Smart India Hackathon/2020
Idea/Approach Details

Ministry/Organization Name :- Govt of Madhya Pradesh

Problem Statement :- Vehicle recognition and compilation in database software (MS333) -Software - Web App development

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Idea/Approach :- Vehicle recognition and compilation in database software

We present a web based application for searching vehicles in surveillance videos based on semantic attributes. Such a system can be used by intelligence agencies to search for suspicious vehicles involved in some criminal activity. The Intelligence Officer just needs to enter the location and time stamp of the crime scene on a web portal and he/she can get the description form for each vehicle (which includes color, direction of travel, speed, height, model, license plate, peculiar attachments,logos, accessories and dents etc.) in the specified time frame and in the field of view of camera from Video-Based Evidence Analysis done on CCTV footage of crime scene.

Database Formation:- We can not rely on license plate recognition solely, as they are not effective for low-resolution cameras or when the plate number is not available. Instead we provide a complementary search framework based on other fine-grained attributes. For this, we will be using multi-view vehicle detection based on motionlet classifiers, i.e. classifiers that are learned with vehicle samples clustered in the motion configuration space. Moreover, in order to deal with different vehicle types (buses, trucks, SUVs, cars), we learn the motionlet detectors in a shape-free appearance space, where all training samples are resized to the same aspect ratio, and then during test time the aspect ratio of the sliding window is changed to allow the detection of different vehicle types.

Once all the vehicles are detected and tracked over the video, fine-grained attributes for each and every vehicle are extracted and ingested into a database to allow future search queries which will be made based on the description form of the vehicle at the crime scene as entered by the Intelligence officer. {Example Query :- "Show me all blue trucks traveling at high speed on Chandigarh Highway last Saturday, from 2pm to 5pm".(colour="blue", Type="Truck" , Location = "chandigarh highway" , speed ="high" , TimeFrame= "2pm to 5pm",license_plate=" not valid") . Finally we will get the clips matching the query.

Technology Stack:-

HTML/CSS/Python/ Javascript/Flutter/Dart/ Firebase/ SQL	CNN/ R-CNN/ Fast R-CNN/ Faster R-CNN/ YOLO/SIFT/HOG/Motionlet Classifier	Tensorflow/Keras/Pytorch/ Django/OpenCV/Scikit-learn

System Architecture

Video Based Evidence Analysis
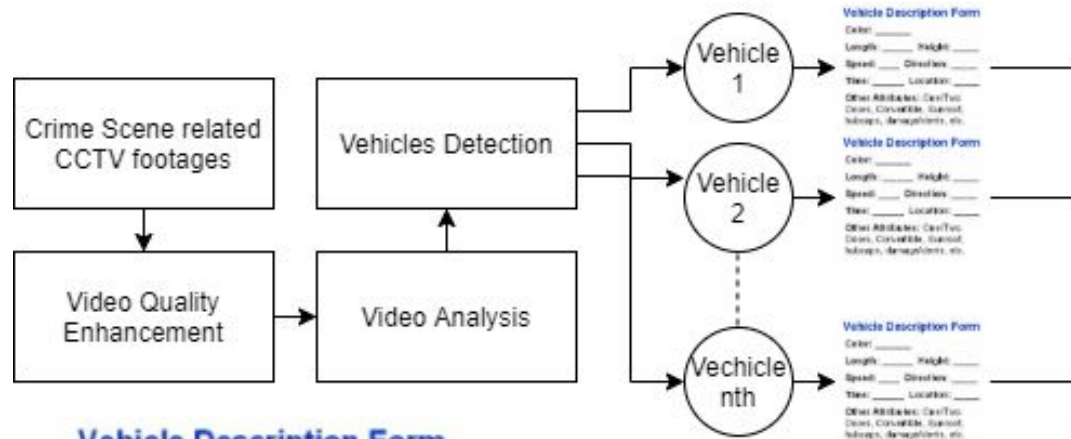
Vehicle Description Form
Color: _____
Length: _____ Height: _____
Speed: _____ Direction: _____
Time: _____ Location: _____
Other Attributes: One/Two Doors, Convertible, Sunroof, hubcaps, damage/dents, etc.
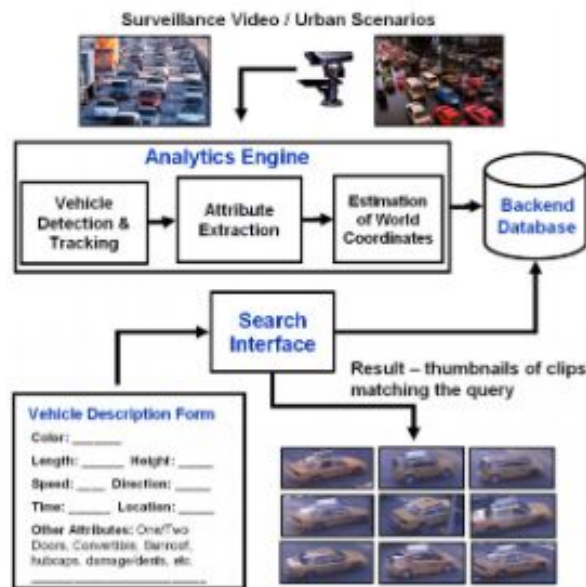
Vehicle Description Form

Color: _____

Length: _____ Height: _____

Speed: _____ Direction: _____

Time: _____ Location: _____

Other Attributes: One/Two Doors, Convertible, Sunroof, hubcaps, damage/dents, etc.

Representative Descriptive form

Attribute Based Vehicle Search

Use cases:-

1. Providing intelligence for suspicious vehicles(by giving timestamp and location we are keeping a track)
2. Finding Stolen Cars.
3. Informing concerned authorities after an accident(license plate recognition will help us to find ownership so we can inform the families,location will allow us to inform nearby hospitals) .
4. Blacklisting Cars (If car does not have proper licence plate or windows are tinted by black screen).
5. Avoiding Overspeeding to prevent accidents (Successive cctv footages will help us to find the average speed of the car , if speed is above permissible value then fine can be imposed on next toll gate)

Dependencies/Show Stoppers

1. Huge Amount of data to process(We will using large computing power).
2. Not enough CCTV coverage(Every street doesn't have CCTV cameras as per current scenario in Madhya Pradesh).
3. Crowded Areas(Reduced accuracy due to difficulty in image segmentation).
4. Different lighting conditions and environmental factors such as rain, reflections, and shadows can affect model accuracy for detecting vehicles.