

15463 Assignment 5

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1 Photometric stereo

1.1 Uncalibrated photometric stereo

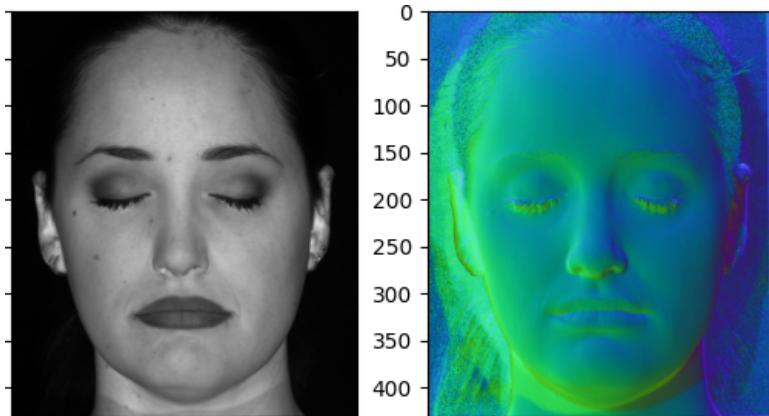


Figure 1: \mathbf{A}_e and \mathbf{N}_e

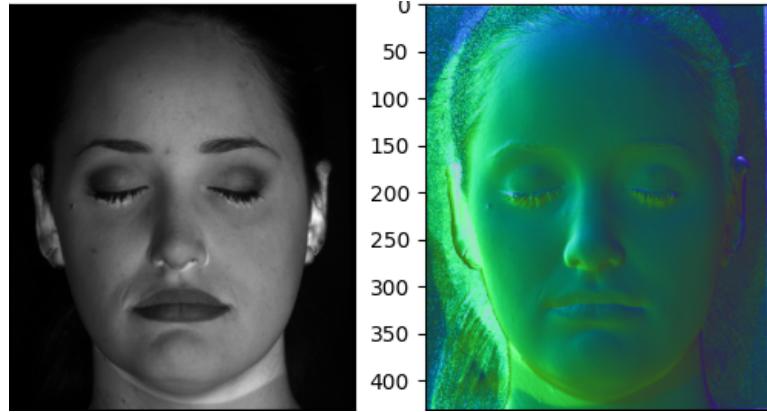


Figure 2: \mathbf{A}_Q and \mathbf{N}_Q

where

$$Q = \begin{bmatrix} 1 & 0.5 & 0.5 \\ 0.25 & 1 & 0.25 \\ 0.5 & 0.5 & 1 \end{bmatrix} \quad (1)$$

1.2 Enforcing integrability

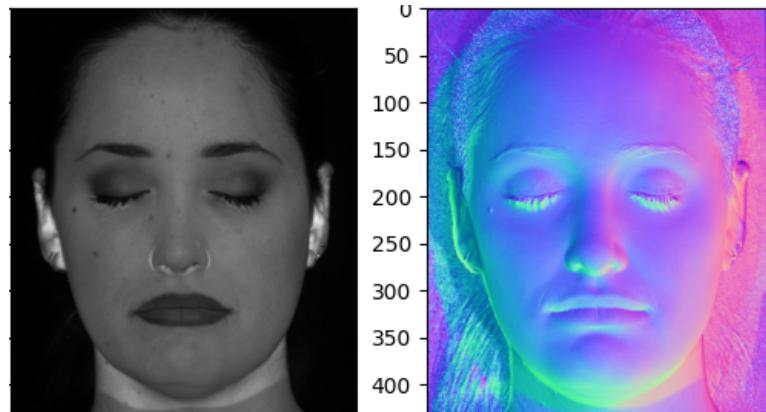


Figure 3: Albedo and Normal

1.3 Normal integration

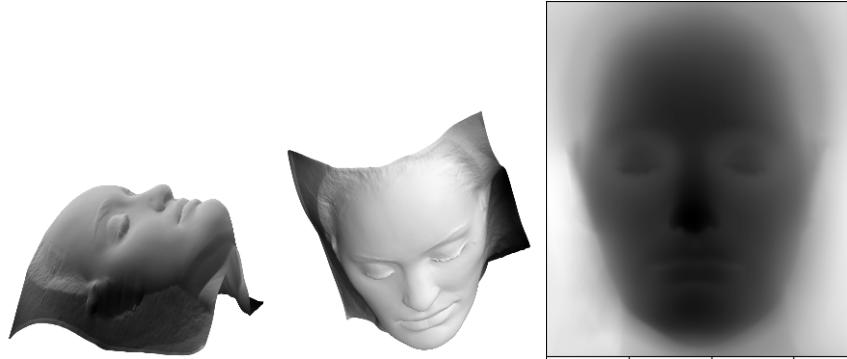


Figure 4: Two views in Poisson Integration and Depth Map(no GBR)

The GBR I ended up using is

$$GBR = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix} \quad (2)$$

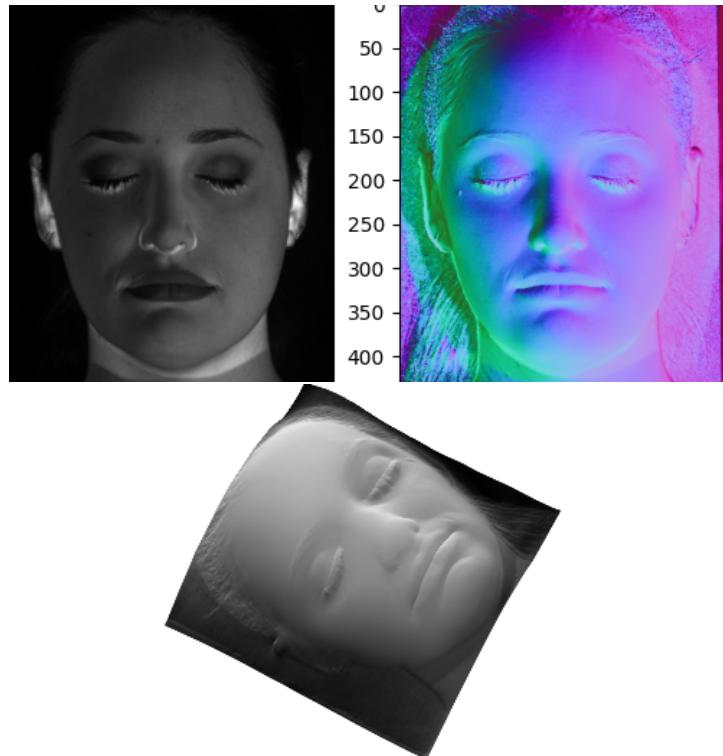


Figure 5: Albedo, Normal, and Surfaces with GBR

1.4 calibrated photometric stereo

Main difference between the calibrated case and Uncalibrated case:

- (1) The calibrated surface is more smooth
- (2) The calibrated surface has more shape detail

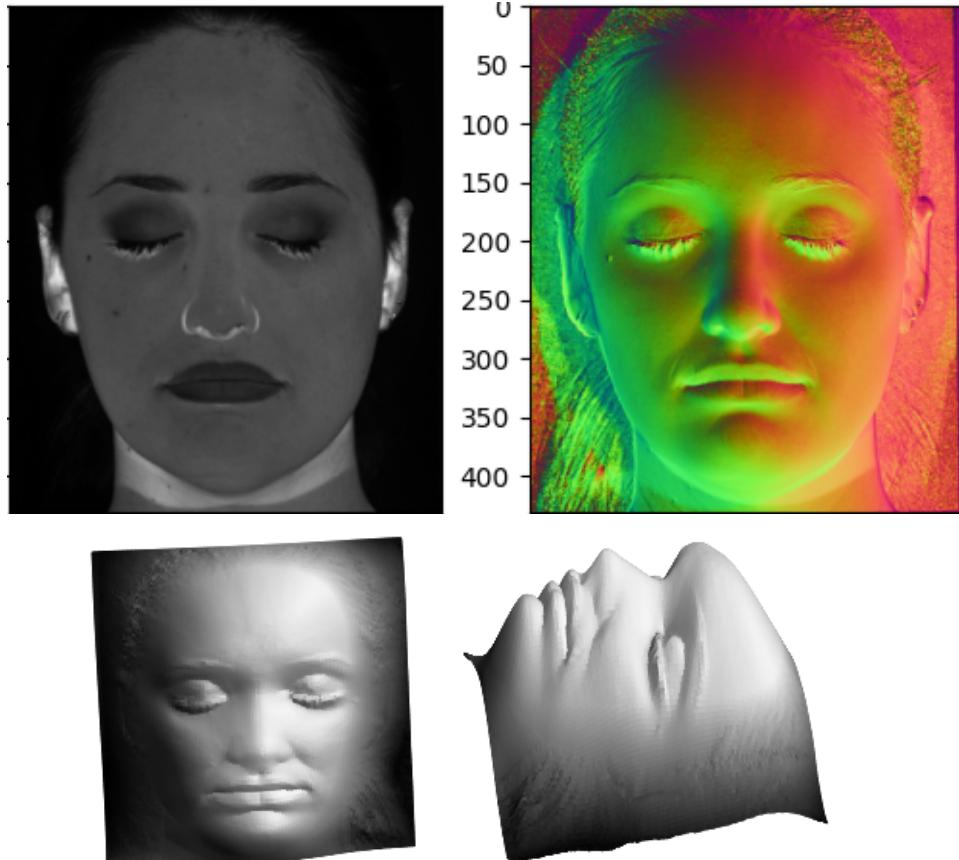


Figure 6: calibrated albedo, normal, surfaces

2 Capture and reconstruct your own shapes

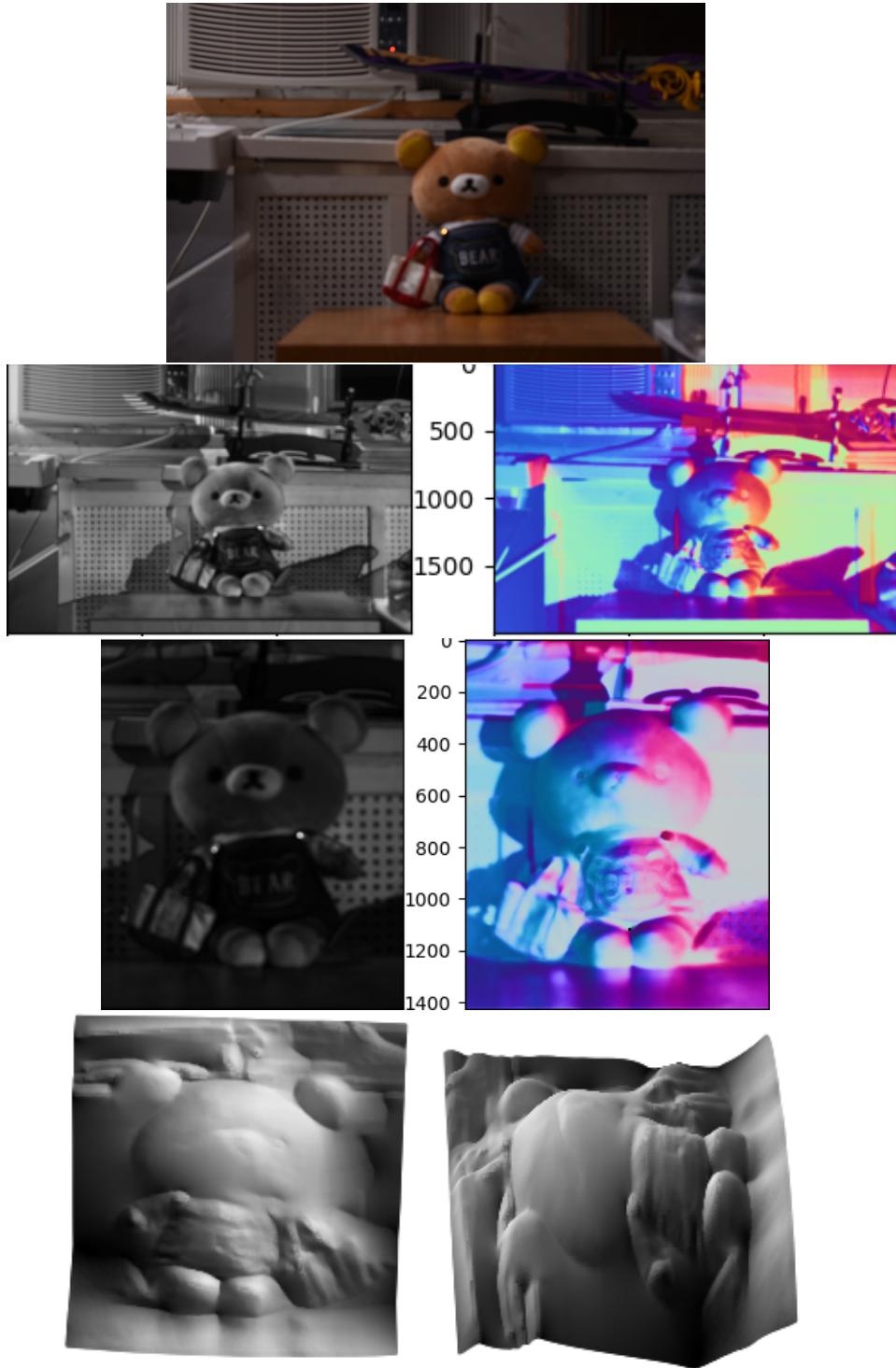


Figure 7: bearKun: the ideal object
8

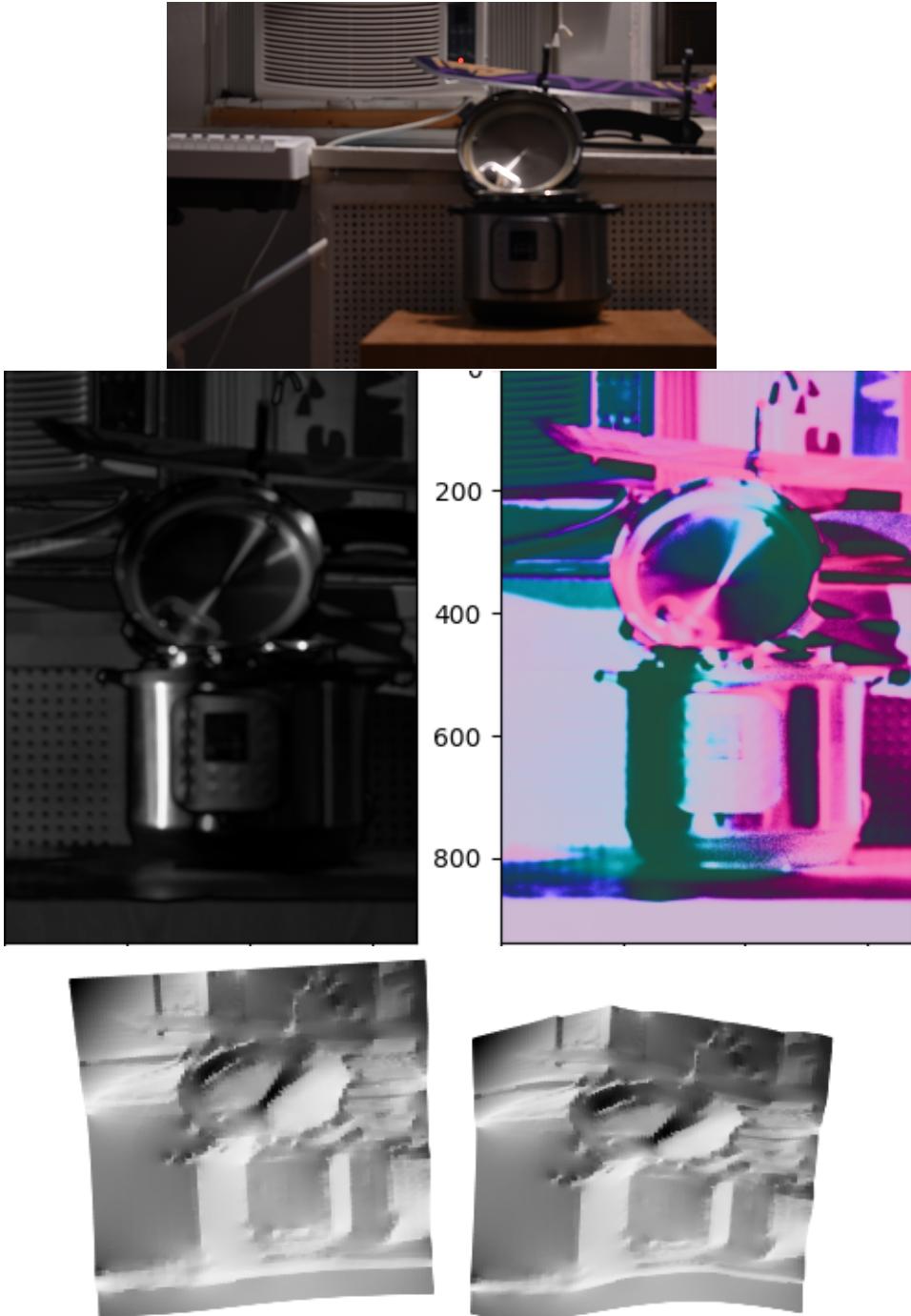


Figure 8: riceCookerKun: the glossy object

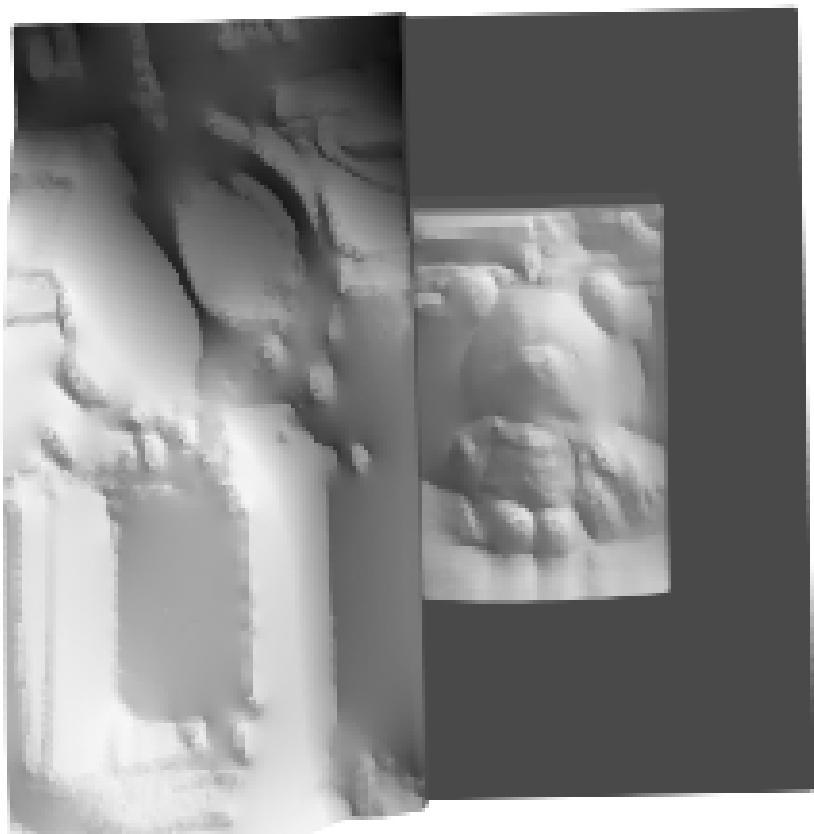


Figure 9: joint rendering of bearKun and riceCookerKun