Depth Map Generation on More Realistic Scenes

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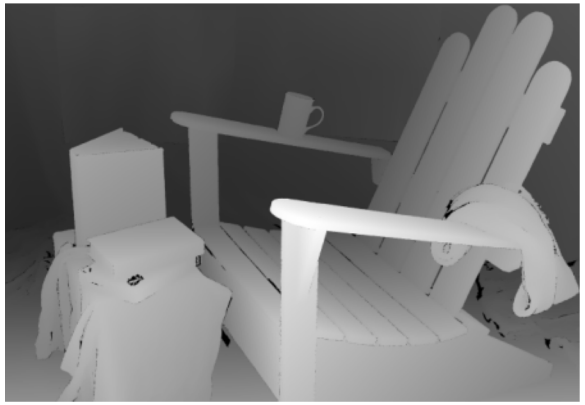
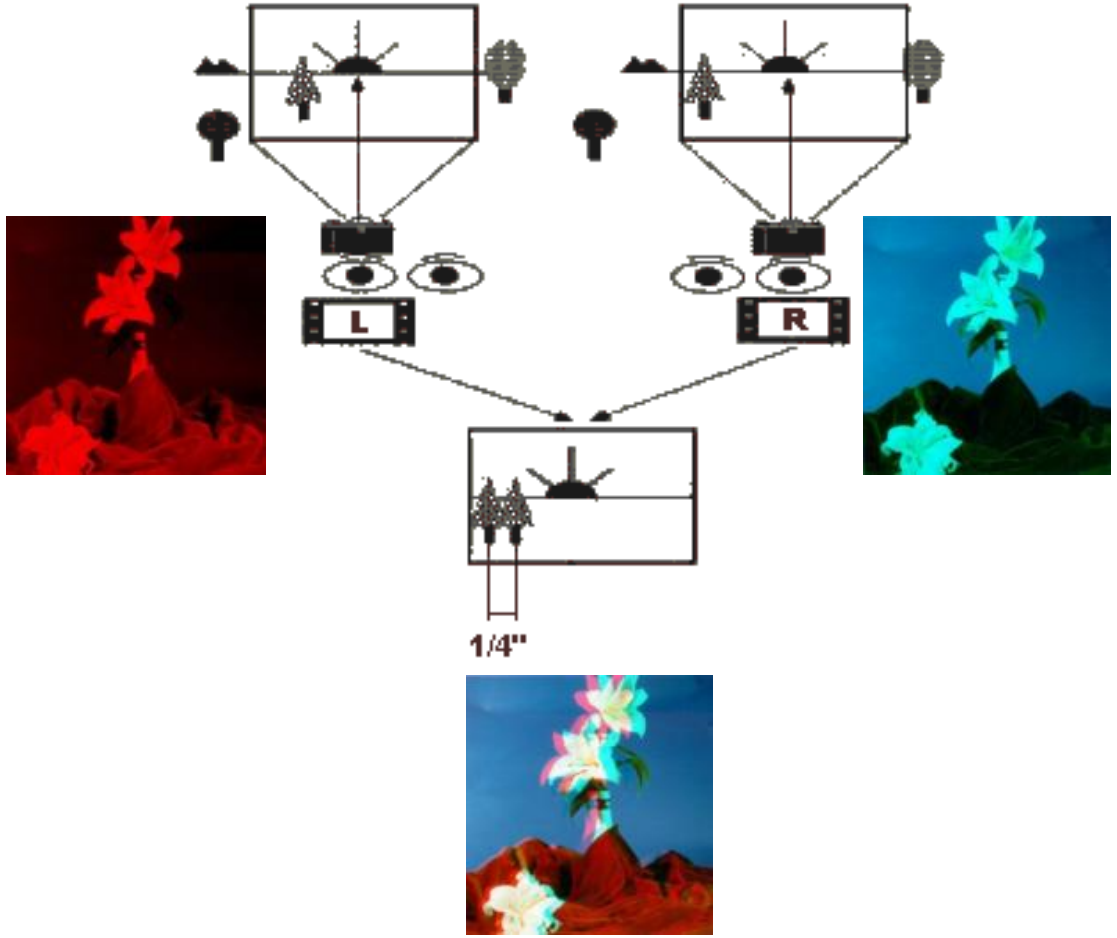
MediaTek

Introduction to Depth Estimation

Stereo matching



Estimated depth from stereo



Parallax from stereo

Application: Bokeh Effect (背景虛化)

Photo by Colby Brown

One of several input photos | Depth map (black close, white far) | Photo with Lens Blur

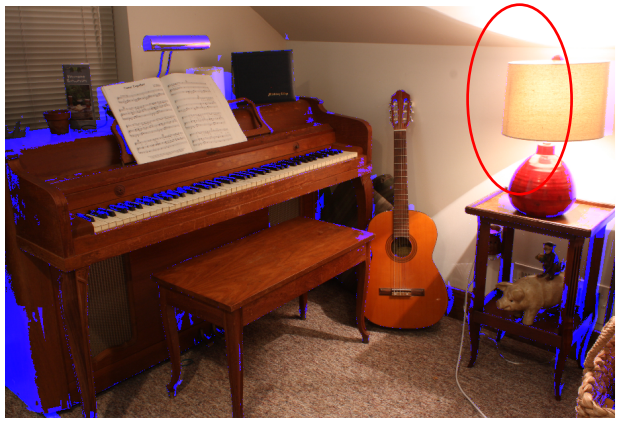
Domain Characteristics Differ

- Real dual cam @ real world

- Under-determined (ill-posed)
  - Repetitive patterns
  - Photometric variations
  - Texture-less areas
  - Occlusions
  - Reflections

Photometric variations

Repetitive pattern



Occlusions & Texture-less

Reflections

New Challenges for You

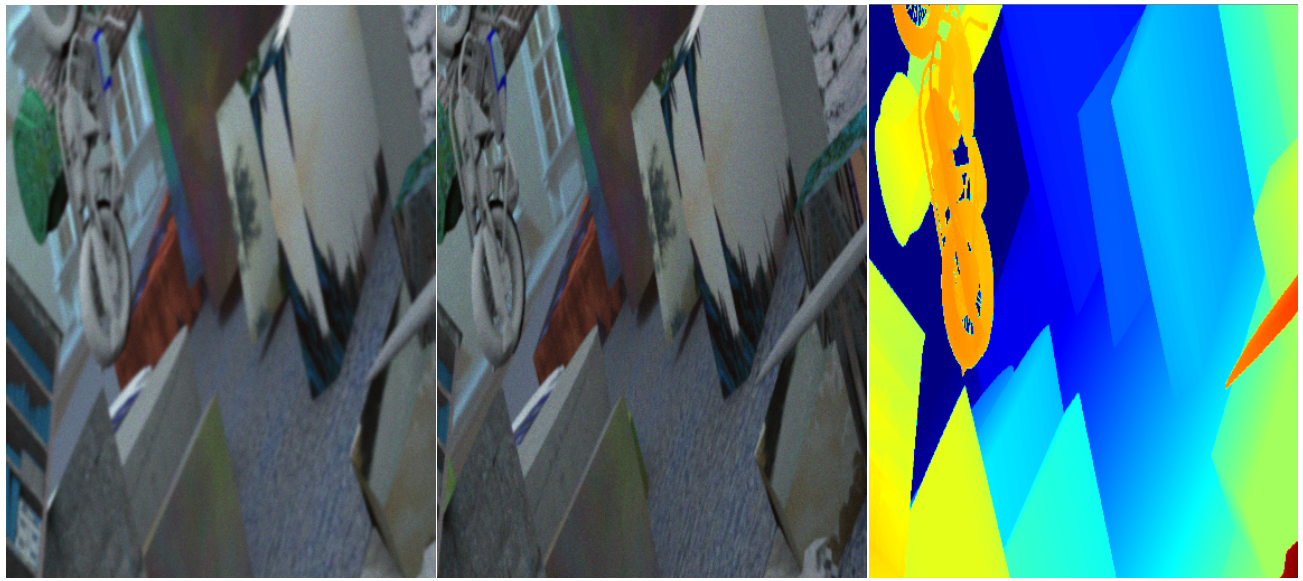
- Synthetic data with data augmentation
- Real smartphone dual-cam data

Provided Utilities

- **util.py** – Read/write disparity files (.pfm) and calculate error
- **visualize.py** – Visualize disparity files (.pfm)

Scoring

- 10 L/R synthetic images with ground truth depth
  - Get as less end point error as possible
- 10 L/R dual-cam images
  - Subjective scoring



Todos

- Compute disparity maps for synthetic and real scenes
  - Synthetic scene (disparity correctness: 50%)
    - Directory: data/Synthetic
    - Stereo pairs: TL0/TR0.png - TL9/TR9.png
    - Ground truth disparity maps: TLD0 - TLD9.pfm
    - Use **cal_avgerr()** in util.py to calculate average error
  - Real scene
    (subjective scoring: object boundary fitting, disparity correctness, disparity smoothness: 40%)
    - Directory: data/Real
    - Stereo pairs: TL0/TR0.bmp - TL9/TR9.bmp
  - Total calculating speed: 10%

Running the Code

- We will run your code in the following manner

```
python3 main.py --input-left <path to left image> --input-right <path to right image> --output <path to output PFM file>
```

Final Presentation

- 1/17 Morning
- We will select 15 groups of MTK project participants to present in the class.
- Send your results to TA (jackieliu@media.ee.ntu.edu.tw) by 1/16 11:59 **am**, the files should include:
  - Disparity maps of the Synthetic and Real datasets (20 PFM files)
  - Report your runtime of processing TL0/TR0 and your machine spec
- We will choose the presenter based on the performance.

Report

- Your student IDs and names
- Algorithm
  - Explain your algorithm and how to deal with the challenging tasks as detail as possible
  - Your references or websites
- Results
  - Synthetic scene/Real Scene
    - Show average error for 10 disparity maps of the synthetic scenes
    - Show your output disparity maps for both synthetic and real scenes
    - Report the computation time and your machine specs

Submission

- Code: main.py (Python 3.5+)
- A PDF report
- Put all the files in a directory with your student ID and compress to a zip file
- Submit to CEIBA (deadline: 1/17 11:00 **pm**)