Assignment-3

1. Bilateral filtering (100 points)

1.1 Bilateral Filtering

Ambient image

Bilateral filtered ambient image

Difference image between ambient and bilateral filtered image

1.2 Joint Bilateral filtering

Input ambient image

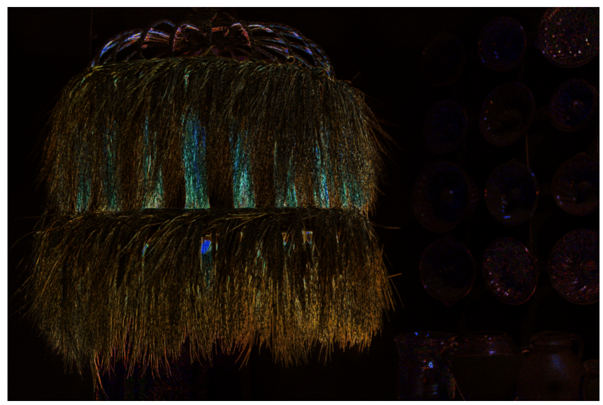
Input flash image

Joint bilateral filtering

Difference between joint bilateral and bilateral output

1.3 Detail transfer

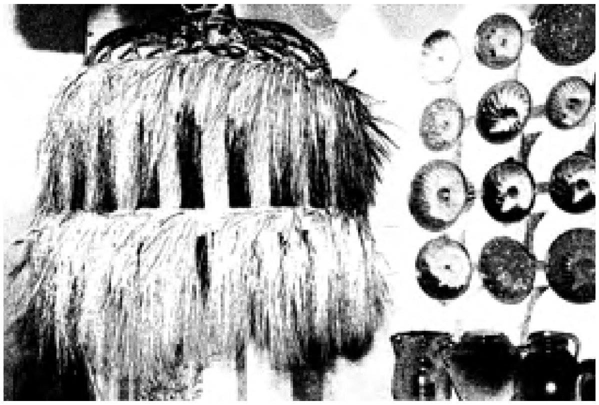
Detail transffered image



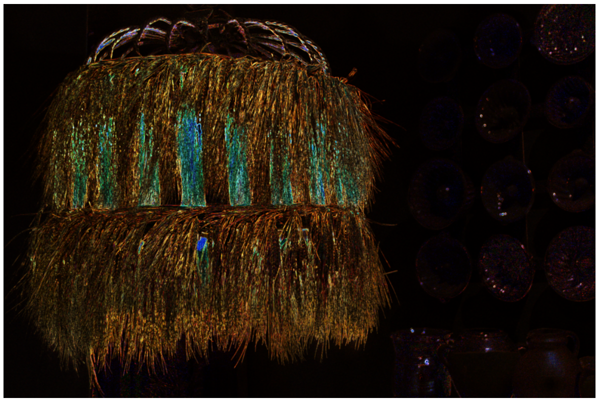
Difference image between joint bilateral filter and detail transferred image.

1.4 Masked detail transfer

Masked image



Mask generated



Difference image between masked and detail transferred image

Discussion

Joint bilateral filter

Detail transfer result

Masked detail transfer

The major difference I saw noticed was in this area. The detail transfer made the image much more sharper. The individual threads became very visible. After masking the image became much more smoother.

After trying with several values, I used sigma_range=0.25 and sigma_spacial= 1.

2. Gradient-domain processing (100 points)

2.1 Check the poisson solver by reintegrating(75 points)

Original ambient image

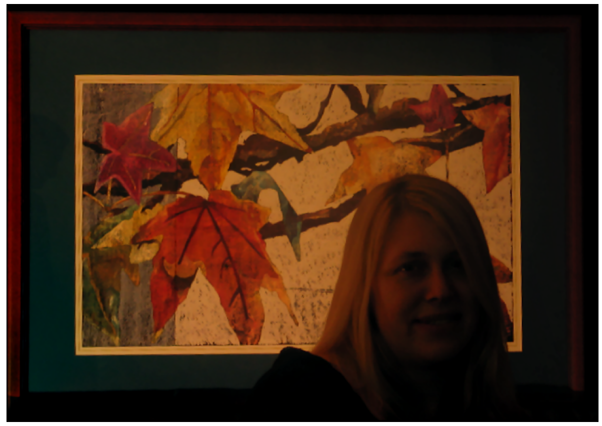


Image after differenciating and reintegrating.

2.2 Create the fused gradient field(25 points)

Ambient image

Flash image

sigma_fuse:40; tau: 0.9; init:ambient image

sigma_fuse:70; tau: 0.9; init:ambient image

sigma_fuse:70; tau: 0.65; init: ambient image

sigma_fuse:40; tau: 0.9; init:flash image

Discussion

I tested several values starting from the ones recommended in the paper 40, 0.9.

As I decreased the tau the image became less brighter and as I increased the sigma, it became more brighter. I didn’t see a lot of change after sigma=40 for the same value of tau.

I feel the final image with sigma=70 and tau=0.65 looks the best.

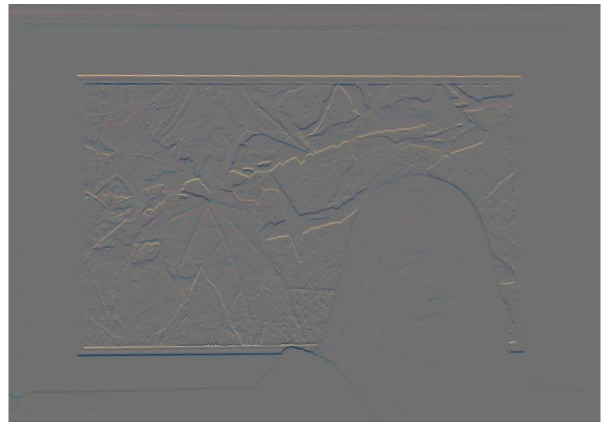
Gradient images

Sigma_fuse: 40 and Tau:0.9

a —> ambient image

ϕ —> flash image

∇a_x



∇a_y

$\nabla \phi_x$

$\nabla \phi_y$

$\nabla \phi_x^*$

$\nabla \phi_y^*$

3. Capture your own flash/no-flash pairs (100 points)

3.1 Bilateral filtering

Ambient image

Flash image

Joint bilateral filtering

Difference image between ambient and joint bilateral bilateral filtering

Image after detail transfer

The difference image between ambient and detail transfer

Image after masking

Mask generated that highlights the area which detects shadows formed by flash

3.2 Gradient domain processing

Ambient image

Flash image

init: ambient image; 0.9, 40

init: amibient image; 0.5, 40

init: flash image, 0.9, 40

4. Bonus: Reflection removal in flash/no-flash photography (50 points)

For this I changed the w_s as $w_s = 1 - tanh(I_{flash} - \tau_{xy})$

Then I used the projection function in the paper $\nabla\phi' \rightarrow \nabla\alpha = \nabla\alpha(|\nabla\phi'.\nabla\alpha|)/||\nabla\alpha||^2$

I calculated $H = img_{flash} + img_{ambient}$

Then used $\nabla\phi^* = w_{ue}\nabla H - (1 - w_{ue})(\nabla H \rightarrow \nabla\alpha)$. Then used the poisson. solver to integrate it to get the final result