Lab 6 - Stereo correspondences

The goal of the lab is to compute a disparity map between (rectified) image pairs.

Try these images to assess your solution.

You will find two synthetic pairs (rls and corridor) and two real pairs.

The rls pair is useful for debugging: it is formed by random noise translated of a constant quantity from the left to the right image, with the exception of a square at the centre translated of a larger quantity. The disparity map you should obtain has a constant value in all the image and a central square with a different (higher) constant value. Occlusions will affect the area surrounding the square. a "good" choice for [dmin, dmax] is [1,6] (from rls_l to rls_r).

Disparity maps

As a first thing you need to write a function `compute_disparity` that takes:

- two rectified images, I1 and I2
- the size of pixel neighbourhoods W
- a vector containing the minimum and maximum disparity possible from image I1 to I2 [dmin, dmax]

and produces (returns in output) the disparity map D (of I1 with respect to I2) where for each pixel we store its disparity value. Notice that the values in D are integers with a sign.

The function will visit all points p=(i,j) of image I1 (with the exception of the ones in the external frame of thickness W/2) and find the "best" corresponding points in I2 (looking at the search range [j+dmin, j+dmax]). Remember to check you are not accessing out of the image size.

The similarity between image patches should be evaluated with SSD (we suggest you use an ad hoc function `my_ssd` that takes two neighbourhoods as inputs and returns an integer similarity value as an output)

Left-Right Consistency

SLIDES - stereo: epipolar geometry

Lab 7 - 8 point algorithm

Image rectification - paper and software

SLIDES - stereo rectification

Image rectification: stuff

SLIDES - reconstruction (UPDATED on 17/12/2013)

Other methods for 3D reconstruction

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Write a function `left_right_consistency` that takes two disparity maps (from I1 to I2, and from I2 to I1) and then checks the consistency of the results, assigning a "special" value to points without correspondence: it could be a large value. An alternative is to use 0 (0 disparity is at the fixation point) since there should not be points at 0 disparity in a rectified stereo pair.

Main

You are encouraged to provide a main file that reads two images and includes the following

```
W=...
dmin=...
dmax=...

D12=compute_disparity(I1,I2,W,[dmin,dmax]);
D21=compute_disparity(I2,I1,W,[-dmax,-dmin]);
D=left_right_consistency(D12,D21);
```

....visualize all three disparity maps noticing that they are integers with a sign and (only for visualization purposes) need to be shifted on the appropriate range of values (if needed) and possibly stretched to improve visibility

Submission status

Submission status	Submitted for grading
Grading status	Graded
Due date	Wednesday, 4 December 2013, 11:55 PM
Time remaining	Assignment was submitted 51 mins 50 secs late
Last modified	Thursday, 5 December 2013, 12:46 AM
File submissions	LAB_6_AHMED.rar

Edit submission

Make changes to your submission

Feedback

Grade	100.00 / 100.00
Graded on	Friday, 31 January 2014, 11:40 AM
Graded by	Francesca Odone