# CM3065 Intelligent Signal Processing

# Exercise 1 Report

# LIM WEE KIAT

## 1. (a) Description of frame differencing

Frame difference method is one of the most commonly used methods for moving object detection and segmentation. The frame differencing method is used to detect every motion that an object makes that was captured by the camera. Firstly, the difference image is obtained by subtracting the corresponding pixel values of adjacent frames, and then the difference image is binarized. When the ambient brightness changes little, if the corresponding pixel value changes less than the predetermined threshold value, it can be considered as the background pixel. If the pixel value of the image area changes greatly, it can be considered as the result of the moving object in the image, These regions are marked as foreground pixels, and the position of the moving object in the image can be determined by using the marked pixel regions.

## (b) Description of background subtraction

Background subtraction has several use cases in everyday life, it is used for object segmentation, security enhancement, pedestrian tracking, counting the number of visitors, traffic vehicles, etc. It is able to learn and recognize foreground masks. it is able to subtract or eliminate the background portion in an image. Its output is a binary segmented image that essentially gives information about the non-stationary objects in the image. There lies a problem in this concept of finding non-stationary portion, as the shadow of the moving object can be moving and sometimes being classified in the foreground. The popular Background subtraction algorithms are:

- BackgroundSubtractorMOG
- BackgroundSubtractorMOG2
- Geometric multigrid

## 2. Analysis of the application

First and foremost, we need to import the OpenCV and assign our background to None. After that, we declare a variable called 'video' to read the video from a video file. Now created a while loop where it will read the video file coming out. We create two variables called 'ret' and 'frame' to read the video each frame coming out of the video. After that, the 'roi' variable is created to focus only on detecting cars that are in the 'main street'. Besides, we change the color profile from color to gray and going to blur the frame in order to remove the unnecessary noise that will be present in the video. We use absdiff function to find the absolute difference between background and current frame. We also need to use a threshold function that can eradicate all the other noises. For example, any difference which is more than 30, it will show white color. We also do dilate function to dilate the treshold image so that it removes the unnecessary noise. To concentrate on the moving object which is the car in the video, we can do that by using contours. Now we draw the countours by using a for loop. Inside the for loop, if the area of the contour is less than 2700 then continue. We use boundingRect function to define a rectangle out of the contours and now we can draw the rectangle. Lastly, we use imshow function to display the color frame with contour of motion of object.

## 3. Table with the data generated by application

|  | Total number of cars | Car per minute |
|---|---|---|
| **Traffic_Laramie_1.mp4** | 6 | 0.033 |
| **Traffic_Laramie_2.mp4** | 4 | 0.038 |