



Computer Vision for Traffic Cameras

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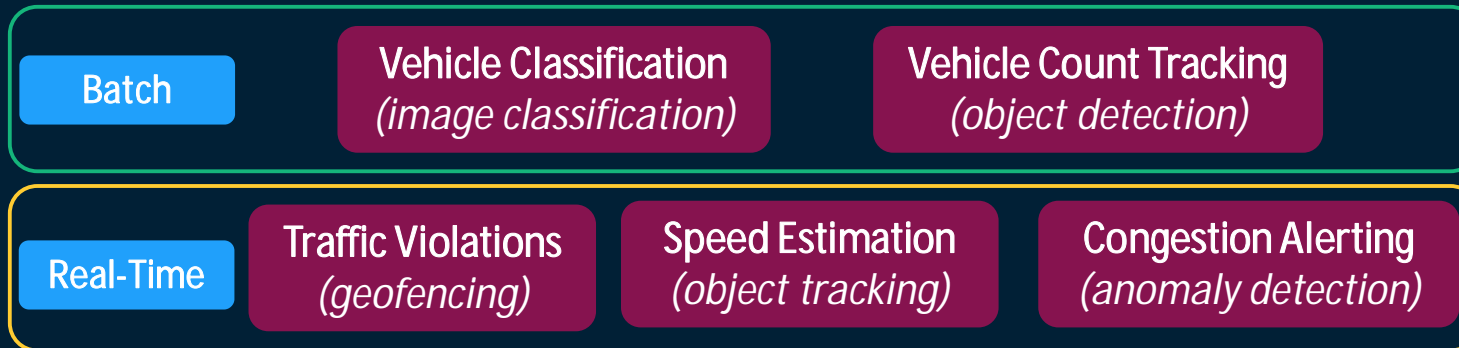


Traffic Analysis Using SAS Computer Vision

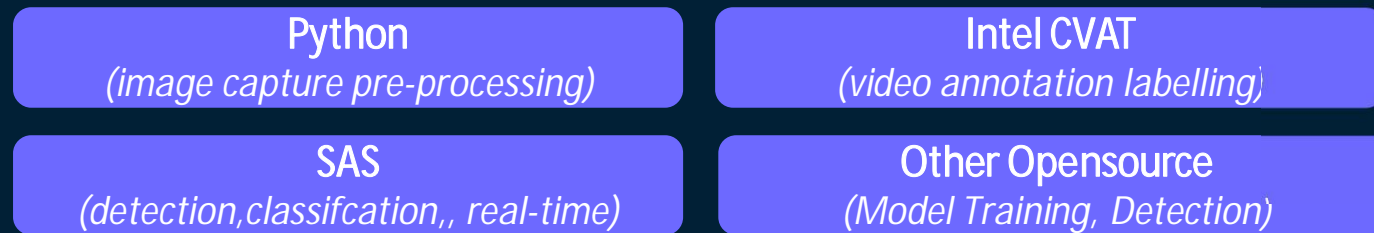
Increase efficiency of TMC operations with many cameras (time & money)

- Utilizing traffic cameras to reduce dependency on sensors and human labor
 - Source data comes from publicly available traffic camera video feed

- Use Cases:



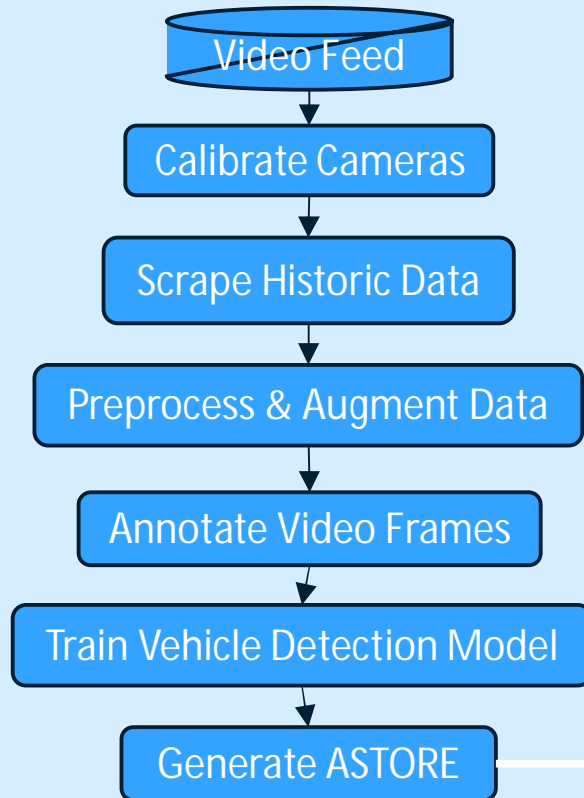
- Leveraged combination of SAS Deep Learning and 3rd Party Open Source Software Tools:



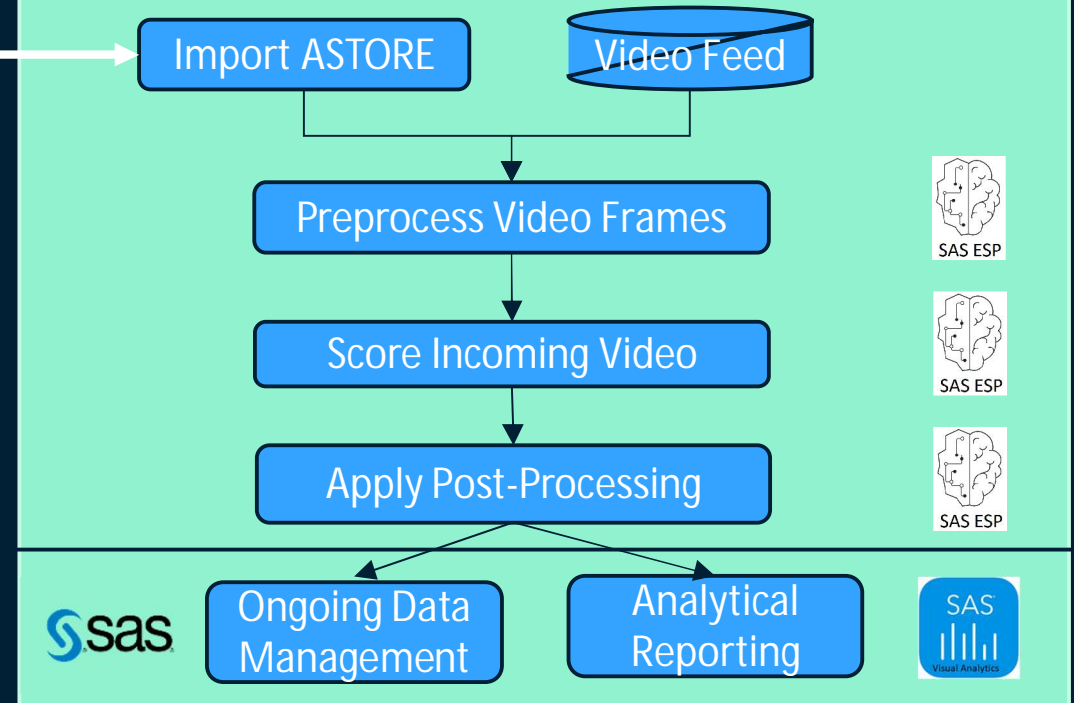
Technical Overview

Computer Vision Process Flow

Offline Model Training with SAS Viya



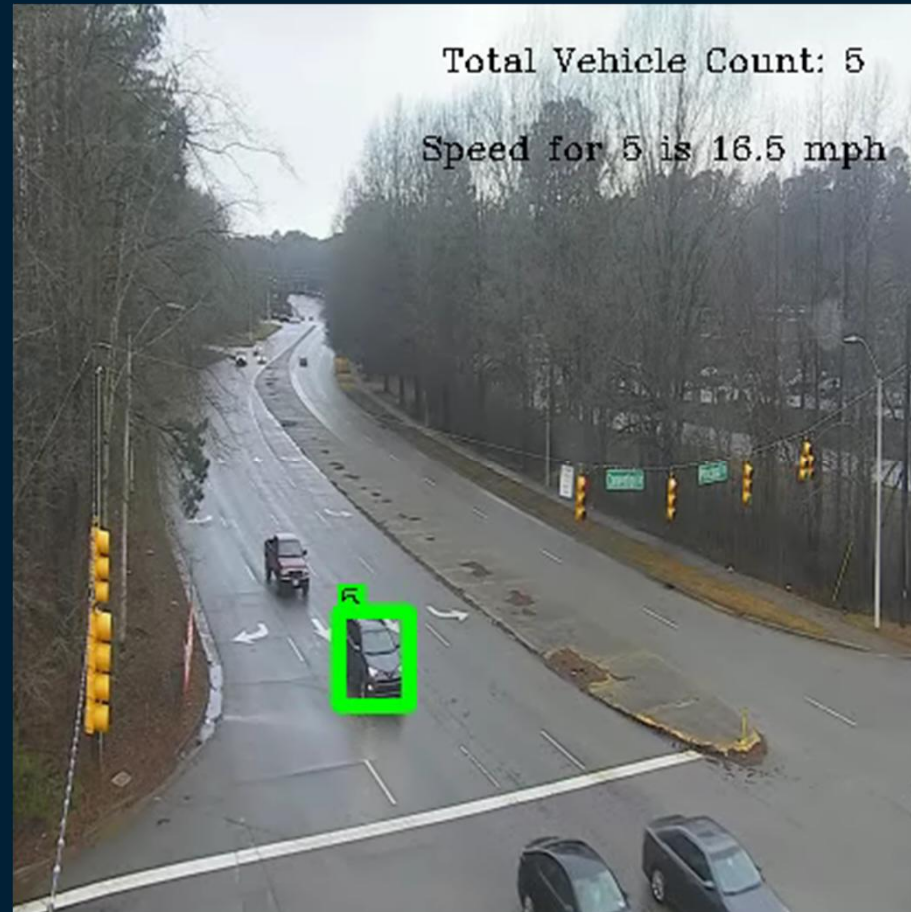
Online Video Scoring with SAS ESP



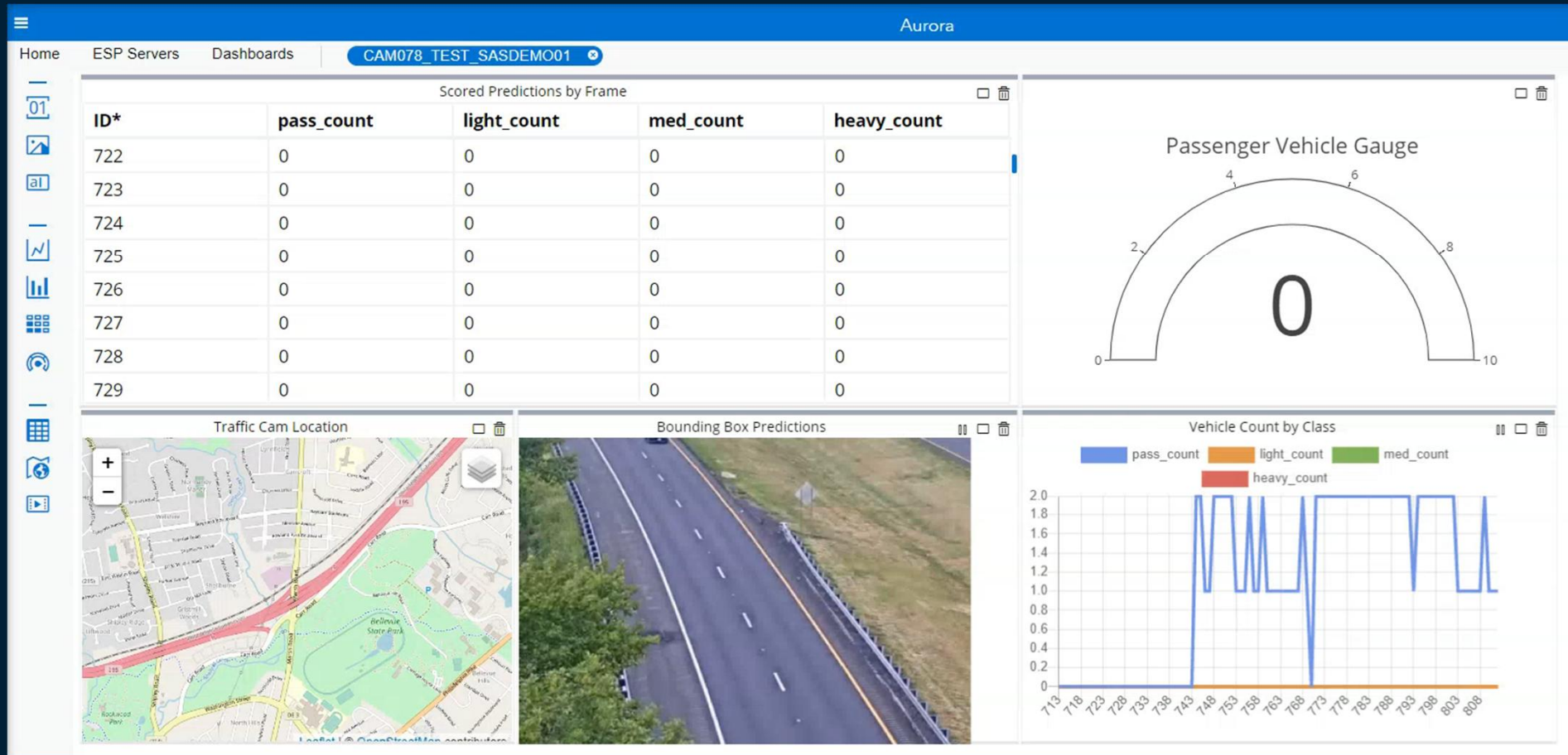
Vehicle Detection and Tracking



Speed Estimation



Running Computer Vision Projects in Real-Time



Challenges

- **Traffic Cameras**

- Requires fixed and reliable camera view (no panning, zooming, shaking)
- Speed estimates heavily dependent upon reliability and consistency in FPS of incoming video
- Speed estimates require precise point of reference to measure pixel displacement
- Detection at night, foggy, snowy and other weather conditions

- **Model Training**

- Different camera views require customized model training
- Post-processing: Geofencing and filtering the output is required for improved accuracy
- Models require resizing images/frames

Working with Traffic Cameras -Axis firmware

Capturing Videos for Batch and Real-Time Processing

- 1) Connecting directly to cameras; no descriptive error on why it failed
- 2) Getting cameras to write their video files into storage; MS Azure
 - IP address match with Azure network security,
 - Camera did not support a version of the SMB protocol that was supported by Azure
- 3) Work-around connecting camera to local drive- Symlink local share to Azure
 - Not able to get any written files, symlink failure or other issue with camera
- VMS: Proprietary video format