Report :

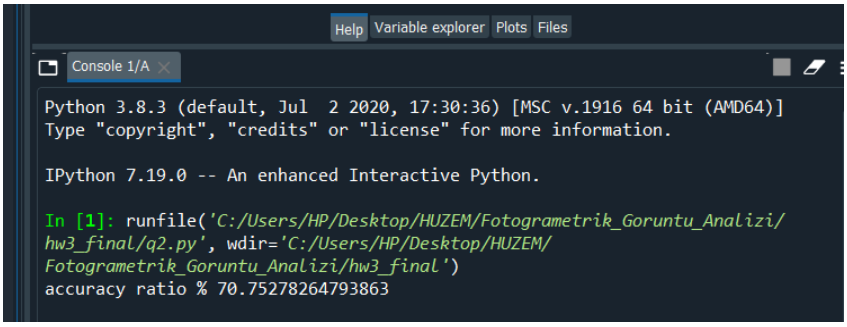
Q1) *I obtained disparity image from left and right images with semi-global block matching method. We evaluate along an epipolar line. In the case of a rectified image, this is along the horizontal scanline. For each pixel along that scanline, we evaluate each possible disparity result in this method.*

Parameters that I used;

- ***Block size:*** *It is an important parameter for resolution. Larger sized blocks show clear results if you want a high-resolution image.*
- ***Minimum / maximum disparity:*** *this should match the expected movements of objects within the images. In freely moving camera settings, a negative disparity could occur as well – when the camera does not only move but also rotate, some parts of the image might move from left to right between keyframes, while other parts move from right to left.*
- *(“numDisparities” is the differences between minimum disparity and maximum disparity. It defined the searching area and the algorithm will search similar pixels in this area for matching.)*
- ***Speckle:*** *The algorithm includes some smoothing and avoids speckles.*
- ***Speckle range and size:*** *Block-based matchers usually create "speckles" near the boundaries of objects, where the matching window catches the foreground on one side and the background on the other. To get rid of these artifact objects, we post-process the disparity image with a speckle filter controlled by the speckle_size and speckle_range parameters. speckle_size is the number of pixels below which a disparity drops or blob is dismissed as "speckle." speckle_range controls how close in value disparities must be to be considered part of the same drops.*
- ***uniqueness_ratio:*** *Margin in percentage by which the best (minimum) computed cost function value should "win" the second-best value to consider the found match correct.*

You can find the code with the name q1.py.

Q2) *I compared the Ground_truth image and my output image as pixel value with +- 1 pixel precision in x and y directions. While doing this I didn't get the broken pixels of the Ground_truth image. As a result of the comparison, I found my accuracy by dividing the equality values I obtained by the total number of pixels.*



You can find the code with the name q2.py.

Q3) *I can compute depth information from my disparity result. Disparity image is an image obtained from right and left images on the same rectified line. This means that here we observe a stereo method. Using the correct base and height (distance from the object) value and using the pixel values of the lidar images as a reference, if we get a disparity image with high similarity with the ground truth, we see that black colors are far and white colors are close -addition, objects farther away from the camera 's displacement is more than objects closer to the camera- so we get depth information. Also, we can use depth-map estimation method and plane-sweep algorithm for dense surface and to get depth information.*

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