

Vehicle-Headlight-Tracker

This is an algorithm that detects cars on the road using headlights. It detects the lights and pairs their movement as moving cars. When a light source is not moving for some time, it will be excluded from grouping and treated as background light.

Instructions

The algorithm outputs with 2 windows, namely 'Output' and 'Controller'. As the name suggests, the 'Output' window shows the result of the processed window while 'Controller' is used to control the variables of the algorithm for better performances.

The variables of the controller are as below:

1. BGR - HSV

Toggle between using BGR (Blue Green Red) and HSV (Hue Saturation Value) to detect headlight

0: BGR

1: HSV

Default value: HSV

HSV is more sensitive compared to BGR in terms of light, hence, it is generally better than BGR. BGR tends to pick up white pixels as light as well, which leads to low accuracy. At very specific situations, BGR will have higher accuracy. So, toggle to BGR setting only when HSV is picking up a lot of errors.

2. BGR Threshold

Threshold value or simply the brightness to be categorized as light source. The higher the value, the brighter the pixel has to be for the algorithm to pick it up as light source

Min value: 0

Max Value: 10

Default Value: 4

In HSV mode, this value does not affect the algorithm in any way

3. HSV Threshold

Threshold value or simply the brightness to be categorized as light source. The higher the value, the brighter the pixel has to be for the algorithm to pick it up as light source

Min value: 0

Max Value: 10

Default Value: 9

In BGR mode, this value does not affect the algorithm in any way

4. Stabilize Display Count

Toggle to stabilize the display of car count. The value changes EVERY FRAME, in 30FPS video you can't see anything, unless you are Superman. When turned on, it simply take display the average count of every few frames

0: Off

1: On

Default Value: Off

5. Car Count on Average

How long you want display of car count to update (per frame)

Min Value: 0

Max Value: 10

Default Value: 5

When 'Stabilize Display Count' is off, this value does not affect the algorithm in any way

6. Resize Value

Resize the output window, the larger the value, the larger the window size

Min Value: 0

Max Value: 10

Default Value: 7

7. Headlight Min Area in Pixels

The minimum the area of light needs to be for the algorithm to take it as headlight of a car. The value is given in 10 pixels, i.e. value of the bar at 2 refers to 20 pixels

Min Value: 0

Max Value: 10

Default Value: 5

Disclaimer: Do NOT attempt to be stupid and put the value as 0. If you put the value at 0 and wonder why the algorithm is not detecting any car..... wait for it..... because headlight can be smaller than nothing. Conclusion? Don't put 0!

Since it is in pixels, if you made the video output way too small by changing the resize value, at the point where all light source are smaller than 10 pixels, nothing will be detected as well

8. Show Blob Detected

Toggle to show all blobs or the potentials headlight detected. You can use this to view what is being picked up by the algorithm

0: Off

1: On

Default Value: Off

9. Show Cars

Toggle to show the cars (the numbering and boxes around the headlight pairs)

0: Off

1: On

Default Value: On

10. Car Direction Vertical - Horizontal

The direction of the car movement. The car could be moving horizontally or vertically in the video, toggle this to change the detection mode

0: Vertical

1: Horizontal

Default Value: Vertical

11. Headlight max horizontal distance

The horizontal distance between the headlight pair of a car (in pixel).

Min Value: 0

Max Value: 10

Default Value: 5

The scale of the value changes according to the direction of the car. When the car is moving vertical, per tick on the track bar refers to 40 pixels; while the car is moving horizontal, per tick on the track bar refers to 5 pixels

12. Headlight max vertical distance

The vertical distance between the headlight pair of a car (in pixel).

Min Value: 0

Max Value: 10

Default Value: 5

The scale of the value changes according to the direction of the car. When the car is moving horizontal, per tick on the track bar refers to 40 pixels; while the car is moving vertical, per tick on the track bar refers to 5 pixels

13. Camera FPS * 10

The FPS of the camera that captures the video, not the video nor display itself. The higher the FPS of camera, the smaller the distances of the light move from one frame to another. It is used to track the movement of the light. The value per tick in the track bar refer to 10FPS

Min Value: 0

Max Value: 5

Default Value: 3

Why max value at 50FPS? If the FPS is too high, the light does not seems to move at all from one frame to another, and, I couldn't afford 60FPS camera 😬 so no one is get to process 60 FPS video