Research Log - Week 01

JeffGWood@mavs.uta.edu

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May 18, 2016

Reviewed [Chen1993] [1] Section 2. Consider reviewing follow relevant articles:

- Disparity [Gosh89]
- Optical Flow [Nage86]
- Look-up tables [Wolb89]
- 3d scenes [Pogg91]

Working on MatLab code to pick correspondig points in stereo-images, and calculate pixel offset vectors.

May 19, 2016

Read Section 2.3 of [Chen1993] [1]. View interpolation is limited by:

- **Penumbra**: pixels visible in one source image *but not both*
- **Umbra**, pixels visible in neither source image, and *invisible* in destination image.
- **Holes**, pixels visible in neither source image, but *visible* in destination image.

Calculatred formula for *pre-displaced* quad-pixel calculation using a bi-linear interpolation as:

$$\mathbf{P}(u,v) = \mathbf{P}(0,0)\cdot(1-u)\cdot(1-v)+\mathbf{P}(1,0)\cdot u\cdot(1-v)+\mathbf{P}(0,1)\cdot(1-u)\cdot v+\mathbf{P}(1,1)\cdot u\cdot v$$

May 20, 2016

Derived formula for uv calculation using *geometry matrix*, *blending matrix* and *basis vectors* of $\mathbf{u} = [u\ 1]^T$ and $\mathbf{v} = [v\ 1]^T$

$$x_{uv} = \begin{bmatrix} u & 1 \end{bmatrix} \begin{bmatrix} -1 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_{00} & x_{01} \\ x_{10} & x_{11} \end{bmatrix} \begin{bmatrix} -1 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} v \\ 1 \end{bmatrix}$$

$$y_{uv} = \begin{bmatrix} u & 1 \end{bmatrix} \begin{bmatrix} -1 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} y_{00} & y_{01} \\ y_{10} & y_{11} \end{bmatrix} \begin{bmatrix} -1 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} v \\ 1 \end{bmatrix}$$

Question for Kamangar: Is there a way given x and y to solve for u and v?

References

[1] 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.