Research Log - Week 04

JeffGWood@mavs.uta.edu

July 28, 2016

June 5, 2016

Almost done with MatLab triangle interpolation program. Hoping to have something to show Kamangar in the next few days.

Was reading up on image-segmentation as a way to improve feature detection through masking. Came accross references to **spectral clustering** which I still don't understand after data mining class. Was reading tutorial at `http://classes.engr.oregonstate.edu/eecs/spring2012/cs534/notes/Spectral.pdf` for starters.

June 8, 2016

Finalized most recent changes to MatLab program. It performs interpolation (between *source* and *destination* images of triangular patches defined by Delaunay triangularization of point correspondances from stereo images (See `Wood_Kamangar/StatusReports/StatusReport_00/Images`). Delaunay triangularization is performed on the source image only then extended to the corresponding points in the destination image so the arrangement of Delaunay triangles remains the same between images.

Summary of results is as follows:

- Triangles confined to one disparity region (See statue head in `image_source.png`, `image_destination.png`, and `truedisp.row3.col3.pgm`) show few artifacts and minimal blurring.
- Triangles crossing disparity regions or containing pixels occluded in the source or destination images (see camcorder tripod and lamp stand) have visibly more artifacts.

Started reading first page (*Abstract* and *Introduction* sections) of [Sharstein2002] [1].

June 9, 2016

Continuing to read [Scharstein2002] [1].

SUMMARY: Disparity can be defined by two ideas:

- *Human Vision* : Difference in location of features in the left and right eye.
- *Computer Vision* : Inverse depth. Can be treated as a 3-dimensional projective transformation (collineation or homographyv)of 3-d space (X,Y,Z).

Define fllowing terms:

- **Disparity Map**: $d(x, y)$
- **Disparity Space**: (x, y, d)
- **Correspondance**: Pixel (x, y) in reference image r and corresponding pixel (x', y') in matching image m given by $x' = x + sd(x, y)$ and$y' = y$ (assuming horizontal displacement *only*), where $s = \pm 1$ is chose do d is always positive.
- **Disparity Space Image**: Any function or image defined over continous or dispartiy space.

June 11, 2016 Continuing to read [Scharstein2002] [1]:

SUMMARY: Algorithms can be ordered in 4 common subsets:

1. Matching cost computation;
2. Cost (support) aggregation;
3. Disparity computation / optimization;
4. Disparity refinement;

Two main types of agorithms:

- **Local**: Including *Squared Intensity Differences* and *Absolute intensity differences*.
- **Global** Includeing *Energy minimizatio*.

Continuing to read up on *Spectral Clustering* and *Laplacian embedding* for uses in image segmentation.

References

[1] Daniel Scharstein and Richard Szeliski. A taxonomy and evaluation of dense two-frame stereo correspondence algorithms. *Int. J. Comput. Vision*, 47(1-3):7–42, April 2002.