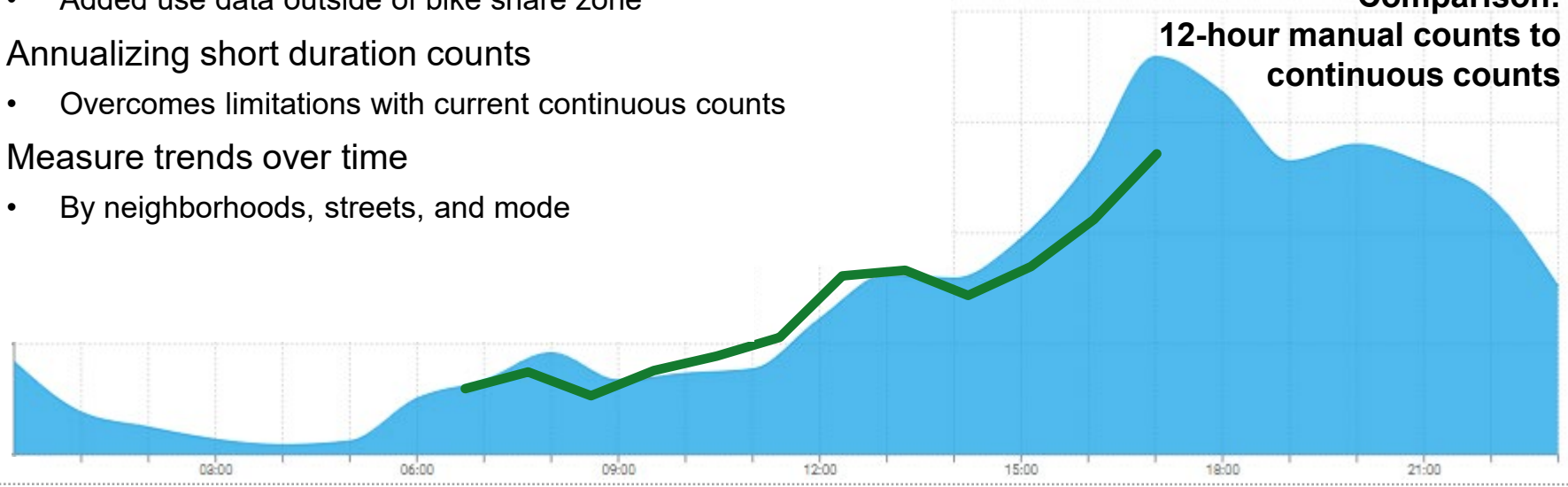
Annualizing short duration counts

- Overcomes limitations with current continuous counts

Measure trends over time

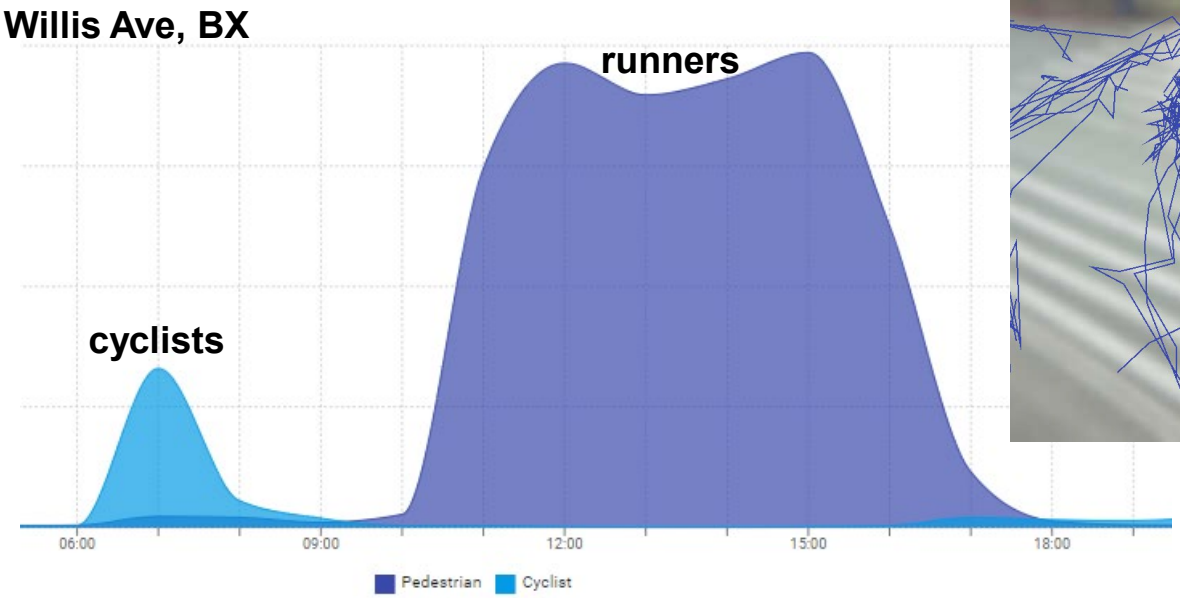
- By neighborhoods, streets, and mode

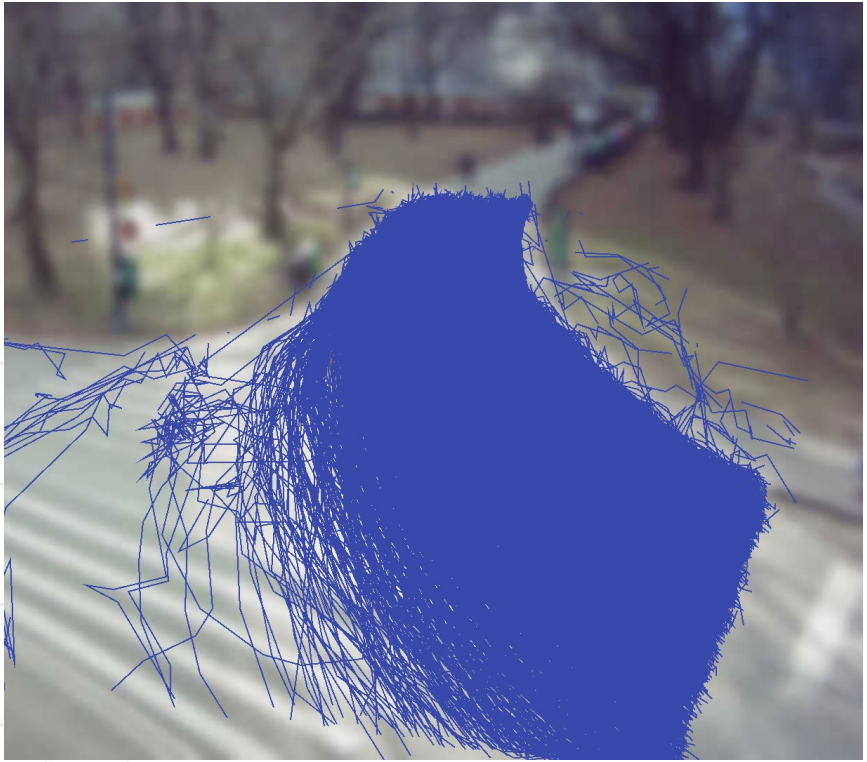
Comparison:
12-hour manual counts to continuous counts



Use Case: Special Events

2023 Marathon





Runners entering Central Park from Columbus Circle

Current Limitations*

**Based on demonstration experience, does not reflect all products or those in development*

- Does not subclassify e-bikes
- Requires pole & power for full functionality
  - No short duration analysis with sensor (video-based is available)
  - Must have an available pole
  - Limited battery options
- Wide streets and intersections require multiple sensors (& poles!) for full coverage
- Conflict analysis tool needs further development to identify critical interactions and relate them to crashes and other outcomes

Next steps

- Complete demonstration
- Look to scale up for monitoring
- Use for specific studies (project analysis, safety evaluations, etc.)
- Once comfortable with accuracy, make count data available on Open Data

Example model: Transport for London Cynemon cycling model, AM trips using Waterloo Bridge

Thank You!

Questions?

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