

### CS346 Project 3: Dynamic programming for Stereo Reconstruction

**Due May 8<sup>th</sup> 2014 9:30AM, submitted via Blackboard**

This project includes Disparity Space Image (DSI) computation and stereo reconstruction by applying dynamic programming.

(1) Read in two images and convert them into grayscale images. Some sample images are included in the project directory on Blackboard. You can also try images on the Middlebury website.

(2) Compute the Disparity Space Image (DSI) for each row of images, using Normalized Cross Correlation (NCC).

(3) Apply dynamic programming on the DSI image to find the path with the minimum cost from the top-left corner to the bottom-right corner.

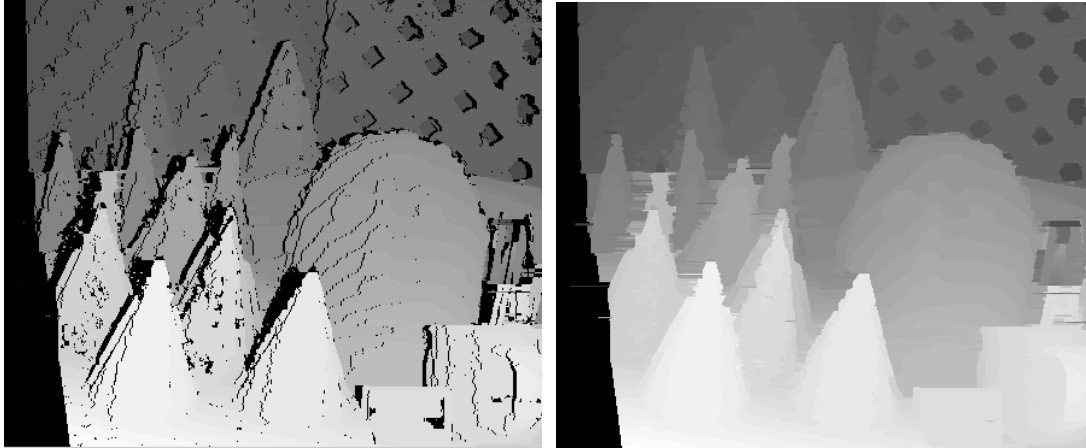
(4) Back-trace the path and compute the disparity.

(5) Repeat steps (2)-(4) for each row of the image.

(6) Fill-in the occlusion.

The following figure shows one example.





Upload running code and a written report to Blackboard by the due date/time. Half of your grade will be based on the written report discussing your program, design decisions, and experimental observations, and half on the program itself and output it produces. The report should contain:

- a) Brief summary of what you think the project was about (what was the task; what were you trying to achieve),
- b) Brief outline of the algorithmic approach,
- c) Pictures of intermediate (e.g., a DSI image and its optimal path) and final results that convince me that the program does what you think it does.
- d) Any design decisions you had to make, e.g., SSD or 1-NCC for dissimilarity measure, occlusion filling techniques, show the stereo reconstruction result on the coordinate system of left and right images.
- e) Experimental observations, e.g., the effect of different patch size and occlusion cost.
- f) A description of what each group member contributed to the final program or report, to discourage slackerism!!!

**Bonus (2 points)** Make stereo images from your own digital cameras. Keep in mind that the image pair we use in this project require that camera is shifted horizontally only, therefore the searching is performed on horizontal image scanlines.