DALHOUSIE UNIVERSITY

*Inspiring Minds*

# CSCI 4261 – Intro to Computer Vision

**Assignment #4**

**Topic: Optical flow**

**Instructor: Dr. Carlos Hernandez Castillo**

**Due date: June 17, 2022**

**By: Shadman Mahmood**

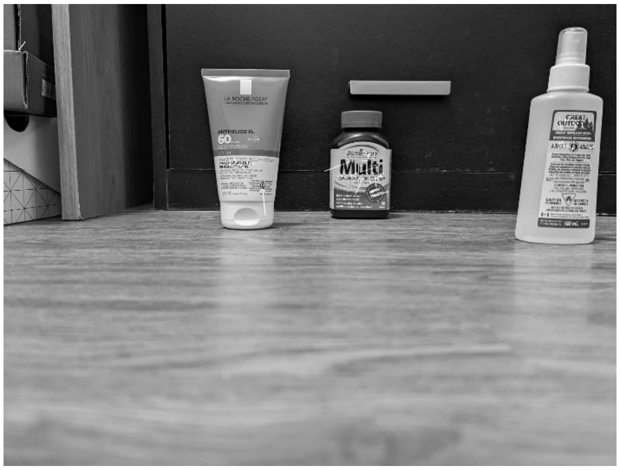
**B00780608**

# Task A:

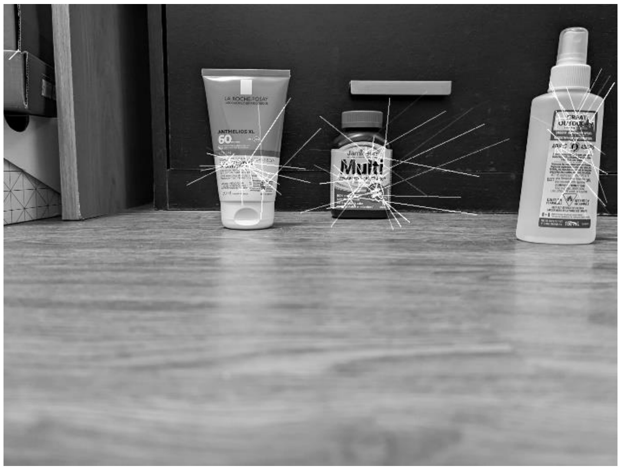
## 1)

### a) 3x3 window: (small window)

Lucas-Kanade Method

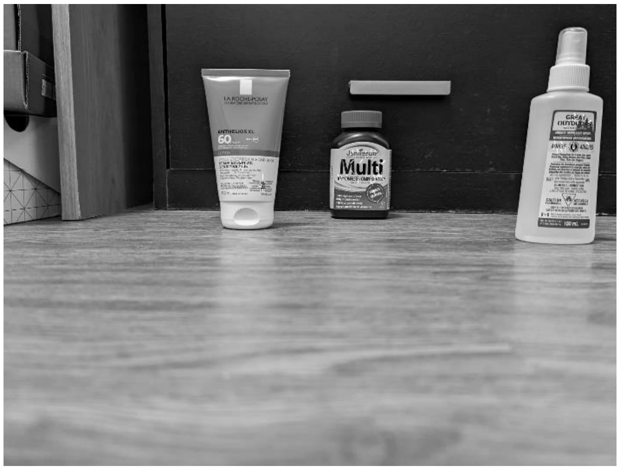


Lucas-Kanade Method (coarse to fine algorithm)

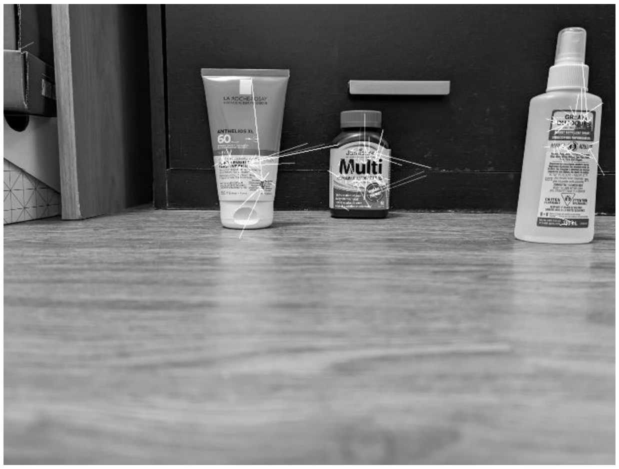


### b) 10x10 window: (large window)

Lucas-Kanade Method



Lucas-Kanade Method (coarse to fine algorithm)



## 2)

a) **How does the optical flow change between the simple estimation vs the coarse-to-fine algorithm?**
The optical flow can be observed more visibly when the coarse-to-fine algorithm is used for the large as well as the small window and vice versa when using simple estimation.

b) **Can you see a difference in the magnitude of the flow in the objects that are far compared to those in the front? how does this change depending on the window size?**
Objects that are farther away have more optical flow compared to the nearer objects and this is as expected since farther objects will seem to have a greater displacement in the camera lens when moving from initial to B1 position. Increasing the window size makes the optical flow more accurate and less optical flow is perceived compared to the smaller window.

## Task B:

## 1) and 2) The outputs for the 2 videos can be found in the zip folder

## 3)

a) **How did you create optical flow?**
Optical flow is the relative pixel-wise motion between frames which have a small-time step between them. To implement optical flow a background subtraction method (*cv2.bgsegm.createBackgroundSubtractorMOG()*) was used and then contours were located on the background subtracted frames. Finally, I passed the contour points to the Lucas-Kanade method with gray scaled frames of the input video. I also generated the arrowed lines on the contour points, however due to the small start and end points given to the arrowedLines method I ended up with arrows that look like diamond shape in the optical flow video.

b) **Did you remove the background?**
Yes, I removed the background of the input video using a method from OpenCV.

c) **What is the strategy used to find a car? Is there any other strategy you could have used?**
Firstly, a region of interest was selected on which contouring was applied. Then the contour area was found which was used to locate the car. Contour area values above 1900 allowed me to find the car I wanted in that ROI.

d) **What was the approach you used to draw the trajectory or the box?**
Once the contour area method was applied on ROI and the car was isolated since it had contour area value greater than 1900, I simply applied the *boundingrect* method along with a drawing method from OpenCV called *rectangle*.