Candidate Number: EX0829

CM3065 Intelligent Signal Processing - Final Assignment

Exercise 1:

Brief Description of the application:

The initial step in the implementation of the video processing system involves the installation and importing of essential libraries such as OpenCV-python and pywin32. Subsequently, the video file is opened, and its successful importation is verified before proceeding with further operations.

The code cell responsible for background subtraction and frame differencing contains a variable initialized for background subtraction. In particular, the detection shadows parameter is set to false to prevent the appearance of gray shadows on the generated mask. The foreground mask and frame rate variables are also defined, enabling the video file to be processed frame by frame while computing the difference between the frame rate and the background subtraction. The foreground mask undergoes dilation to add an extra layer of pixels before being subjected to erosion to remove the topmost layer.

Contour threshold and contour values are employed in computing the contours' regions and determining if they are suitable for drawing a bounding rectangle. When the contour area reaches a specific threshold, the bounding rectangle is displayed on the screen, and four data points are appended to a list as a tuple. The top left coordinates of the rectangle, together with its width and height, are represented by these four data points. To ensure that the next loop iteration receives a copy of the coordinates, the list of rectangles that meet the requirements and are displayed on the screen is maintained. A double for loop is utilized to prevent the same bounding box from being counted twice. The difference between the previous and current bounding boxes is retained, and the direction of the bounding box is presented alongside it. The contour condition value is also employed to exclude bounding boxes that identify human figures.

Rectangles bounding an area of the video feed surrounding vehicles heading towards the city centre are identified. To determine whether a vehicle is entering the city centre region, the top left corner of the vehicle must come into view and leave the video. The number of vehicles heading into the city centre is tallied using a stored vehicle count variable. Dividing the total vehicle count by the length of the video, which is converted to minutes, yields the number of vehicles heading towards the city centre per minute. A certain vehicle is deemed to be heading towards the city centre after the list containing rectangle information has been updated for the specified number of frames.

The results of the application are shown in the below table:

	Total No.Of Vehicles	Cars Per Minute
Traffic_Laramie_1.mp4	6	4.76
Traffic_Laramie_2.mp4	5	7.03

Generated Link:

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