Research Log - Week 12

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July 31, 2016

Decided to test *spectral clustering* routines `fnDistance` and `fnSimilarity` from June 5, 2016. Routines work on small images (approximaltey 100 pixels in size), but are bombing out `matlab` on larger images since for an image containing n pixels, the *Laplacian matrix* would be $n \times n$ in size requiring large amounts of memory. Put functions and test scripts in `Wood_Kamangar/StatusReports/StatusReport_12/`

I am looking into other methods of *image segmentation* including *graph-cuts* (described as the "gold-standard").

August 1, 2016

Started reading [Mark1997] [1].

SUMMARY: Paper describes expanded algorithm for *view interpolation* that building on [Chen1993] [2]. Pixels (including z-buffer and color information) in source images (referred to in article as *reference frames*) are transformed to the new new frame (referred to in article as *derived frames*) via *Euclidean*-transformations and *Affine*-transformations.

The paper addresses problems associated with *holes* being proudced in the derived frame, which result from a number of sources. They inlcude pixels *occluded* in the reference frame. Another source are surfaces that are highly incident to the image plane in the refence frames, but more closely parallel to the image plane in the derived images. The occurance of holes can be addressed through the use of a *mesh* for surface reprsenation (similar to that resulting from a *point cloud*). This results in holes of the latter type (surfaces of different angles to the image plane) being filled. Holes of the former type (from occluded pixel areas) occur along a siloutte of the backround/foreground surfaces. Normally the mesh results in a distorted surface connecting that foreground and background surface. The proposed algorithm (referred to in the article as *compositing*) addresses this issue by keeping the surfaces distinct and seperate and filling in the missing pixels with those containing the maximum (farthest) z-value.

August 2, 2016

Finished reading [Mark1997] [1]. Still unclear about some aspects including details calculations in section **4.3 Connectedness Calculation**.

SUMMARY: The pixels (including *color*, *z-value*, and *block size*) in the two reference frames are transformed to the common derived frame. Each reference frame is transformed seperateley, after which the compositing algorithm chooses which pixel values from the *transformed-reference* frames are used in the *derived* frame (pixel intensities are a *boolean decision* rather than an *interpolation calculation*. Because this maps *integer* pixel positions to *non-integer* pixel positions. Integer pixe

References

[1] William R. Mark, Leonard McMillan, and Gary Bishop. Post-rendering 3d warping. In *Proceedings of the 1997 Symposium on Interactive 3D Graphics*, I3D '97, pages 7–ff., New York, NY, USA, 1997. ACM.

[2] Shenchang Eric Chen and Lance Williams. View interpolation for image synthesis. In *Proceedings of the 20th Annual Conference on Computer Graphics and Interactive Techniques*, SIGGRAPH '93, pages 279–288, New York, NY, USA, 1993. ACM.