Computer Vision HW4 - Stereo Matching

資工四 b05902058 陳竣宇

Part 1: Depth from Disparity

$$\frac{b}{X_L + b - X_R} = \frac{z}{z + f}$$

$$\frac{b}{b + d} = \frac{z}{z + f}$$

$$bz + dz = bz + bf$$

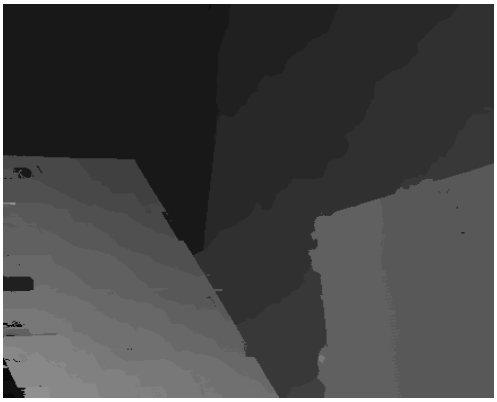
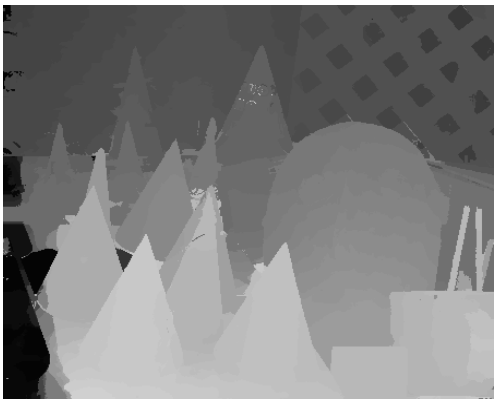
$$d = \frac{f \cdot b}{z}$$

Part 2: Disparity Estimation

Algorithm

- Cost computation
  - $C_{i,j} = (1 - \alpha) \cdot min[\|I_i - I'_{i-1}\|, \tau 1] + \alpha \cdot min[\|\nabla_x I_i - \nabla_x I'_{i-1}\|, \tau 2]$
- Cost aggregation
  - Apply the image guided filter on each layer of the cost computed from the previous step
  - Use *img_left* as the guided image
- Disparity optimization
  - winner-take-all ==> choose the minimum cost
- Disparity refinement
  - hole filling + weighted median filtering

Results

Image	Disparity map	Bad pixel rario
Tsukuba		3.26%
Venus		1.60%
Teddy		14.71%
Cones		10.40%

Average: 7.50%

Reference

- Fast Cost-Volume Filtering for Visual Correspondence and Beyond