

# Computational Cameras: Problem Set 3

Bingliang Zhang, UID 2242929, CMS G1

May 4, 2024

Total time spent on this homework: 7h. The codes and images are sent by email to all TAs.

## 1 Sub-aperture views

The sub-aperture view is shown in figure 1.

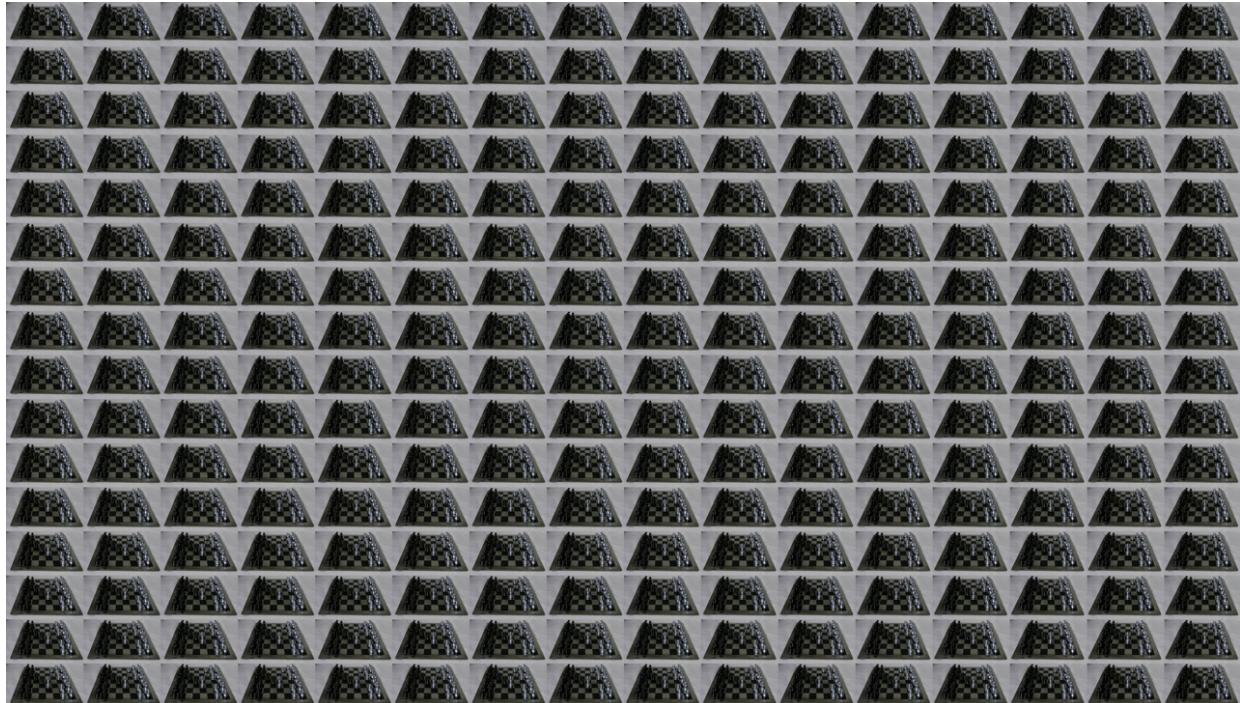


Figure 1: Sub-aperture view

## 2 Refocusing

The refocused images are shown in figure 2. From left to right and top to down, the depth is increasing linearly from  $-2$  to  $1$ .

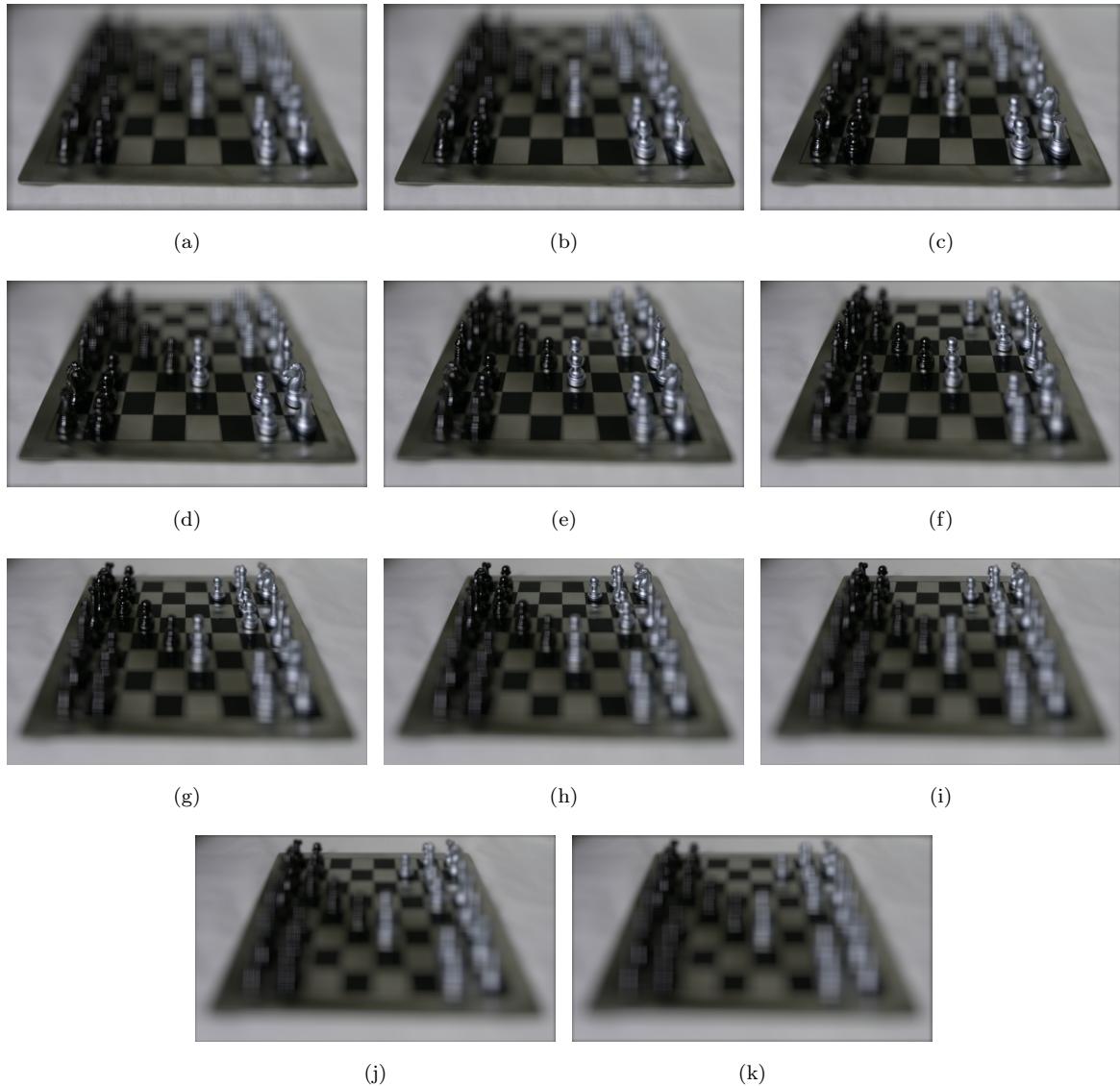


Figure 2: Refocused images.

### 3 Creating an all-in-focus image

All-in-focus image is shown in figure 3

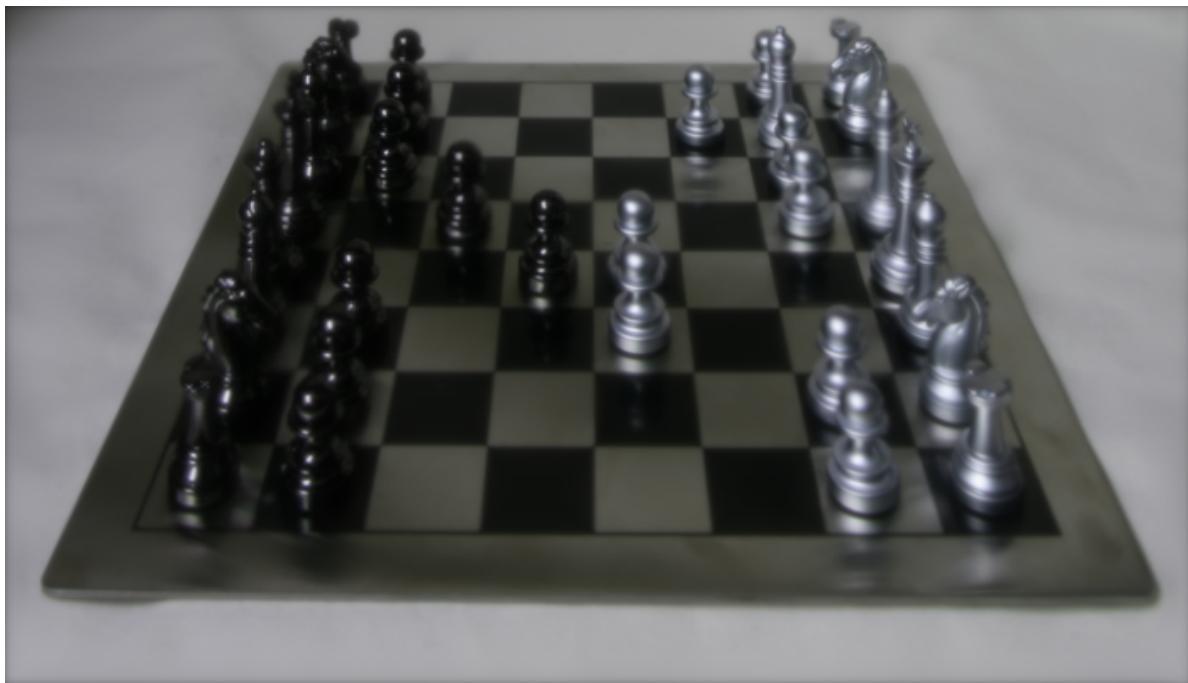


Figure 3: All-in-focus image

## 4 Depth from focus

The depth image is shown in figure 4 (after normalization).

The depths of the board grid centers are incorrectly estimated, as indicated in figure 5. This may be due to reflections from the chess pieces. The all-in-focus image is unaffected by this issue because the board grid contains only low-frequency details, which are not very sensitive to depth defocus.

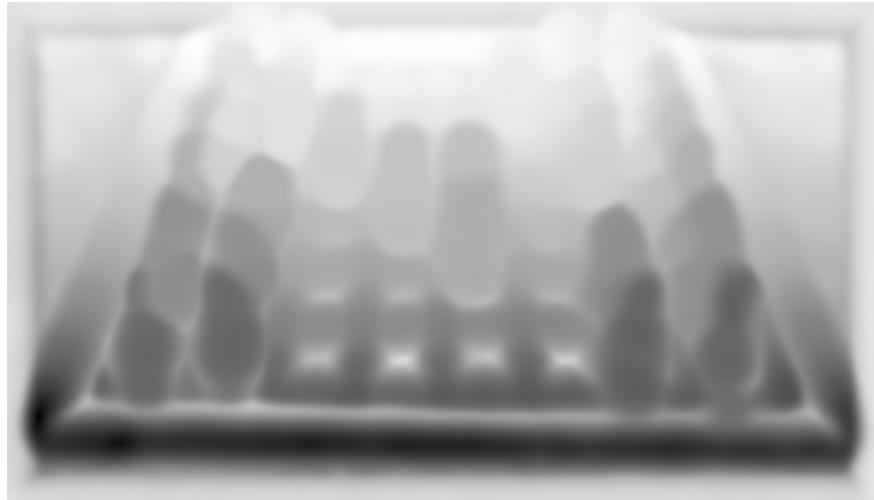


Figure 4: Depth image

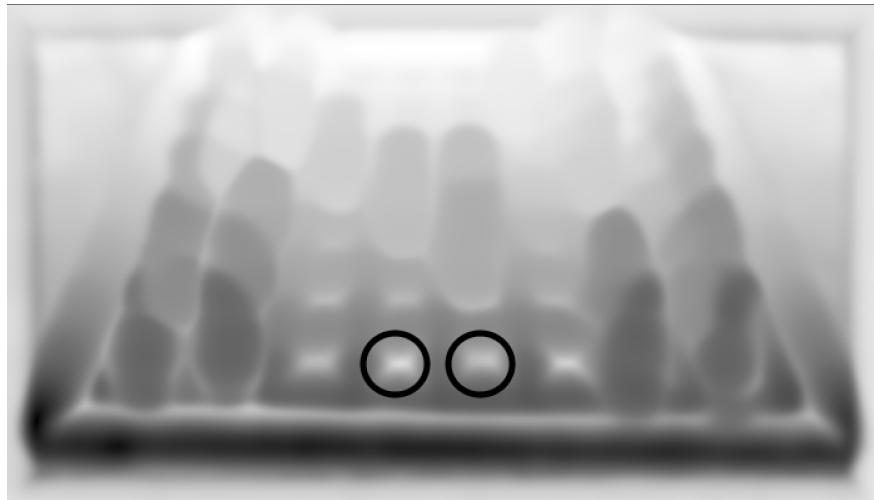


Figure 5: The black circle indicates the incorrectly estimated parts.

## 5 Capturing your own light field

The sample video frames are shown in figure 6.



Figure 6: Sampled frames

The final composite image is shown in figure 7.



Figure 7: Composite image