CS 532 – 3D Computer Vision
Assignment 2

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Problem 1

In order to calculate the disparity between the left and right images, a winner-take-all stereo algorithm was used followed by calculating the disparity map and error rate. The rank transform was taken with window size of 5. To calculate the disparity, window sizes of 3x3 and 15x15 were taken.

It was observed that increasing the window size results in a smoother disparity map which should be expected as increasing the window provides more local context around each pixel, giving us better accuracy. This is seen when looking at the error rate. The error rates are shown below.

Error rate with 3x3 window: 63.714%

Error rate with 15x15 window: 44.507%

Problem 2

For this problem, I modified the code for Assignment 1 in MATLAB to reduce the resolution by changing the focal point of x and y while keeping the FOV same. The resulting video showcases the reduced resolution of the image moving in the x direction. To reduce the time for images, the iterations were done to 20 frames and the first and second frame were chosen, however, any frames could be chosen. I cropped the two images in a resolution of 880 by 672 which was quite big for computational purposes. Therefore, I converted the image into a 620 by 620 image which was still heavy to compute but was completed in the final hours. The range of disparities was another question and to answer that, range from 0 to 64 and 0 to 128 were chosen to see what difference does varying the window size and disparity window has on the resulting disparity map.

Theoretically, increasing the disparity range leads to an increased number of potential matches between two images, however, the window size must also be tweaked to get a reliable disparity map and reduce inaccurate matches. Looking at the fish stereo example, it seems that the window size could be greater than 15 with similar tweaking necessary for disparity range.

The output images for both problems can be looked at the output folder provided in the zip file.