CS 532: Homework Assignment 2
Due: March 3rd 6:00PM

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Collaboration Policy. Homeworks will be done individually: each student must hand in their own answers. It is acceptable for students to collaborate in understanding the material but not in solving the problems. Use of the Internet is allowed, but should not include searching for previous solutions or answers to the specific questions of the assignment. I will assume that, as participants in a graduate course, you will be taking the responsibility of making sure that you personally understand the solution to any work arising from collaboration.

Late Policy. No late submissions will be allowed without consent from the instructor. If urgent or unusual circumstances prohibit you from submitting a homework assignment in time, please e-mail me explaining the situation.

Submission Format. Electronic submission on Canvas is mandatory. Submit in a zip file, **a single pdf file containing**:

- the source code,
- the resulting disparity maps,
- the error rates from the experiments.

Also include the code and output images separately.

Problem 1. (70 points) Download the Teddy stereo pair and ground truth from the course web page and implement a winner-take all stereo algorithm using the rank-transform (see Notes 3). Compute the rank transform in 5×5 windows. Then, compute disparity maps on the rank-transformed images, aggregating the absolute differences of rank in 3×3 and 15×15 windows. Show the resulting disparity maps in the report. There is no need to store or show the rank-transformed images. Pixels for which any window falls out of the image boundaries can be set to black. The disparity range for these images is from 0 to 63.

Read the ground truth disparity map and divide the values by 4 and round to the nearest integer. Compute the percentage of bad pixels (error rate) by counting the fraction of pixels that differs by more than one disparity level from the ground truth (divided by 4). Differences equal to 1 are considered acceptable. Report the error rates.

Problem 2. (30 points) For the 3×3 aggregation window above, compute matching confidence using the PKRN measure. Using the PRKN values, generate a disparity map containing the top 50% most confident pixels. Report the error rate of the sparse disparity map and the number of pixels that have been kept. Pixels without disparity assignments should be ignored in this evaluation.