Course Assignment
COL-780
Medial Axis Detection of Moving Objects

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Stepwise Description:

Background Subtraction:

The function *cv.createBackgroundSubtractorMOG2()* provided by OpenCV has been used. It is a Gaussian Mixture-based Background / Foreground Segmentation Algorithm. Here, it is used to filter the still background, to work on the moving object only.

Image Cleaning (*cv.morphologyEx*):

To reduce noise, morphological transformation operation has been applied to the image frames with a 5X5 kernel of 1's. We have used erosion as well as dilation functions. In erosion, the kernel runs through the image and a particular pixel is kept 1 only if all the pixels under that kernel are 1. This results in a thin image with reduced noise. Then dilation expands that thinned line.
Firstly, we have applied opening (which is erosion followed by dilation) to remove the noise and expand the noise-free features, and then closing (dilation followed by erosion), to close small holes inside the foreground objects, or small black points on the object.

Identification of Lines and Edges:

Scharr operator has been used to compute the first derivative of the images in x and y direction. Then the Hough transform has been used to extract all lines in the images. The function *houghlinesp* of OpenCV has been used to take into account the end-point of the detected segment. We have taken the spatial-median of all these lines to get the medial axis of the object.

Previous Frame Feedback:

To reduce noise in the computed medial axis, we have compared the slopes of the Medial Axes of the current frame with that of the previous frame. If the difference in slopes is greater than a given threshold, we have discarded the current (possibly noisy) median, and taken that of the previous frame itself.

Links to output files:

https://drive.google.com/open?id=1nH1uUJYYLl5hKeaE-lEm3gSPEbijoiXp