Effective Light Field Rendering for Thumbnails

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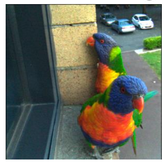
Motivation

- Phone cameras are adopting LF technology
- LF images contain more information than conventional images

LF image

vs.

Conv. image

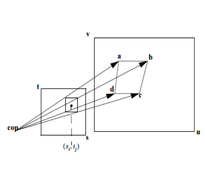


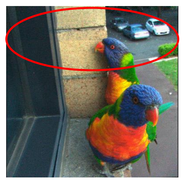
How can we take full advantage of the additional information?

(Dansereau et al., CVRP 2013)

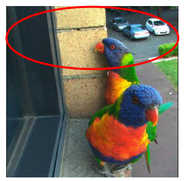
Rendering Methods

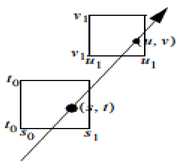
1. Texture Mapping





2. Quadrilinear Interpolation





- Aliasing in texture mapping is resolved with quadrilinear interpolation
- Rendering using these techniques does not properly capture perspective
- These methods are only effective for scenes without significant depth variations

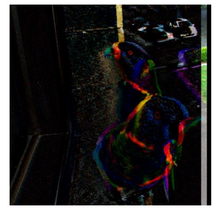
(Slater, 2000)

3. Depth-corrected Interpolation

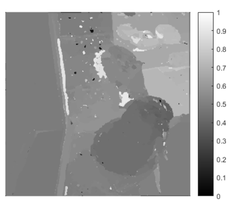
- Scene depth is estimated using an occlusion-aware algorithm *(Wang et al., ICVV 2015)*
- Features shift differently according to depth

Image Differences

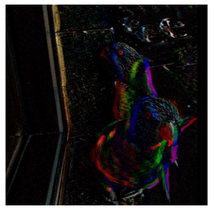
Uniform Depth Scene



Depth Map Estimate

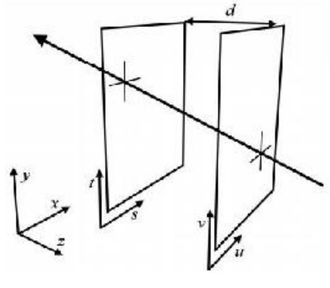


Depth Consideration



LF Parameterization

- Two plane parametrization *(uv* and *st* planes*)*



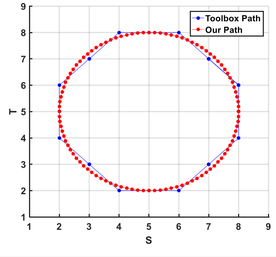
- We use this parameterization to render nice images from the captured LF

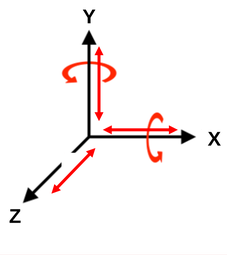
(Levoy and Hanrahan, 1996, Dansereau and Burton., ISCAS 2004)

Thumbnail Generation

Results

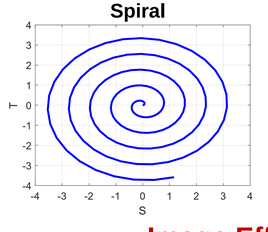
- Results are compared against LF Toolbox capabilities
- Images are as good as our depth estimation
- Multiple degrees of freedom are considered





Perspective Path

Spiral



Tornado

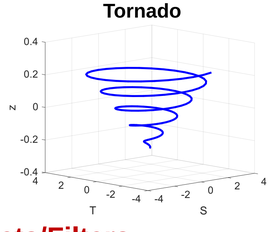
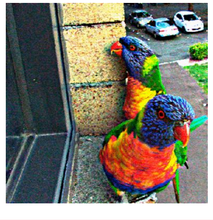
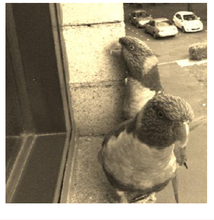


Image Effects/Filters

Morphological Manipulations



Opacity Changes



Future Work

1. Obtain better depth estimates using alternative algorithms
2. Optimize rendering algorithm to become more computationally efficient (i.e. compression and vector quantization)

References

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