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CS 445 - Project 4: Image Based Lighting

Complete the claimed points and sections below.

Total Points Claimed [] / 210

Core

- | | |
|--------------------------------|----------------------------|
| 1. Recovering HDR maps | |
| a. Data collection | [] / 20 (recorded in B&W) |
| b. Naive HDR merging | [] / 10 |
| c. Weighted HDR merging | [] / 15 |
| d. Calibrated HDR merging | [] / 15 |
| e. Additional HDR questions | [] / 10 |
| 2. Panoramic transformations | [] / 10 |
| 3. Rendering synthetic objects | [] / 30 |
| 4. Quality of results / report | [] / 10 |

B&W

- | | |
|----------------------------------|----------|
| 5. Additional results | [] / 20 |
| 6. Other transformations | [] / 20 |
| 7. Photographer & Tripod removal | [] / 25 |
| 8. Local tone-mapping operator | [] / 25 |

1. Recovering HDR maps

Include

- (a) Your LDR images (if you took your own)
- (b) Figure of rescaled log irradiance images from naive method
- (d) Figure of rescaled log irradiance images from calibration method
- (d) Plots of g vs intensity and intensity vs g
- (b-d) Figure comparing the three HDR methods
- (b-d) Text output comparing the dynamic range and RMS error consistency of the three methods
- (e) Answers to the questions below

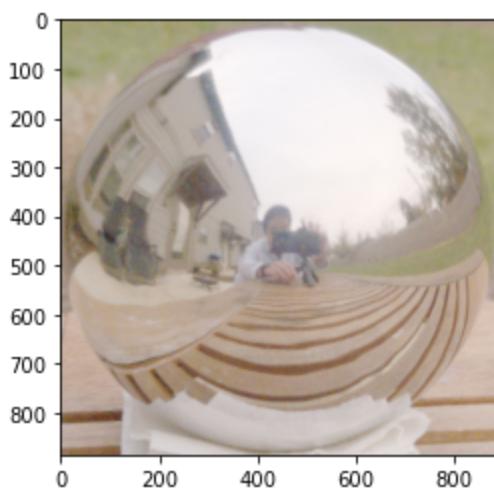
(a)

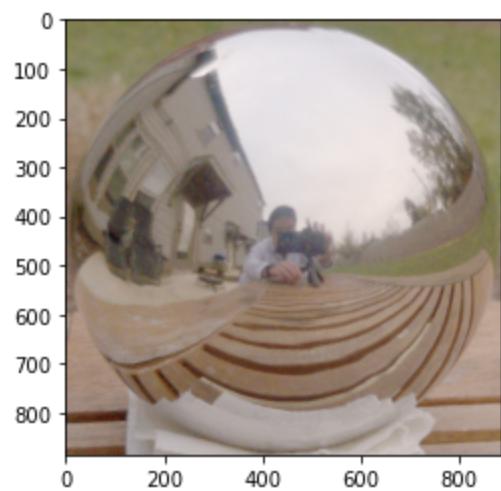




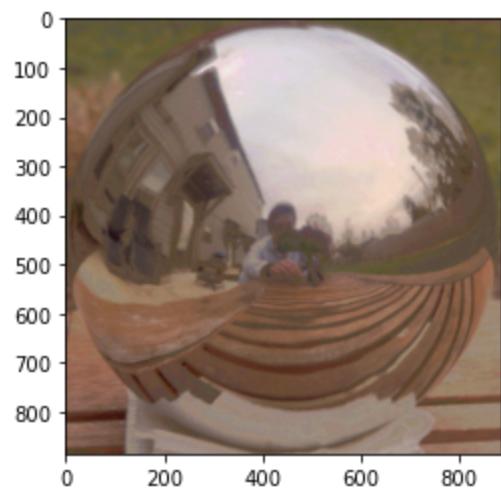


(b)

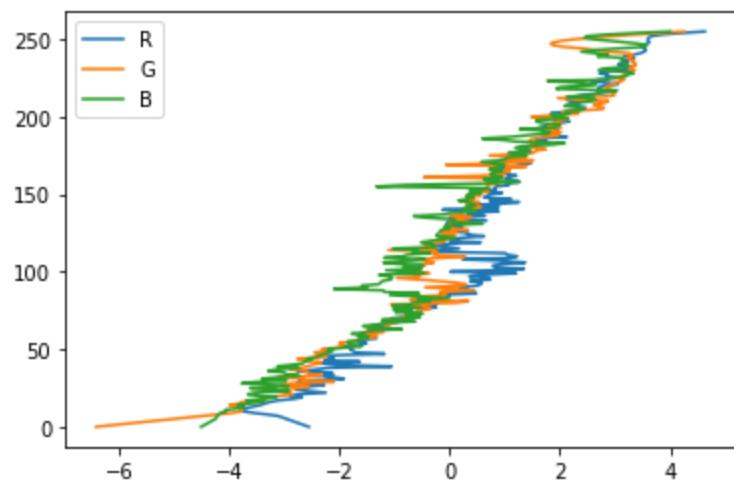


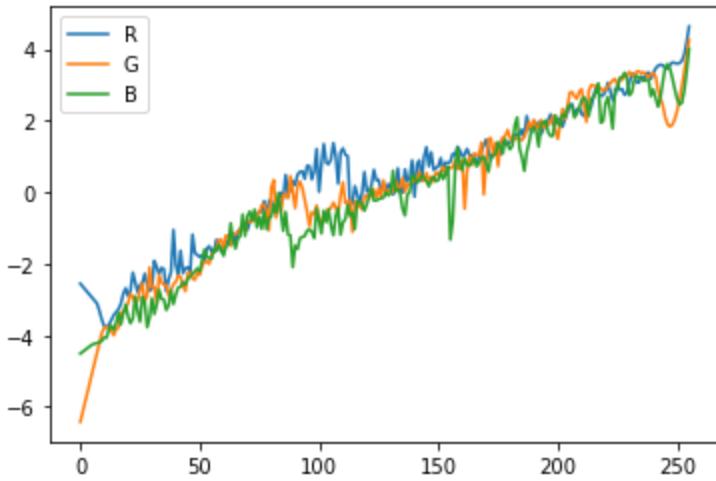


(d)



(e)





(f) Comparison:



naive: log range = 4.279 avg RMS error = 0.733

weighted: log range = 4.035 avg RMS error = 5.573

calibrated: log range = 9.233 avg RMS error = 3.395

Note if you claim credit for data collection, you must use your own images for parts 1-3

Answer these questions:

1. For a very bright scene point, will the naive method tend to over-estimate the true brightness, or under-estimate? Why?

It will under-estimate the true brightness. This is because the brightest part of the photo of slower shutter speed would overexposure, resulting a lower sampling brightness than it actually was, and causing the naive average brightness to be lower than the real brightness.

2. Why does the weighting method result in a higher dynamic range than the naive method?

By change the weight of the brighter part and the darker part, the actual brightness and darkness of the overexposure and underexposure part of the photos are compensated, and thus give us a wider dynamic range.

3. Why does the calibration method result in a higher dynamic range than the weighting method?

The weighted method is inaccurate in evaluating how much weight each photo should contribute to the hdr result. By taking irradiance and exposure time into account, the recovery of the brightness is much more accurate, and thus provides an even wider dynamic range.

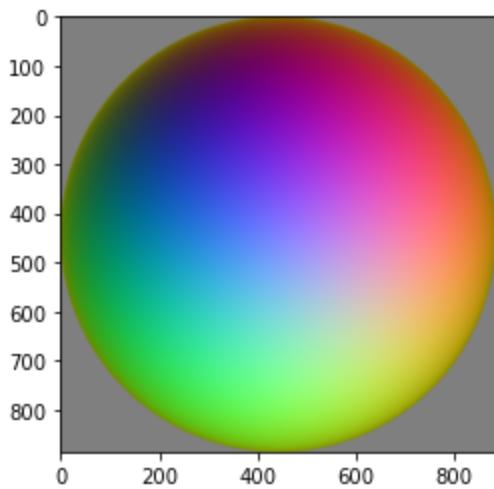
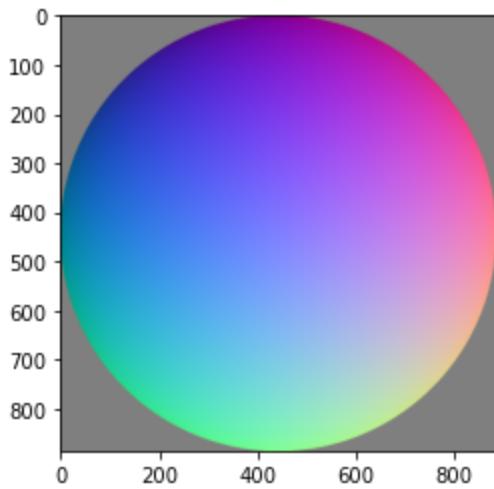
4. Why does the calibration method result in higher consistency, compared to the weighting method?

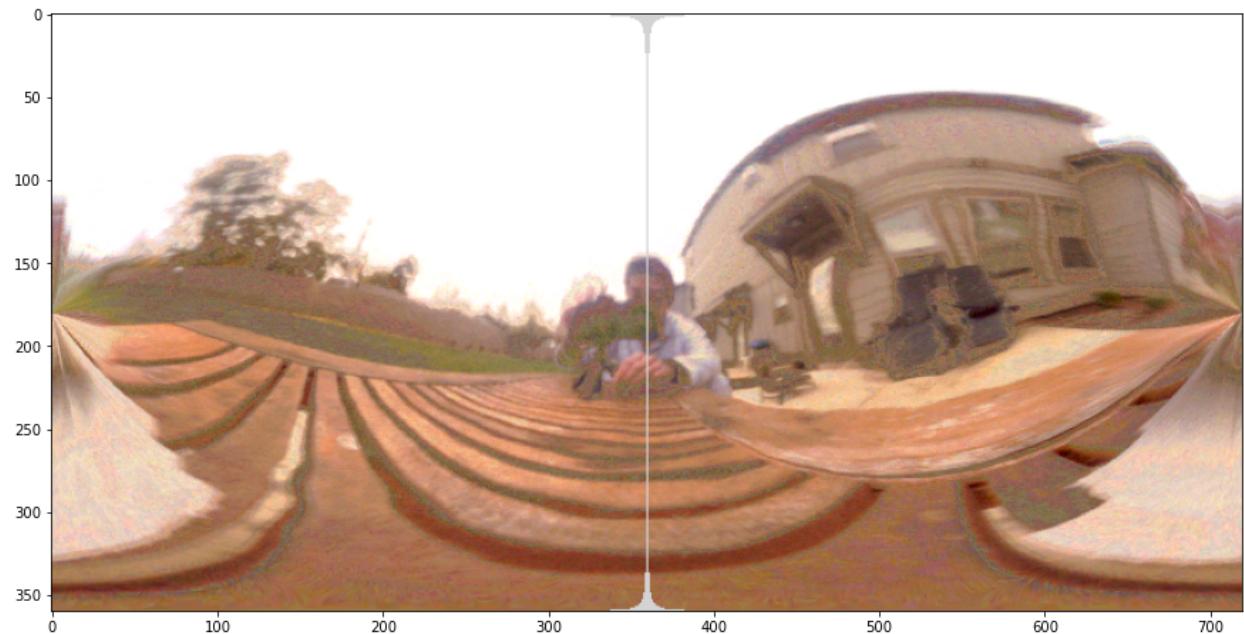
This is basically for the same reason as above, where the weighted method is inaccurate as it applies the same weight to all the pixels in the same photo, whereas the calibration method is essentially applying different weight according to the brightness, or irradiance.

2. Panoramic transformations

Include:

- The images of normal vectors and reflectance vectors
- The equirectangular image from your calibration HDR result





3. Rendering synthetic objects

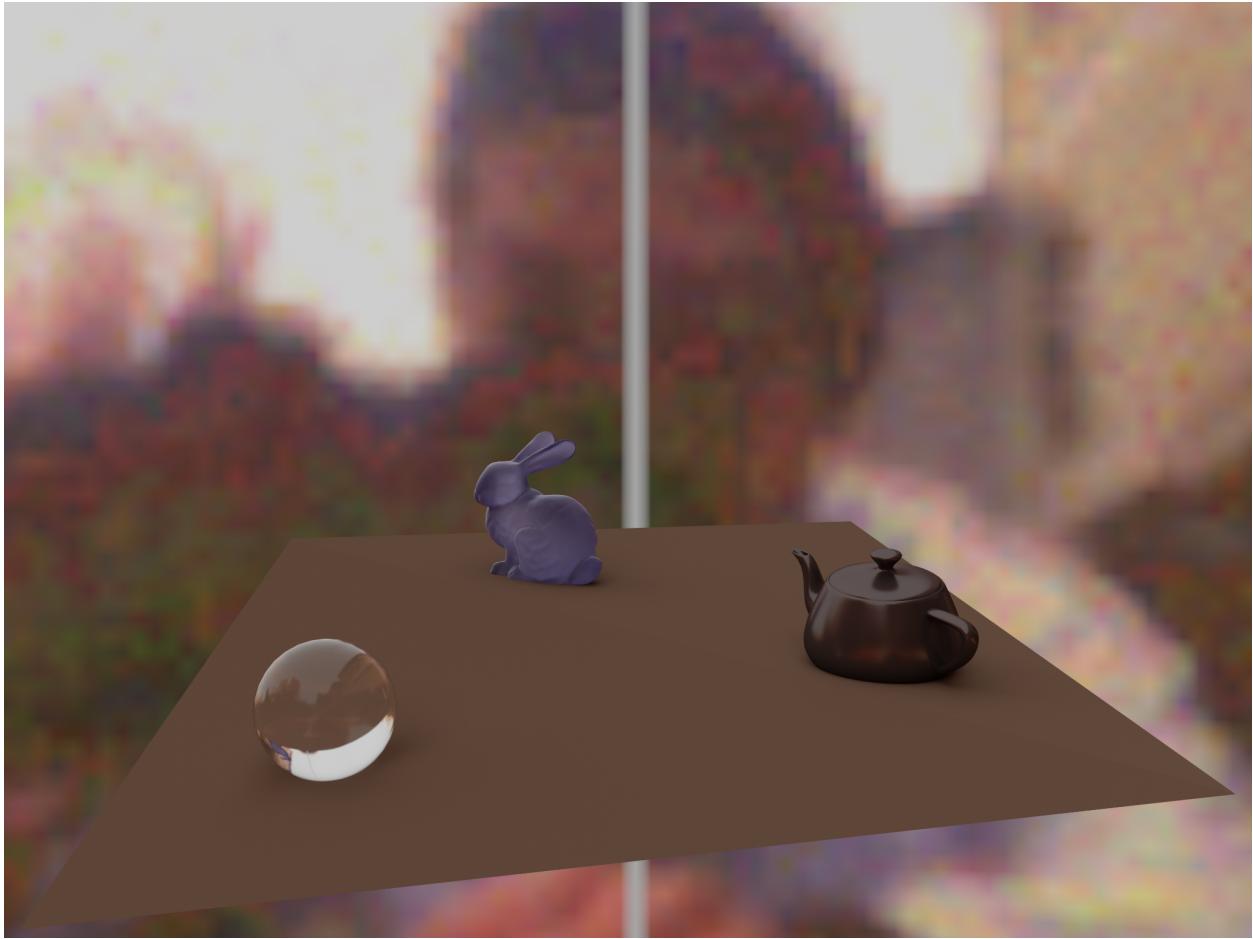
Include:

- Component images: (1) Background image; (2) Rendered image with objects; (3) Rendered image with local geometry (e.g. support plane); (4) Rendered mask image
- Final composited result

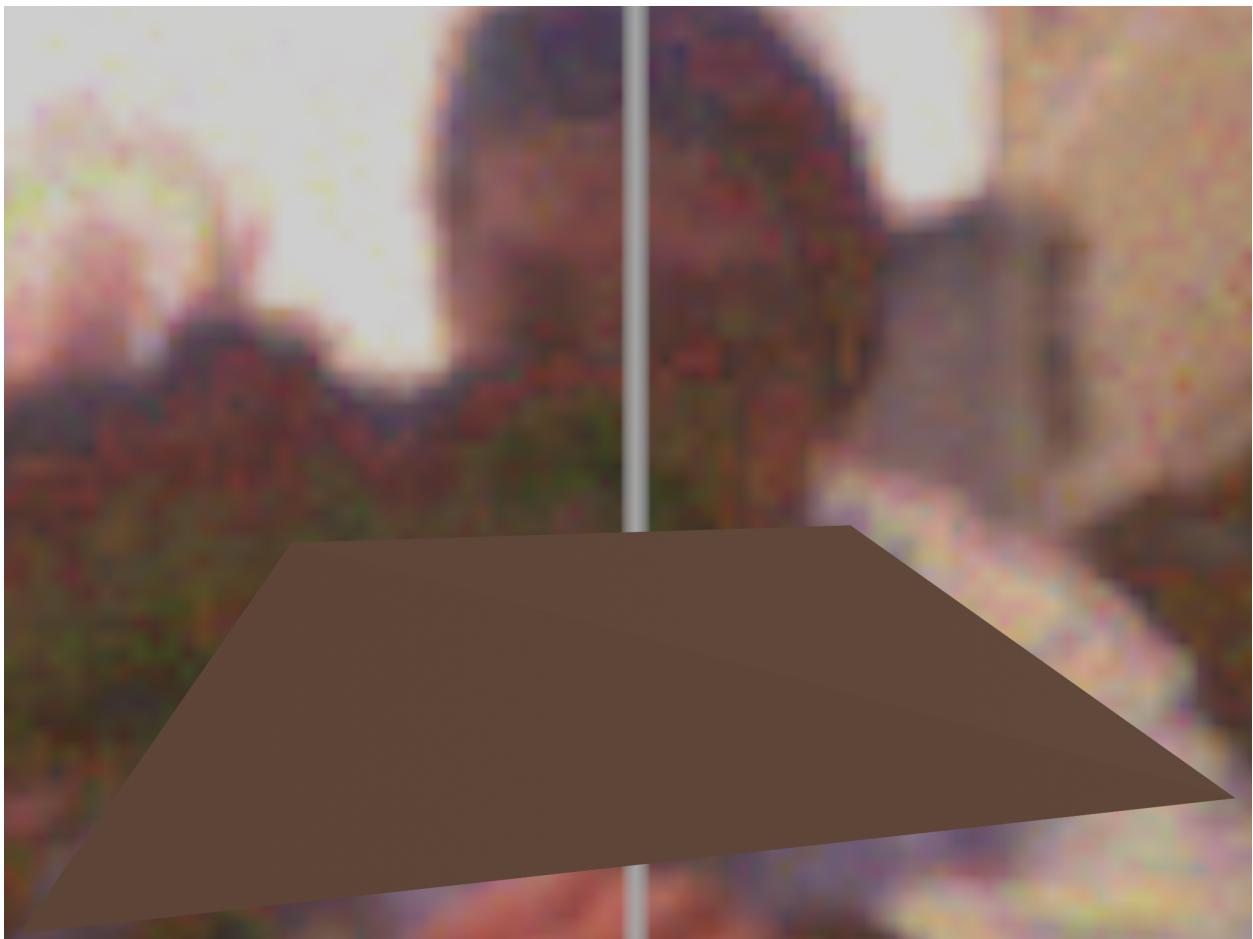
Background:



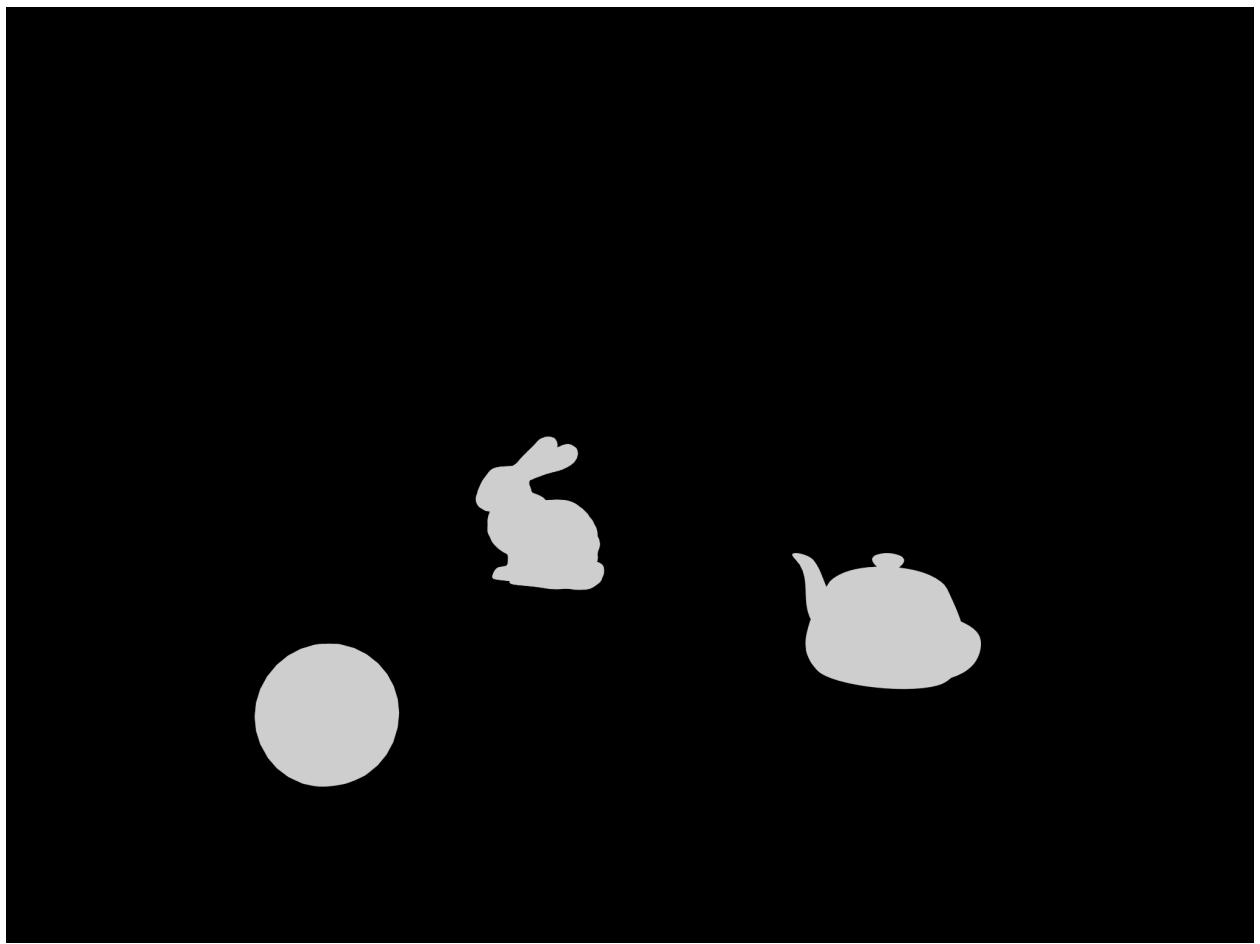
Rendered Objects:



Rendered Empty:



Rendered Mask:



Final Result:



4. Quality of results / report

Nothing extra to include (scoring: 0=poor 5=average 10=great).

5. Additional results (B&W)

Include background image and final composited result image for: (10 pts each)

- New objects, same environment map
- New environment map, same objects

New Object:





New Environment:





6. Other transformations (B&W)

Include (10 pts each)

- Angular environment map
- Vertical cross environment map

7. Photographer and tripod removal (B&W)

Include:

- Original LDR images
- Equirectangular image created from your own photos without photographer
- Explain your method

8. Local tone-mapping operator (B&W)

Include:

- Displayed HDR image, computed as linearly rescaled log of HDR image
- Your HDR image display improved by tone mapping
- Explain your method

Acknowledgments / Attribution

List any sources for code or images from outside sources