Computer Vision - Project 2  
Visual traffic monitoring at a road intersection

Task1:

On first task, after getting the images and their queries, I obtained the pixels coordinates from each monitored road’s corners, and I have a initialize an array with each of them.

If we crop a road with it’s coordinates will look something like this:  
A car on a road

Description automatically generated

A close up of a stick

Description automatically generated

After that I used an YOLO pretrained model to detect any vehicles from the picture:

A traffic jam on a street

Description automatically generated

Having those bounding boxes and the polygons for each road, I detected the number of cars on roads specified in query by finding the bounding boxes that intersects the road polygon, and apply next rules to check if those bounding boxes(cars) are actually on the road:

* for roads with number: 1,2,3, 7,8,9 (the ones from upside and downside of the pictures)  
  if the bounding box intersect more than 40% from it’s area, means that car is on the road
* for road with number : 4,5,6 if the left-downside corner of the bounding box is inside the road polygon, means that car is on the road.

With this steps I completed the queries for all images.

Task 2:

For this task on each video I extracted the foreground:

From each frame I extracted the last 3rd frame, to get a consistent movement on current frame by making an absolute difference between them, applying a Median Blur to reduce noise and a threshold to obtain the mask for moving objects. After this I extracted the mask from the current frame.

A screenshot of a video game

Description automatically generated

For each video Iinitialize the tracker on the original video first frame, and if there is a motion on the bounding box, the tracker will be updated on the mask with movement objects, otherwise will be updated on the current frame for original video.

I used the CSRT tracker from opencv-python package.