Synthetic Depth of Field Effect
Variable Synthetic Depth of Field with Stereo Cameras
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Evaluation

NYU V2

KITTI Stereo

iPhone Stereo

Discussion

- Under ideal conditions, our method can achieve moderately acceptable depth of field blurring and bokeh.
- Segmentation mask is an important feature to improve the blurring around the target subject.
- Disparity matching algorithms need to be more robust for mobile stereo cameras, perhaps with bilateral smoothness and confidence constraints [4].

References

Method
Background: Circle of Confusion

Defocus Radius Map

$r_i = \frac{c(d_i)}{2p} = \frac{c(d_i)}{2p} \frac{B_r}{f^2}$

Blur Kernels

$B_r \in R^{(2r+1) \times (2r+1)}$

Merge Blurred Images

$I_{out} = \sum_i (B_r \ast f)_{r_i}\ast r$

Stereo Disparity
1. Calibrate & rectify.
2. Search matching tiles along rows. Compute match cost (SSD) for each disparity in a cost volume.
3. Filter cost volume conv2 with box filter (cost aggregation).
4. Choose disparity with lowest filtered cost.

Experiments

Front Focus (chair)
f/1.4 f/1.0 f/0.5

Back Focus (man)
f/1.4 f/1.0 f/0.5

Bokeh Shape
circle square hexagon

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Matlab disparityBM [3]

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