16.01.2021

HACETTEPE UNIVERSITY

DEPARTMENT OF GEOMATICS ENGINEERING

FALL 2020-2021

# GMT 431-Photogrammetric Image Analysis

ASSIGNMENT 3

Student ;

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QUESTION.1 )

I first introduced the pictures. I researched and tried the values of disparity parameters one by one and decided which photo looks better. As a result, I decided that my parameters should be block size = 5, minimum disparity = -1 and number of disparity = 256. minimum disparity is minimum possible disparity value. number of disparity is maximum disparity minus minimum disparity and must be divisible 16.

```
window_size = 5
minDisp = -1
numDisp = 255 - minDisp
stereo = cv2.StereoSGBM_create(minDisparity=minDisp,
                               numDisparities=numDisp,
                               blockSize=window_size,
                               P1=8 * 3 * window_size**2,
                               P2=32 * 3 * window_size**2,
                               disp12MaxDiff=1,
                               uniquenessRatio=5,
                               speckleWindowSize=100,
                               speckleRange=1)
```

'

QUESTION.2)

```
def gtl2r():
    size = disparityl.shape
    height = size[0]
    print("Height of the image : " , height)
    width = size[1]
    print("Width of the image :  " , width)

    goodPixels = 0
    unknown = 0

    for i in range(height):
        for j in range(width-numDisp):
            if groundTruthl[i, j+numDisp] != 0:
                if abs(np.array(disparityl[i, j+numDisp].astype(np.float32))
                       -np.array(groundTruthl[i, j+numDisp].astype(np.float32))) <= 1:
                    goodPixels += 1
            if groundTruthl[i, j+numDisp] == 0:
                unknown += 1

    truePixels = (goodPixels / (((width-numDisp) * height) - unknown)) * 100
    wrongPixels = 100 - truePixels
    print('This disparity map is %{0:.2f} true'.format(truePixels))
    print('Percentage of different pixels %{0:.2f} '.format(wrongPixels))
    print("Unknown disparity values : " , unknown)
```

Firstly I printed the dimensions of the picture I got the output from. Then I defined names for correct and incorrect pixels. I set the intervals to hover the height in the first for loop and to travel horizontally in the second for loop. I subtracted the number of disparity value from the width value because the non-overlapping part in the disparity picture is equal. I set a condition. In this condition, I re-conditioned the ground truth values that are not equal to zero. In the second condition I have specified false values with more than 1 inequality. I added the remaining pixels as correct pixels. Then I printed the values equal to zero in the unknown value. I learned that there is such an equation (goodPixels / ((width-numDisp) * height) - unknown)) to find the percentage of correct pixels.

QUESTION.3)

With our disparity result we can calculate the depth but first, the pictures must match before we can calculate the depth. It has to be a pair of pictures because it is defined by an equation such as (depth = (baseline * focal length) / disparity). The reason for the picture pair comes from the definition of disparity. Disparity is the difference in the image position of the same 3D point when projected into two different cameras under perspective. The displacement between the positions of any two points on the scene visible in both cameras is called disparity.

The results of the output I got ;

```
>>>
========= RESTART: C:\Users\iremb\Downloads\hw3\irem_bakir_
Height of the image :  1110
Width of the image :   1390
This disparity map is %71.10 true
Percentage of different pixels %28.90
Unknown disparity values :  6772
>>>
```

References :

https://stackoverflow.com/questions/61053294/what-is-difference-between-disparity-and-depth#:~:text=Any%20point%20in%20the%20scene,points%20is%20called%20the%20disparity.&text=By%20getting%20the%20depth%20of,get%20the%20depth%20map%2Fimage. – 16.01.2021

https://docs.opencv.org/3.4/d2/d85/classcv_1_1StereoSGBM.html -16.01.2021