Assignment 1

Computer Vision

August 2019

1 Medial axis detection of Moving Objects

The aim of this assignment is to get you familiarised with basic OpenCV operations. Your task is to highlight the medial axis of the moving object in the video clips given using OpenCV's inbuilt operations.

- You can access the videos here.
- We'll be working on the frames extracted from the video. Please refer to the following example.

Once you get the frames, you should follow the below template -

1.1 Background Subtraction

As the name suggests, background subtraction is the process of separating out foreground objects from the background in a sequence of video frames. Please refer the following link for background subtraction.

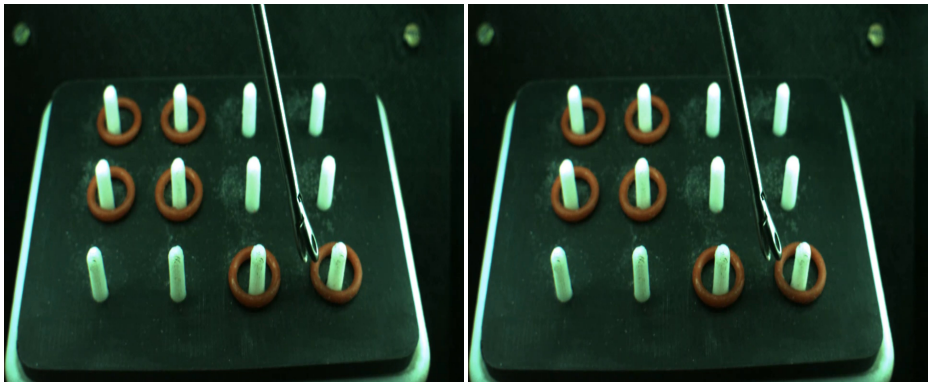
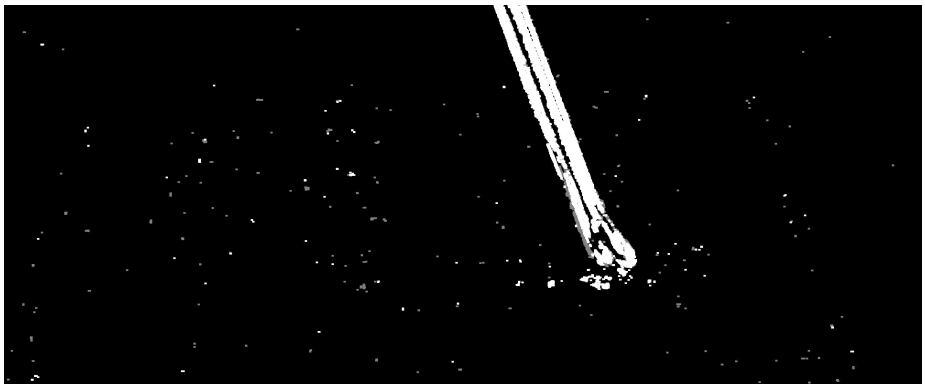


Figure 1: Two consecutive frames showing slight movement in the tool.



(a) Figure (1) frames after background subtraction.

(b) Figure (a) after cleaning using Opening operation. (You can try any other method of your choice.)

1.2 Cleaning of image

The thus obtained background subtracted image may contain noise, imperfections etc. which should be cleaned to get a better picture of the moving object in the foreground. Fundamental morphological image processing techniques like erosion, dilation etc. can be used for achieving the same.
Please refer the following link for morphological image processing techniques.

1.3 Identification of edges and lines

The next step is to identify the edges in the cleaned image, which can be done by using derivatives as covered in the class. Once you detect the edges, you can identify the straight ones in them by using the Hough Line transforms to get an image of the edges.
Please refer to the following links for derivatives, hough line tranformation.

1.4 Medial axis identification

After getting the straight edges, you should compute the medial axis of the object and highlight it on the original frame.

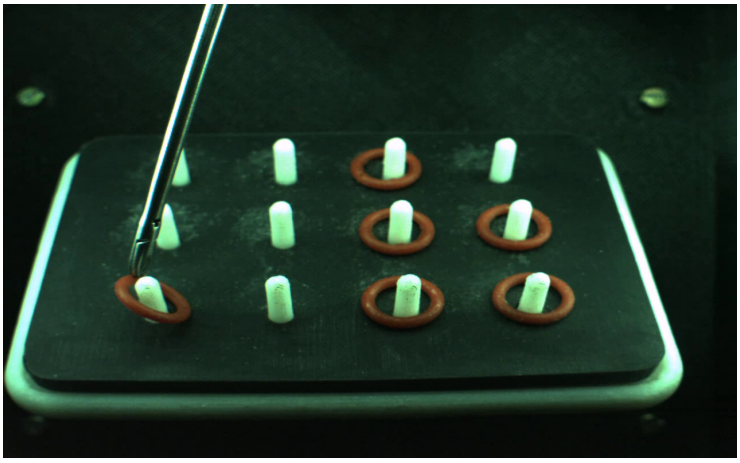


Figure 3: Initial frame

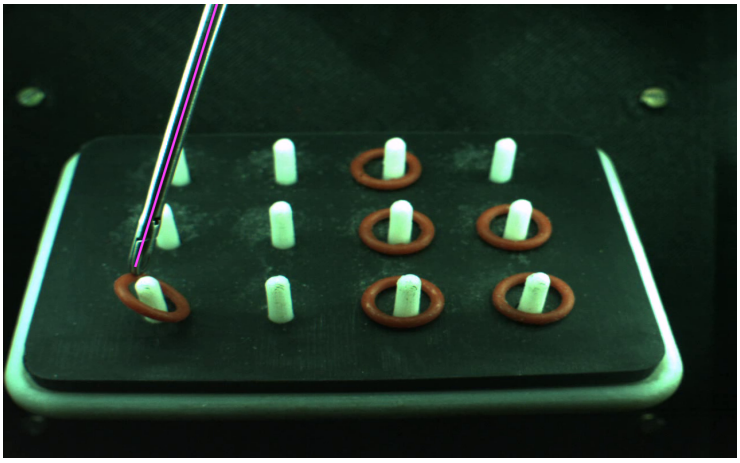


Figure 4: Medial axis marked on the initial frame