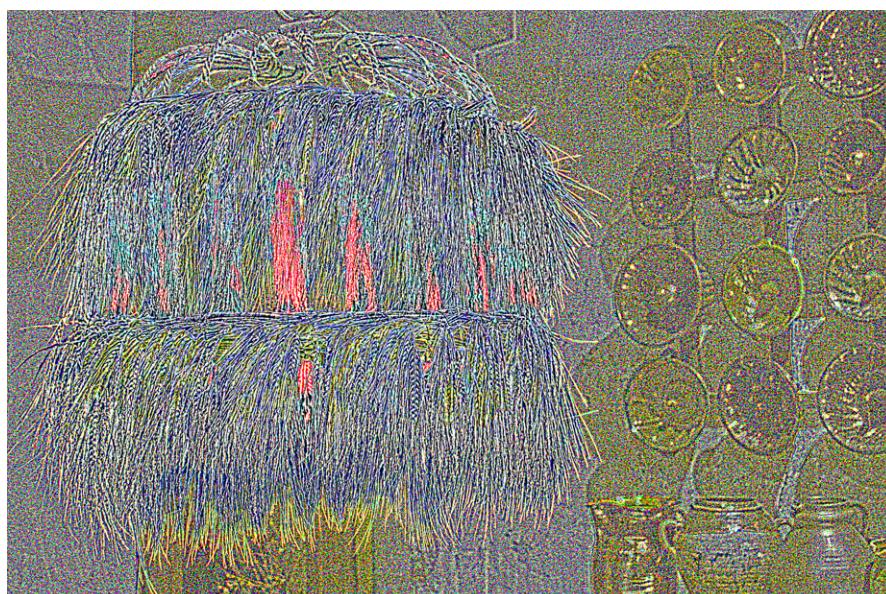


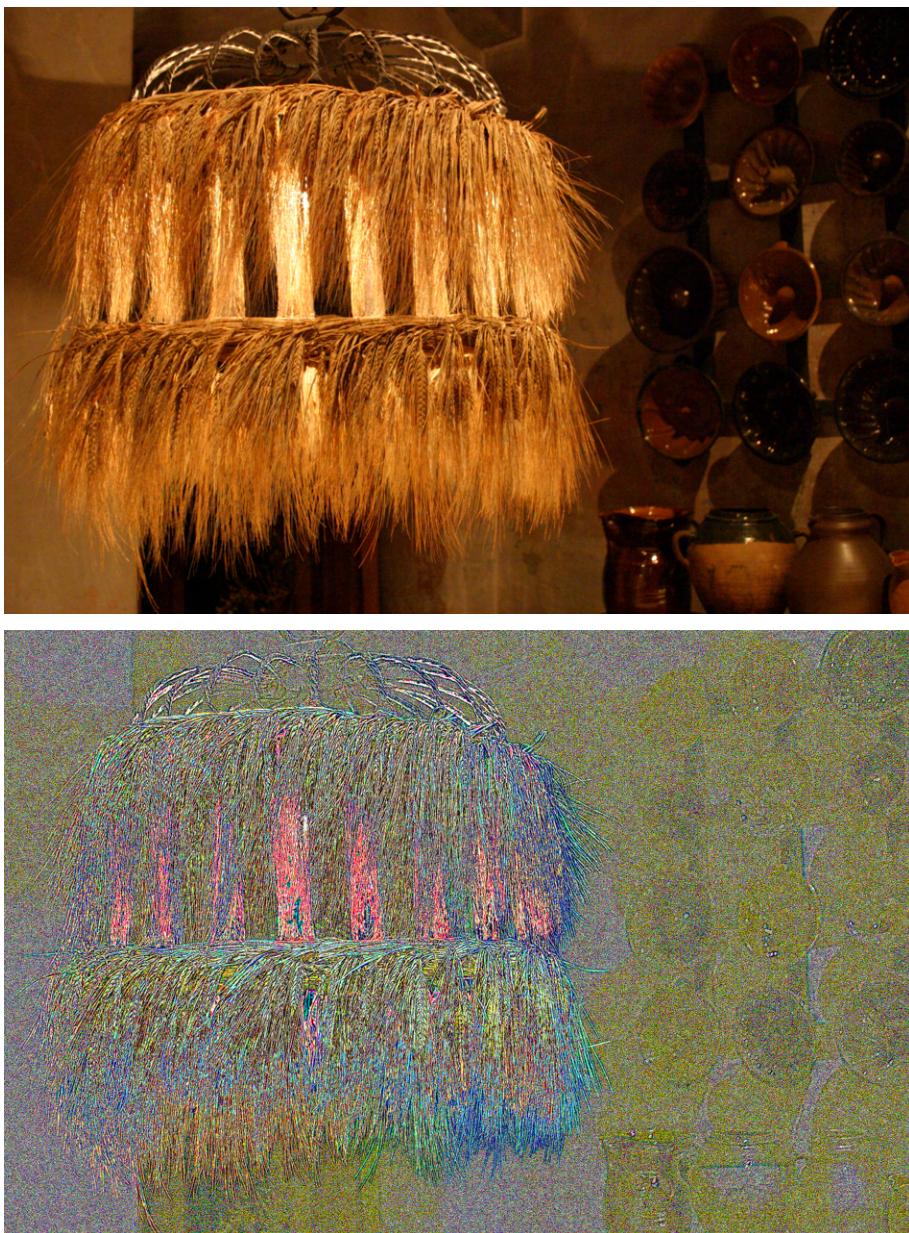
1. Bilateral filtering

Basic bilateral filtering



with $\sigma_s = 5$ and $\sigma_r = 0.05$

Joint bilateral filtering



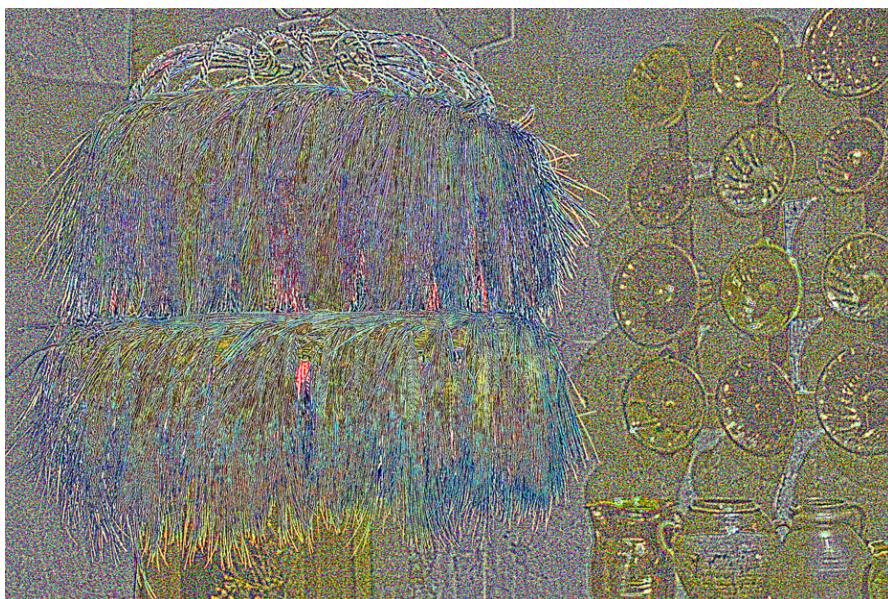
with $\sigma_s = 1$ and $\sigma_r = 0.15$

Denoising with detail transfer



with $\sigma_s = 2$ and $\sigma_r = 0.05$

Mask-based merging



with previous values for σ_s and σ_r

Advantages and disadvantages of each technique

The advantages of this basic bilateral filtering are that it was good at denoising the background and bringing the chandelier into the foreground, but a disadvantage was it was unable to get any information from the flash image to complement the ambient data.

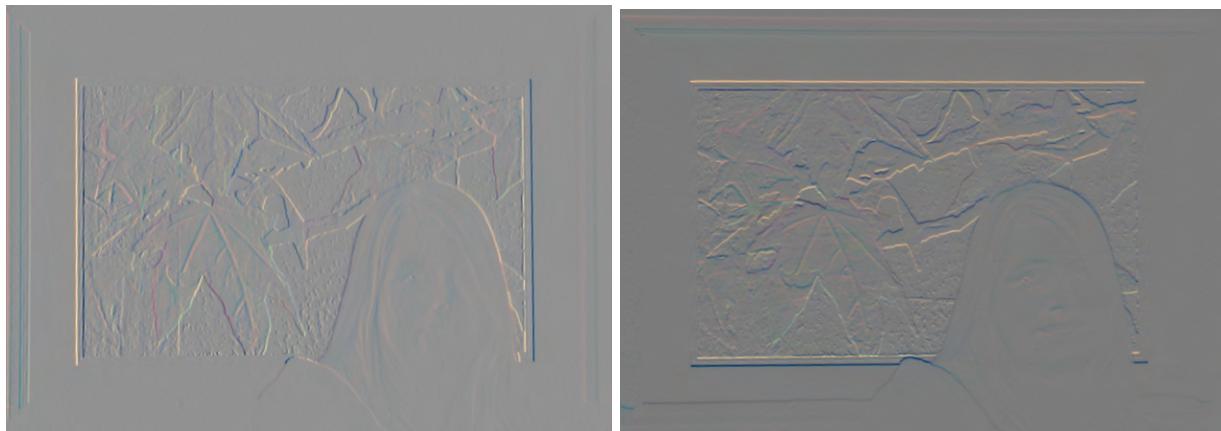
The advantages of this joint bilateral filtering was that it was able to blur the output using the flash image to mimic the view of a light with glow around it, but a disadvantage was thus it was a slightly blurrier image than the basic bilateral filtering technique.

The advantages of this denoising with detail transfer technique was that there were less artifacts and more detail to the image, but a disadvantage was it wasn't as great at blurring the background as the bilateral filtering techniques by themselves.

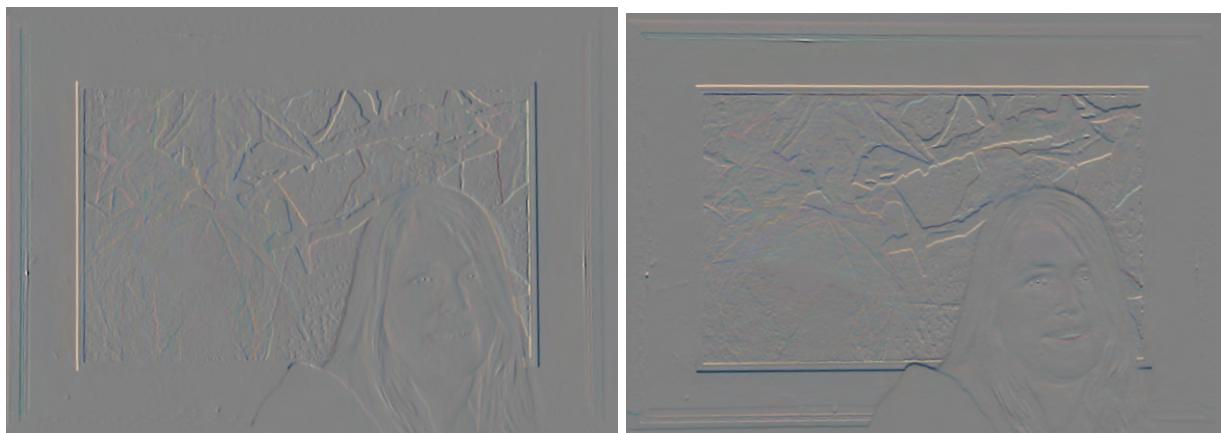
The advantages of this joint bilateral filtering was that it was able to fuse together the ambient and flash images to add detail that wasn't in one or the other and it used the flash image to add shadows and specs that weren't originally visible in the ambient image, but a disadvantage was that without fine tuning, there is still some blur.

Overall, I preferred the mask-based merging technique on the given image and as a method because it took in the most details and information from both the ambient and flash images to produce an aesthetically pleasing fusion of the two.

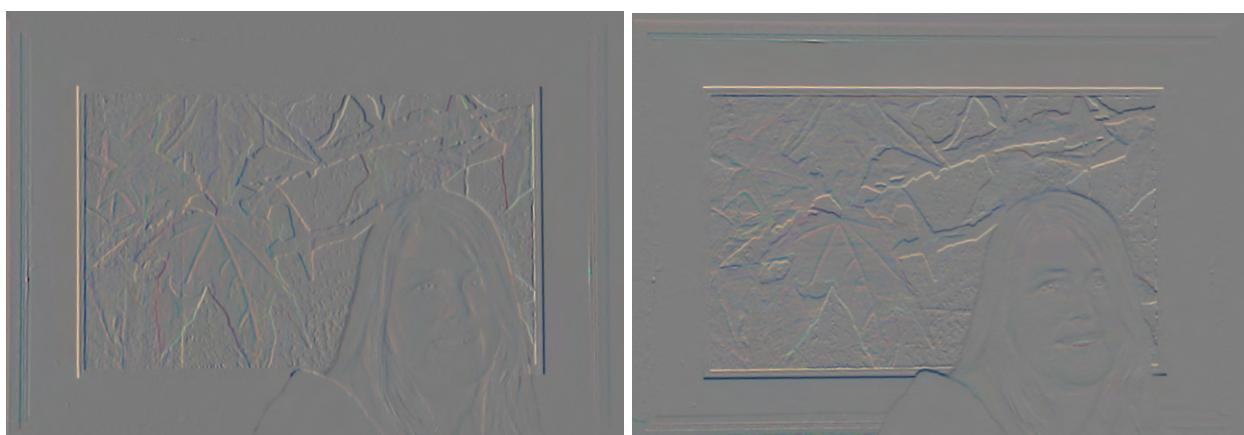
2. Gradient-domain processing



gradient field ∇a



gradient field $\nabla \Phi'$



gradient field $\nabla \Phi^*$



final fused image with $\sigma = 40$, $\tau_s = 0.6$, epsilon = 0.01, and N = 300

3. Capture your own flash/no-flash pairs