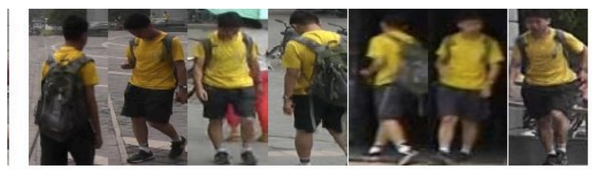
Real-Time Video Analytics for Situation Awareness

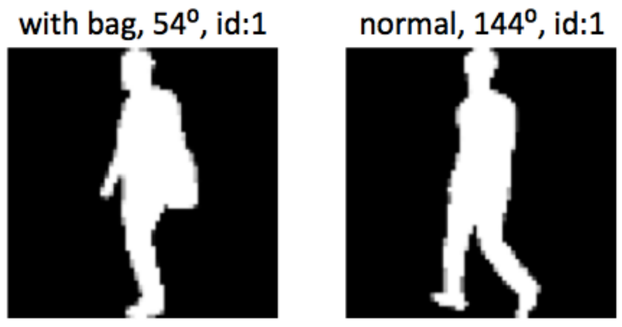
Junwei Liang & Prof. Alexander Hauptmann (PI)
Carnegie Mellon University
{junwei, alex}@cs.cmu.edu

Social Media Event Detection & Analysis

We have developed a system to automatically retrieve useful information from social media and analyze major events.

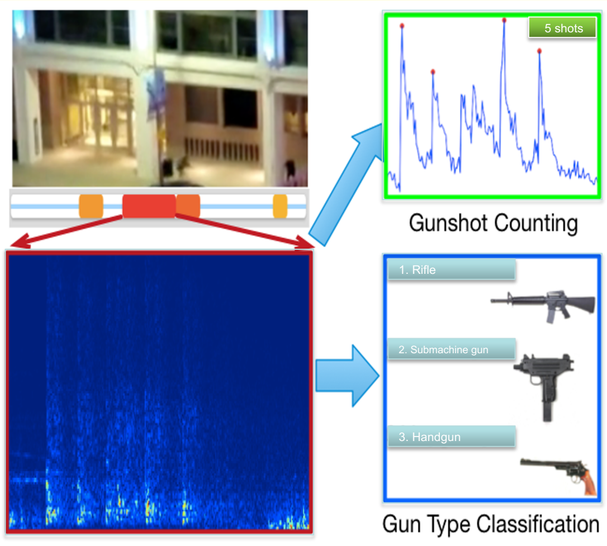
Gait Recognition for Person identification





The above figure is a demonstration of gait recognition for person re-identification. With gait recognition, our system can identify a person even if they have changed their clothing.

Gunshot Detection and Gun Type Classification



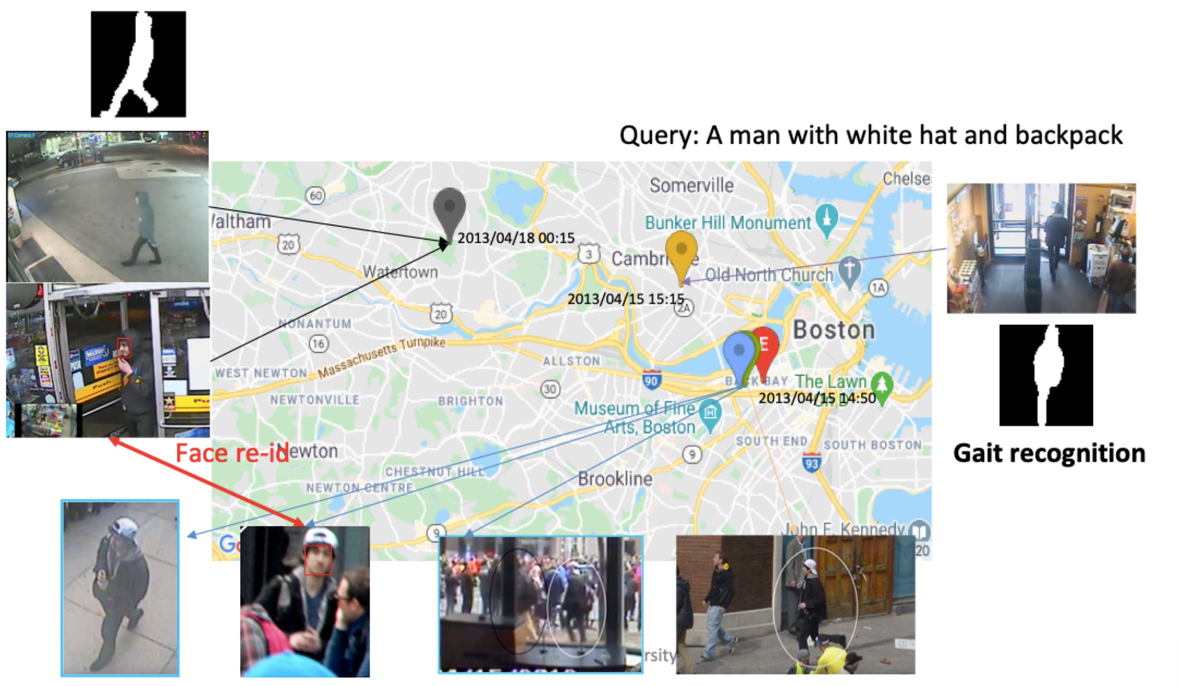
Our gunshot detection and classification system accurately detects which parts of a video contain gunshots and what type of guns are used. This is especially useful given a long video.

Disaster Assessment Using Aerial Videos

We have developed an automatic damage assessment system using aerial videos from social media or public safety personnel. As shown in the above figure, we aim to build a system that accurately detects buildings and the level of damage in order to help yield faster disaster relief efforts.

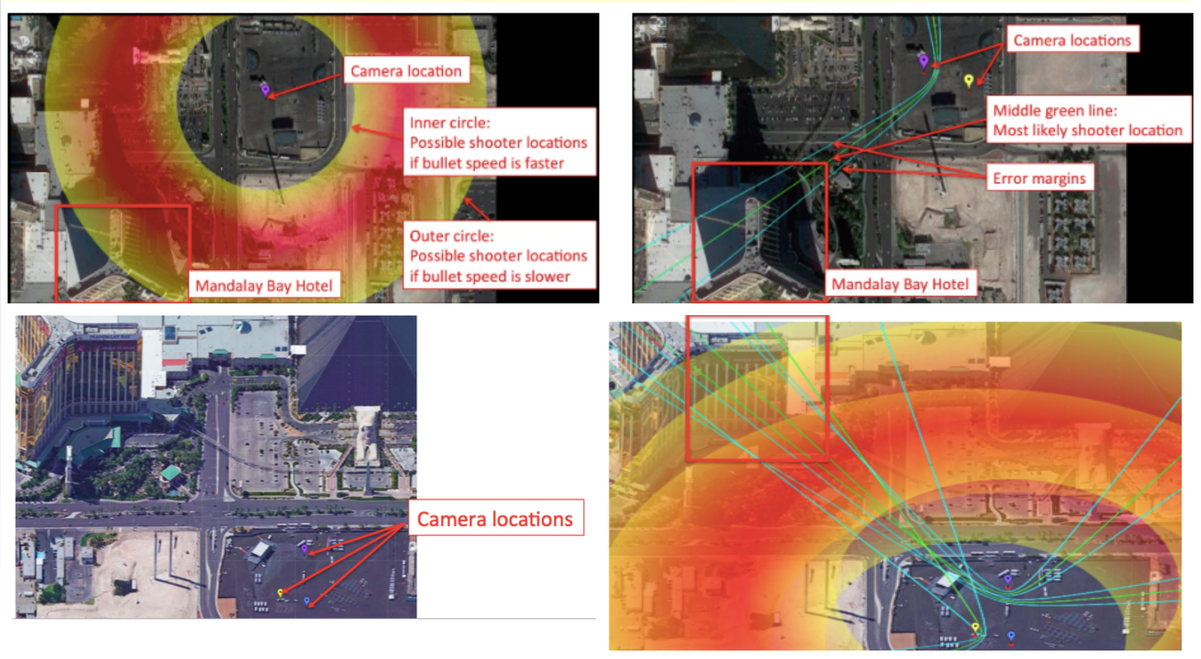
Our system can label each building with different levels of damage as well as which part of the building is damaged so they can be further assessed for structural damages, etc.

Cross-modal Person Re-Identification



We have developed a cross-modal person re-identification system. The above figure uses the Boston Bombing event as a demonstration. We utilize a set of tools including text-visual joint embedding, face re-identification, appearance-based person re-identification, and gait recognition. Given a text query, our system can be used to identify the suspect across multiple modalities and cameras.

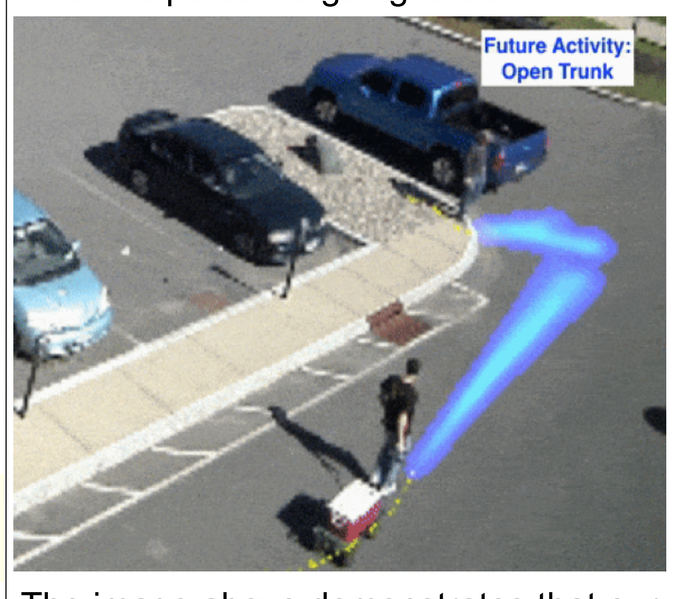
Shooter Localization



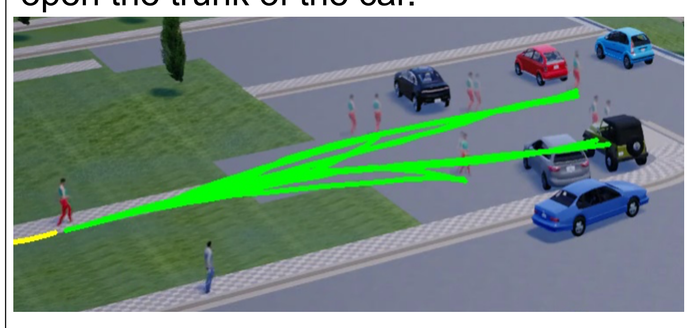
Our shooter localization system can take three videos and estimate the shooter's position. The above figure shows the example from the Las Vegas shooting. See more at https://vera.cs.cmu.edu/

Future Person Prediction

We have developed a system to automatically predict pedestrians' future trajectories and activities. Given a surveillance video, the system can predict for the near future (5 seconds) where the person is going to go and what the person is going to do.

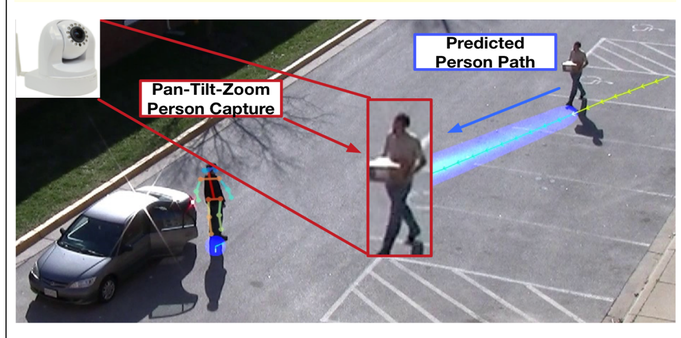


The image above demonstrates that our system correctly predicts that the two people are going to meet, and they will open the trunk of the car.



Using real-world video footage, we have reconstructed a 3D simulation scene and collected a multi-future trajectory prediction dataset for traffic safety. See https://next.cs.cmu.edu/multiverse/

PTZ Camera Automated Capture



Using the above person prediction model, we have developed a demo system with the PTZ camera that could automatically capture high-resolution pictures of persons of interest.

Project / Tool Links

Object Detection and Tracking in Videos
https://github.com/JunweiLiang/Object_Detection_Tracking)

Automatic Person Picture Capturing Using Pan-Tilt-Zoom Cameras
(https://github.com/google/next-prediction)

Event Reconstruction
Video Synchronization
(https://vera.cs.cmu.edu/)
3D Reconstruction
(https://vera.cs.cmu.edu/VERA_3D_Reconstruction)

Shooter Event Analysis
(https://vera.cs.cmu.edu/)