

NAVIGATING CHAOS

REAL-TIME TRAFFIC VIOLATION DETECTION



About our Project

An advanced AI solution for detecting reckless driving, footpath riding and hit-and-run incidents using Traffic CCTV cameras. The system integrates YOLO(You Only Look Once) and SAHI(Slicing Aided Hyper Interface) for object detection and ByteTrack for tracking the detected objects. The pretrained YOLO deep learning model was fine-tuned to ensure accurate detection of vehicles, accidents, and footpaths.

The integration of YOLO, SAHI, and ByteTrack to detect these violations offers a highly innovative solution. This combination ensures real-time processing and accurate detection, regardless of the time of day or weather conditions.

VIOLATIONS DETECTED

Hit-and-Run

Reckless Driving

Footpath Riding

RECKLESS DRIVING

Object Tracking

SAHI with YOLOv8 slices and processes video frames for accurate object detection, and ByteTrack assigns unique IDs to track objects across frames.

Trajectory Data Generation

The time-series trajectories for each detected object are extracted from the results of ByteTrack object tracking algorithm.

Feature Extraction

A fixed length feature vector is generated for each trajectory that represents the behaviour of the detected objects in its lifetime.

Classification

The feature vector is then fed into a classifier module for accurate detection of reckless behaviour.

HIT AND RUN

Accident Detection

SAHI-based YOLOv8 slices video frames, while a custom YOLO accident model identifies accidents in the detected objects.

Object Tracking

ByteTrack tracks the involved vehicles, assigning IDs to generate trajectory and velocity data post-accident.

Behavior Monitoring

The system evaluates "stop-and-flee" or "no-stop" behavior by analyzing velocity changes and exit patterns of vehicles post-accident.

Flagging Offenders

Vehicles exhibiting suspicious behavior (e.g., leaving the scene abruptly) are flagged as potential hit-and-run offenders.

FOOTPATH RIDING

Footpath Segmentation

SAHI-based YOLOv8 detects objects, and a custom YOLO-based segmentation model generates footpath masks for the video frames.

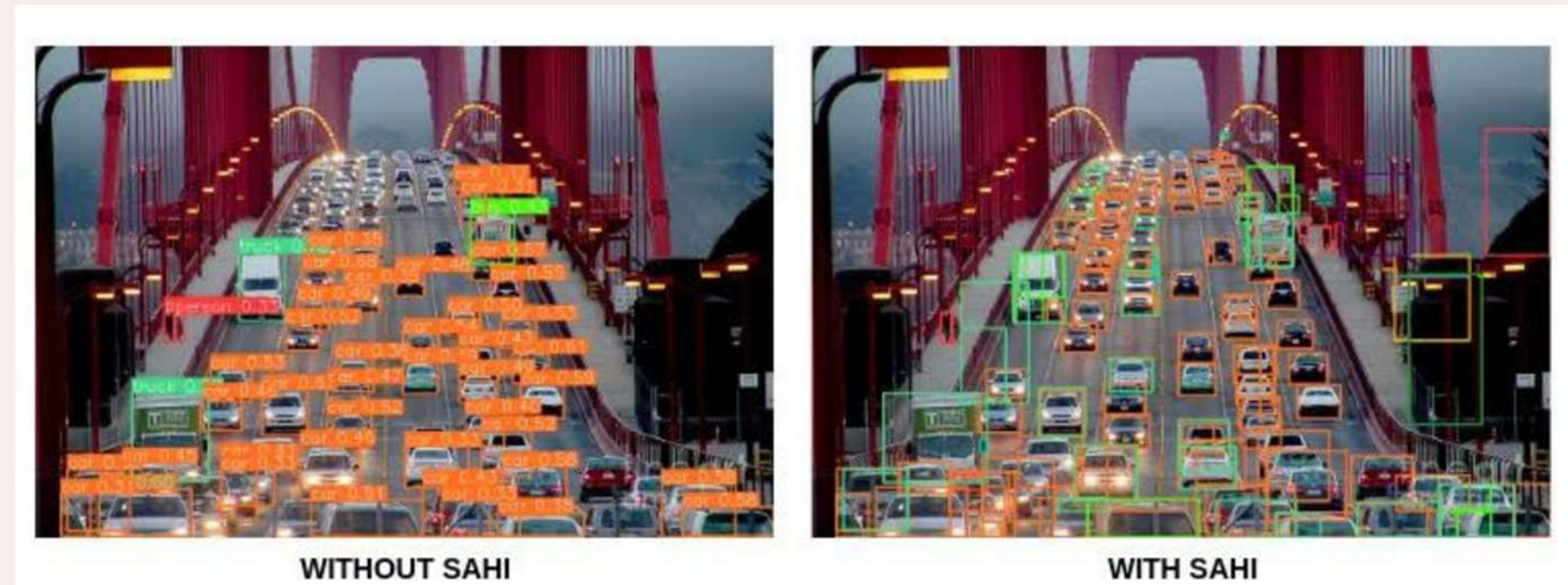
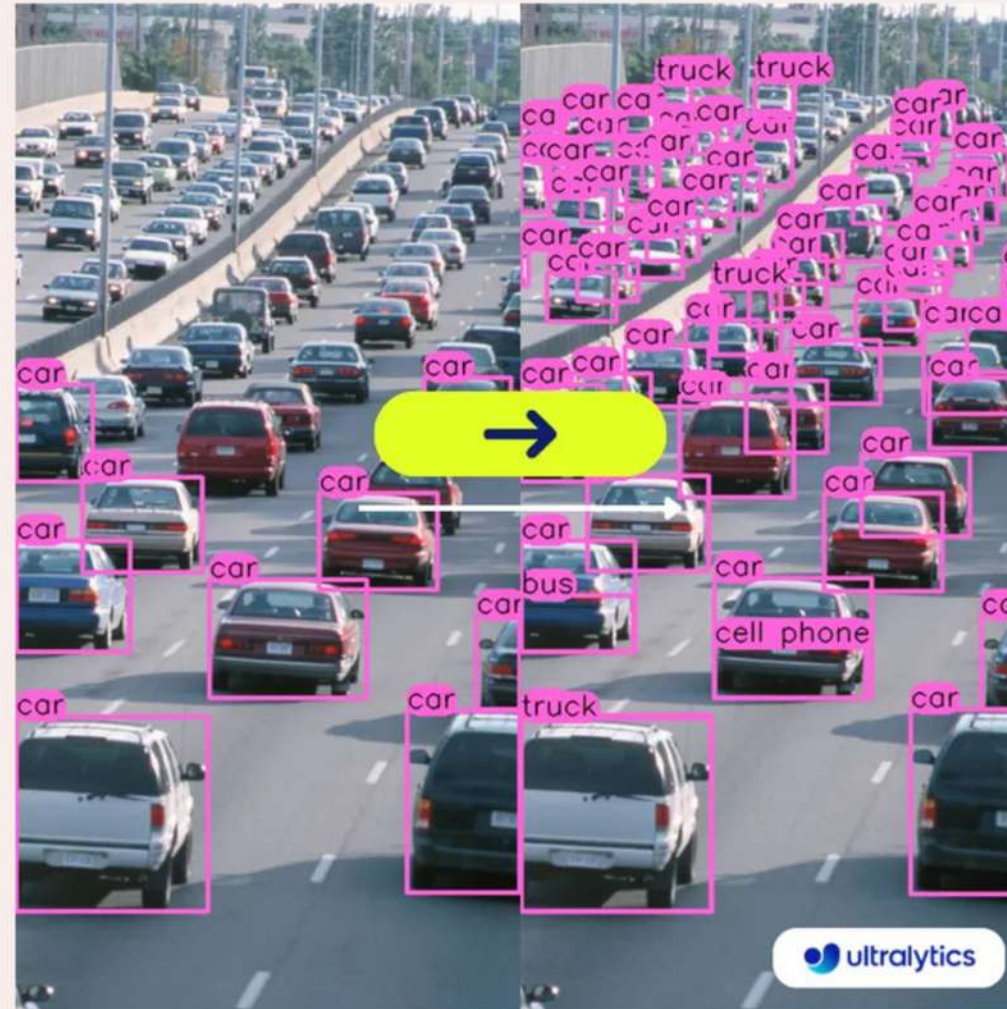
Object Tracking

ByteTrack tracks vehicles' movements and positions relative to the segmented footpath regions.

Overlap Detection

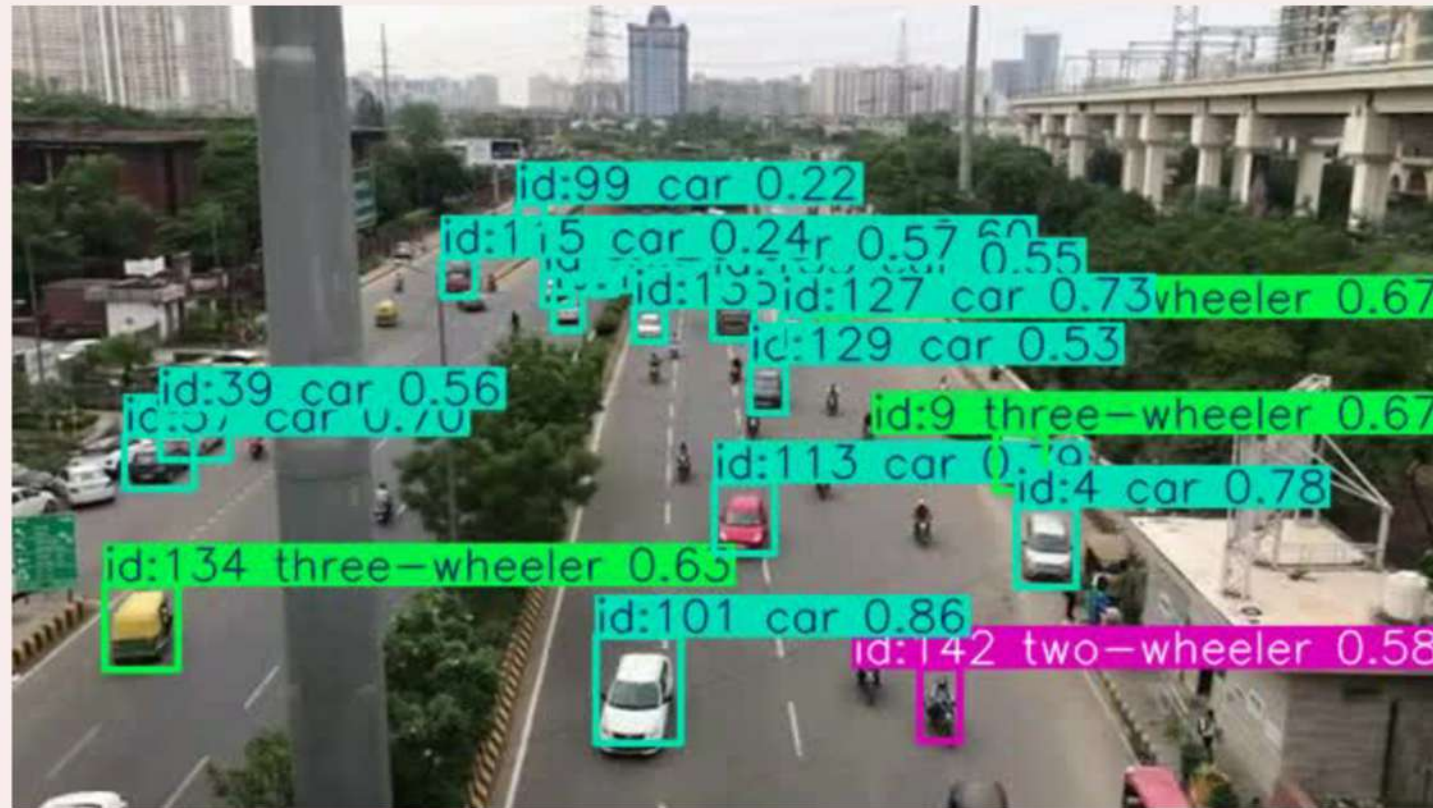
The system identifies significant overlap between a vehicle and the footpath mask to detect potential violations.

DIFFERENCE BETWEEN YOLO WITHOUT SAHI VS YOLO WITH SAHI



SAHI aids in detecting objects that appear very small in the frame while offering a broader context of the object's behavior throughout its lifetime.

TRACKER VIDEO



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RECKLESS DRIVING



video_314	0.243735	0.144263	0.186651	0.090422	0.2136	0.752785	normal
video_314	0.102495	0.070532	0.067488	0.038845	0.126546	0.986901	normal
video_314	0.312774	0.329713	0.324149	0.068022	0.236365	0.879562	normal
video_314	0.803717	0.531868	0.736366	0.068378	0.557787	0.852894	rash
video_314	0.601953	0.452365	0.59457	0.255711	0.216404	0.3853	normal
video_314	0.167541	0.115172	0.138109	0.063015	0.176382	0.896448	normal
video_314	0.123166	0.065761	0.093869	0.011621	0	0.604727	normal
video_314	0.684173	0.32297	0.645125	0.120657	0.412747	0.834166	rash
video_314	0	0	0	0	0	0.954542	normal
video_314	0.153243	0.134626	0.185361	0.065364	0.046714	0.976673	normal
video_314	0.812298	0.699456	0.799207	0.088233	0.420952	0.656362	rash
video_314	0.146749	0.141543	0.170283	0.018383	0.017443	0.897766	normal
video_314	0.249807	0.267934	0.214898	0.061116	0.2187	0.956428	normal
video_314	0.052399	0.014033	0.041183	0.024585	0	0	normal
video_314	0.858714	0.435277	0.778378	0.032302	0.624555	0.98634	rash
video_314	0.065181	0.085576	0.080681	0.02356	0.048558	0.989844	normal
video_314	0.627338	0.478987	0.572085	0.065953	0.52429	0.920117	rash
video_314	0.099373	0.053179	0.070038	0.037475	0.104712	0.991832	normal
video_314	0.085503	0.079262	0.070127	0.015591	0.089913	0.984439	normal
video_314	0.157638	0.134087	0.172188	0.015022	0.061094	0.956668	normal
video_314	0.108018	0.075224	0.078362	0.012755	0.083535	0.984682	normal
video_314	0.81312	0.500712	0.780704	0.088804	0.49546	0.900839	rash
video_314	0.052679	0.018297	0.026245	0.010634	0.018464	0.991917	normal
video_314	0.488252	0.161764	0.408309	0.05552	0.339728	0.913393	normal
video_314	0.175963	0.102166	0.125952	0.028349	0.272777	0.991689	normal

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HIT AND RUN

PLEASE BE ADVISED THAT THE FOLLOWING VIDEO CONTAINS FOOTAGE OF A SEVERE ACCIDENT. WE RECOMMEND WATCHING IT AT YOUR DISCRETION.



Final Hit-and-Run Evaluation:

Participant 146.0 flagged for hit-and-run: never_stopped

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FOOTPATH RIDING



OUR TEAM



SIDDHANT KALE



SHIVGOUDA PATIL



SOWMESH SHARMA



SHUBH KANODIA

**THANK
YOU!**

