CSI 4133 – Lab 02

Calculating the Difference between Two Consecutive Images

Contents

Introduction to Motion Detection

- The extraction of **different types** of information from a **sequence** of images taken at **different time** on a moving scene or from a moving sensor.

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Introduction to Motion Detection

- The input of a motion detection system is a sequence of images, often called frames, taken at different times
  - From a fixed camera on moving objects
  - From a moving camera on fixed objects
  - From a moving camera on moving objects

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Introduction to Motion Detection

- From a fixed camera on moving objects

Frame i
I(x,y,t1)

Frame i+1
I(x,y,t2)

Motion detected

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Introduction to Motion Detection

The simplest procedure to detect motion between two or more successive frames is to compute the **difference** in **the intensity level** of corresponding pixels between these images.

A simple motion detection algorithm is:

$$
\text{Motion} = \begin{cases} 1 & \text{if } |\ I(x,y,t1) - I(x,y,t2)\ | > \text{threshold } (0 <= \text{threshold} <= 255) \\ 0 & \text{otherwise} \end{cases}
$$

The result is a binary motion image where "1" pixels correspond to moving points in the scene while "0" pixels are fixed points.

Procedure

1) Load two successive frames (as frm 1 and frm2) from the same video

2) Convert RGB images to gray scale images

3) Calculate the pixel intensity difference between the two images (absolute value)

4) Perform thresholding on the difference image to get areas of movement in binary format

5) Change threshold values to see different results (track bar)

6) Save the best resulting image

Task

Extract a moving object from two consecutive images (pulled from a video) and save the resulting image to disk.

Idea:

1) Load two frames from the same video.

2) Calculate the pixel intensity difference between the two frames.

3) Perform thresholding on the difference image to get areas of movement in binary format.

4) Change the threshold values to see different results.

5) Save the resulting image to disk.

Task

Extract a moving object from two consecutive images (pulled from a video) and save the resulting image to disk.

Hint:

1) Load two frames from the same video.

   a) The source images can be found in the folder "images01."
   b) Img02_0076.bmp, Img02_0077.bmp, and Img02_0078.bmp are from Video1.
   c) park466.bmp, park467.bmp, and park468.bmp are from video2.

2) The source images have three channels (Red, Green, Blue). In order to calculate the difference between two images, you have to convert the RGB images into Gray-level images.

3) Implement a track bar to adjust the threshold values [0, 255].

Task

Please submit a **lab report**, **source code**, and **screenshots** of your results.
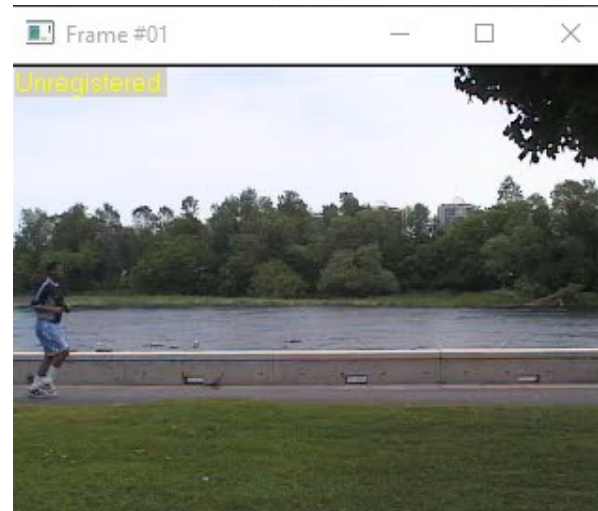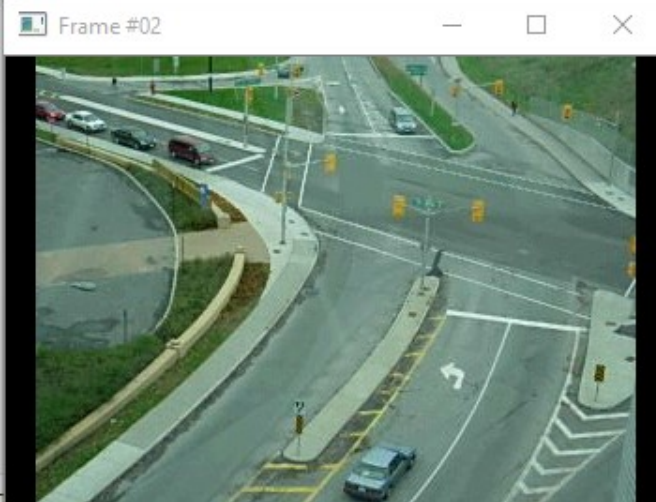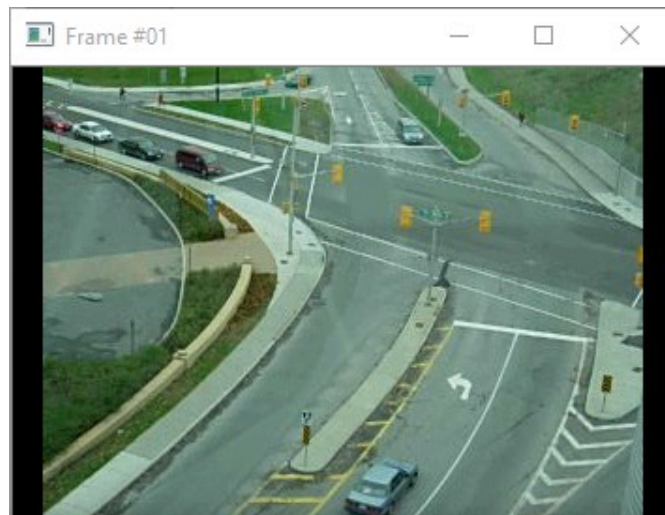
You can choose the 1st and 2nd (or 2nd and 3rd, or 1st and 3rd) images from "park"/"car" as the input image of your code.

You will need to take several screenshots of different threshold values. Then find the best one (show most of the pixels in the car, but fewer pixels of the background).
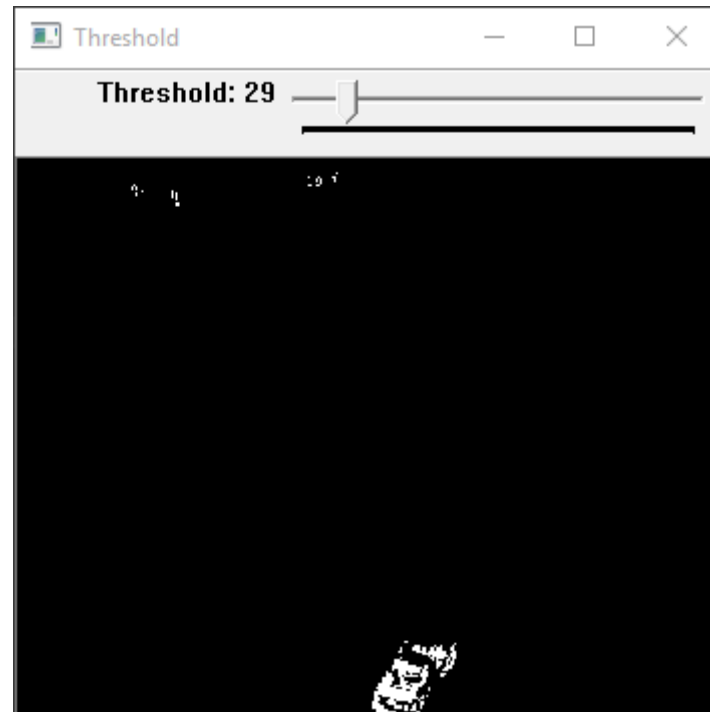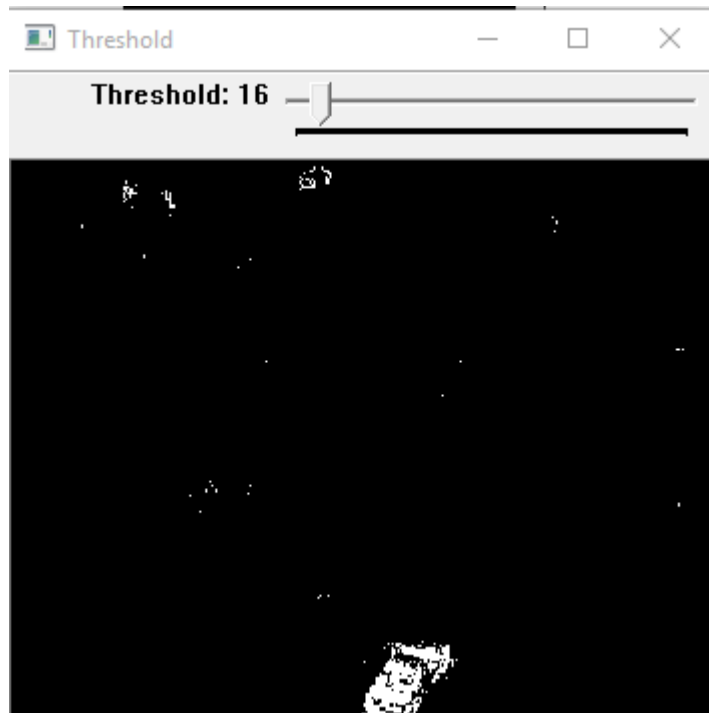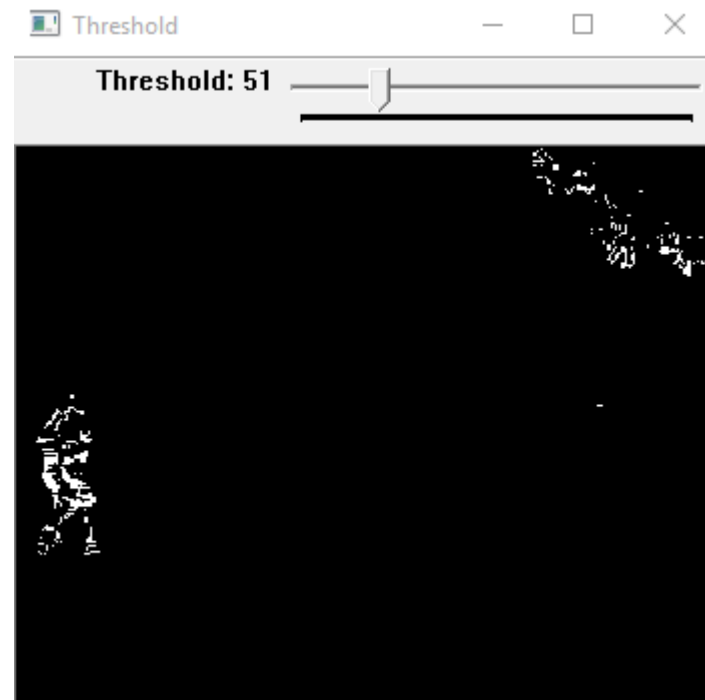
Example

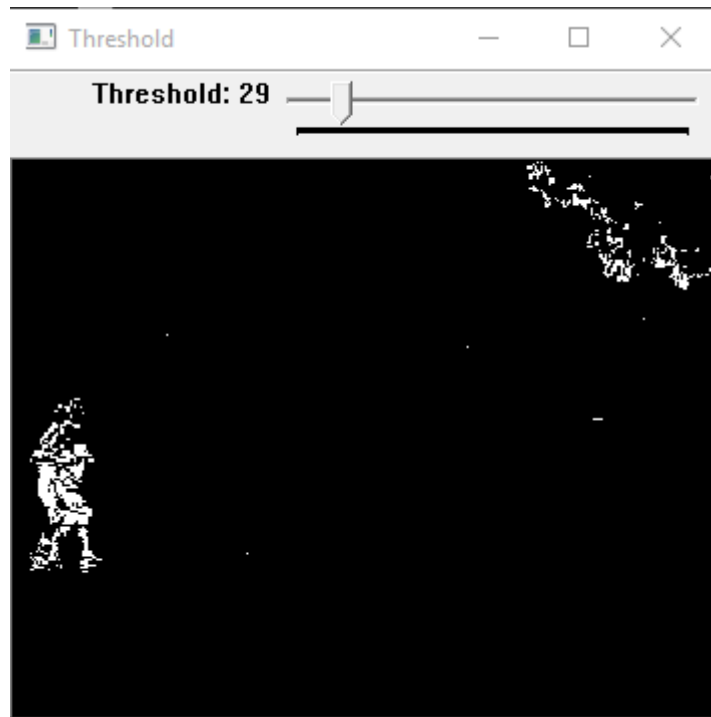Load and display the frames from videos.
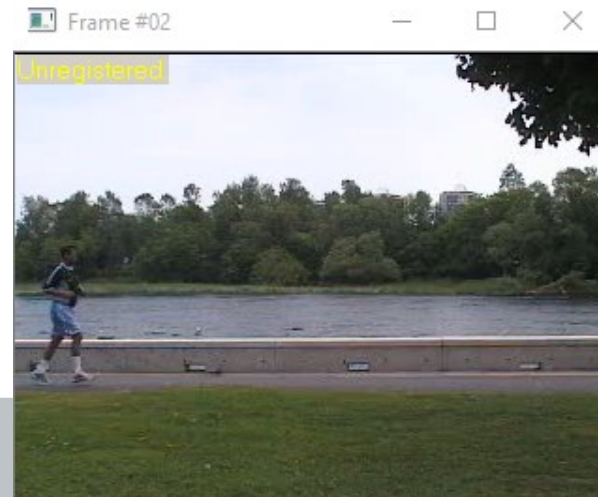
Example

Threshold control and results display.

Example

Threshold control and results display.

END

THANK YOU