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Homework # 5

Objective of this home assignment is to implement HDR tone-mapping of the provided paper.

Steps:

1. First dataset was analyzed, there were 30 images with different exposure levels.
2. These images were combined using OpenCV built-in method (`cv.createMergeRobertson()`).
3. After combination, I got an HDR image (Figure 1).
4. For tone-mapping, I followed Pseudo Code provided by the paper authors and did these steps:
    a. Firstly, from the HDR image **intensity** and **color** layers are calculated (Figure 2).
    b. Bilateral filter was applied on the **log10** of **intensity** image using OpenCV to obtain **base** layer (large-scale features) and **detail** layer (low scale features) (Figure 3).
    c. Two parameters named **compression factor** and **absolute log scale** was calculated using base layer. These parameters are used for performing tone mapping on base layer.
    d. After tone-mapping **base** and **detail** layers are combined with **color** layer to produce tone-mapped image (Figure 4).

Acknowledgement:

For this assignment, following resources were quite helpful:

1. (http://people.csail.mit.edu/fredo/PUBLI/Siggraph2002/)
2. (https://sites.google.com/site/ianschillebeeckx/cse555/hmwk1)

Results:

Figure 1: Tone-Mapped Image

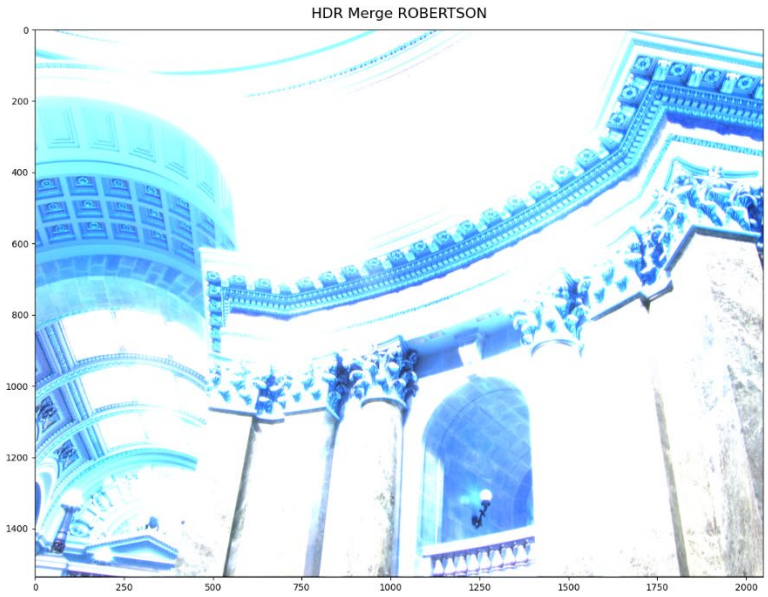

Figure 2 HDR Image

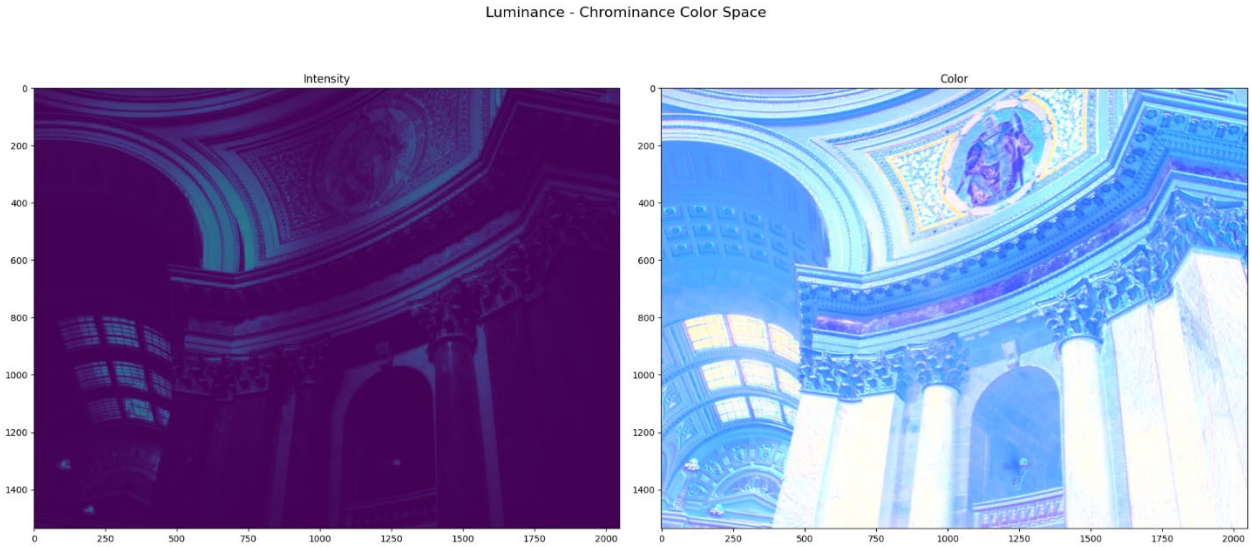

Figure 3: HDR Intensity and Color Layers

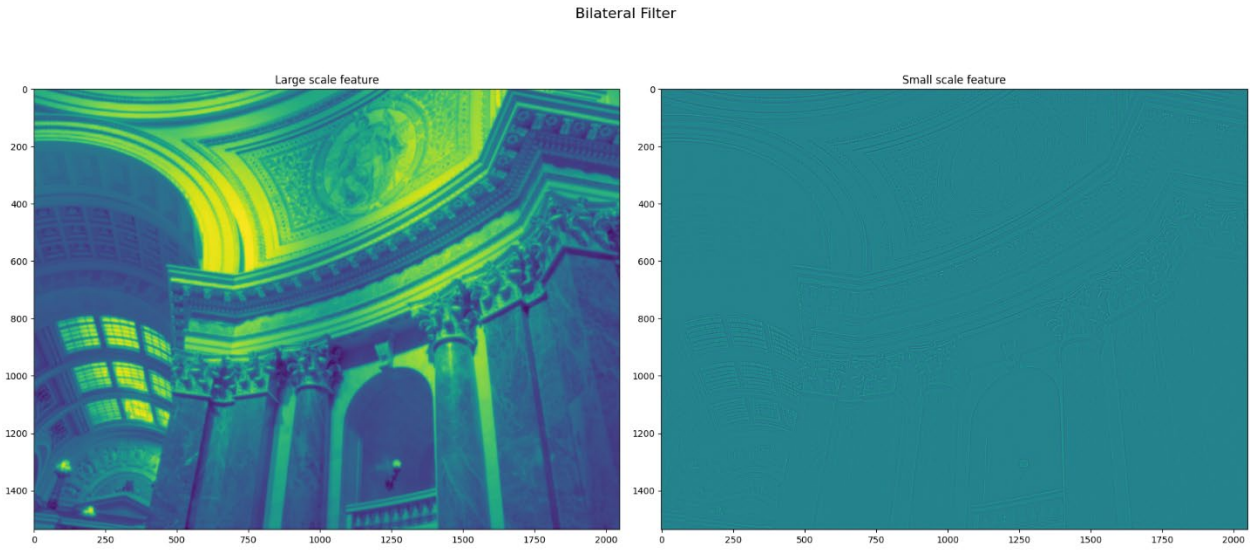

Figure 4: Bilateral Filter

Here is the high-level set of operation that you need to do in order to perform contrast reduction

input intensity= 1/61*(R*20+G*40+B)
r=R/(input intensity), g=G/input intensity, B=B/input intensity
log(base)=Bilateral(log(input intensity))
log(detail)=log(input intensity)-log(base)
log (output intensity)=log(base)*compressionfactor+log(detail) - log_absolute_scale
R output = r*10^(log(output intensity)), etc.

Figure 5: Pseudo Code

OpenCV Built-In HDR Tone Mapping:

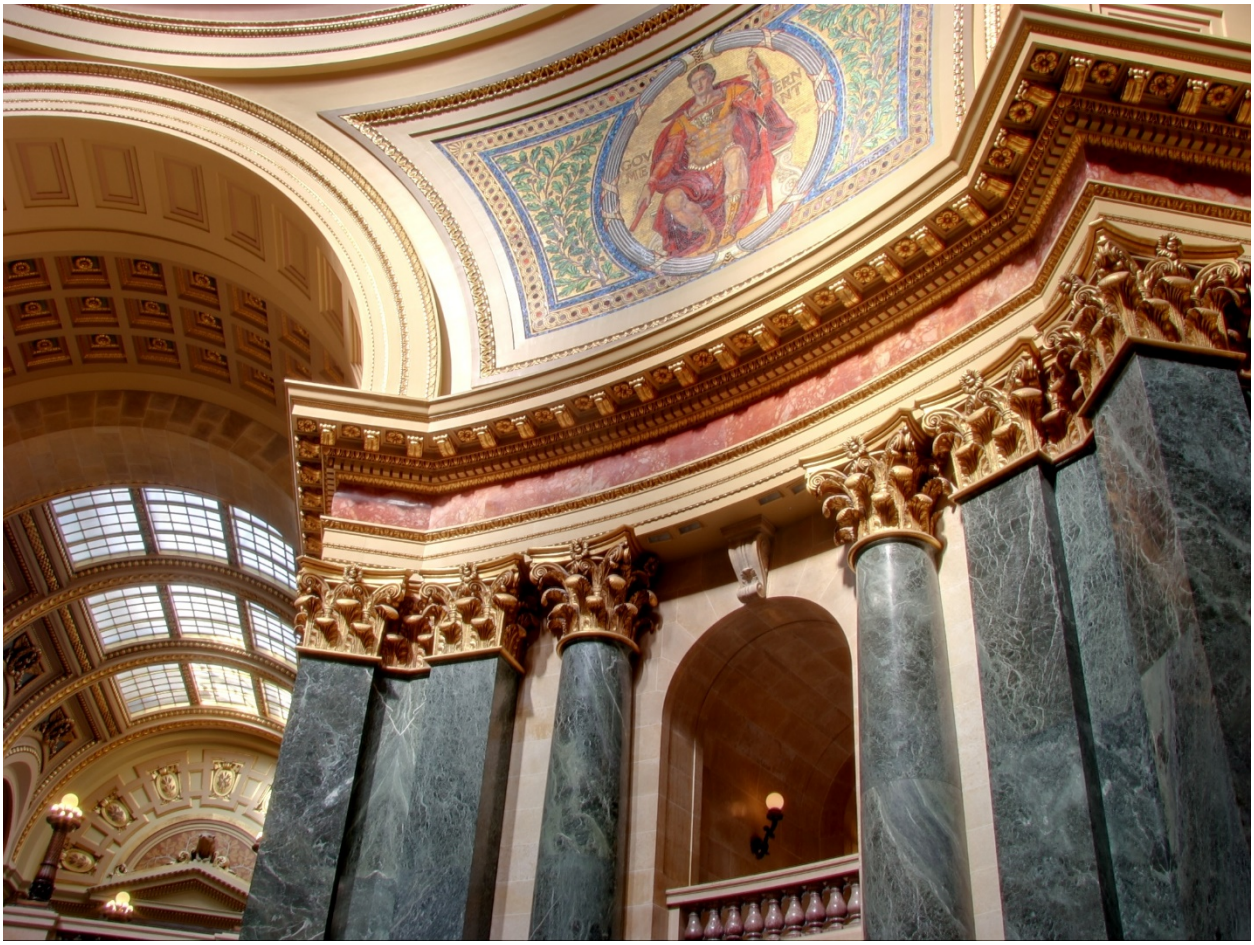

Figure 6: Fusion Mertens

Figure 7: Debevec

Figure 8: Robertson