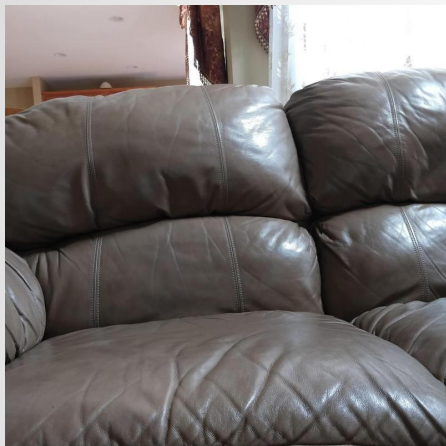


# **Computational Photography**

## **Assignment #4: Blending**

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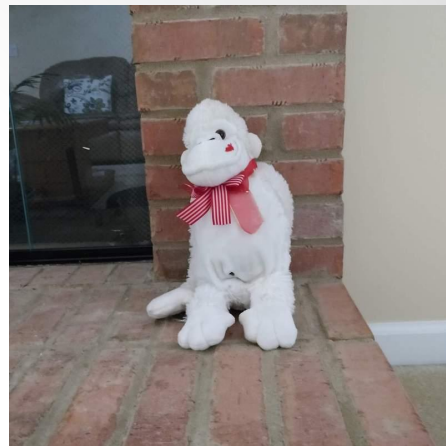
# Input Images



Black



Mask



White

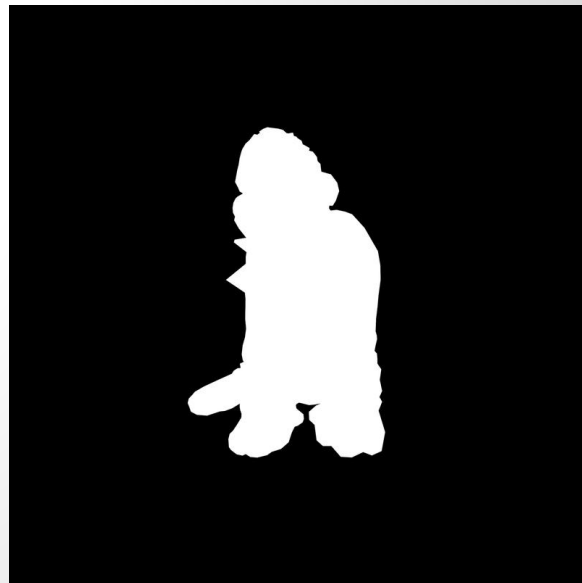
- **What is the subject of your images? Did you take your own pictures?**
  - **The subject of my images are a couch and a monkey. The goal here was to create a blend so the monkey would be resting on the couch. These images were taken in my living room.**

# Mask

First, I took two images of equal size. One intended to be the background of my image, and the other intended to be blended with a mask.

To create the mask I used Gimp. I used a free select tool to trace the image of the monkey. Once selected, I filled the outline with a white fill. I then inverted my selection and filled the background with a black fill.

Mask



# Final Blended Image



**“Sitting Monkey”**

# Blend Discussion

## 1. How did you determine precisely where to make the blend?

Determining where to make the blend was quite simple for me. Since I didn't want aspects of the background from the "white" image (brick, fireplace, carpet, etc), I tried to only select the border of the monkey. The background of the "white" image felt too dissimilar to me to include in the mask. The tradeoff here would be creating a ghostly image at the blending points, however I was thinking a small ghostly artifact could be acceptable if it removed any jagged edges from the mask.

## 2. How might you automate the location of the blending point?

I believe it would be best to find pixels that have similar values and are low in frequency at the blending points, so once they are blended together, it will create a seamless image. Ensuring that the pixels have similar values between the blending points will also ensure that pixel values are changing slowly over space, allowing for easier blending and less impact from high frequency information (like edges).

# Blend Discussion

**3. Do you think that blending or using a cut (as discussed in Lecture 4-04) is a better approach for your input images? Why?**

**I believe a blended image would be better approach for these images. The pixel information between the “black” and “white” images differ too much to find appropriate cuts to make it look like the monkey is sitting on the couch. If a cut was done, there would like be edges showing from the brick in the background of the “white” image on the couch since the colors and intensities are similar compared to the other aspects of the “white” photo. Blending will take care of the dissimilar pixel information and remove jagged edges from the mask but will also create a ghostly artifact which I find better in this case.**

## **reduce\_layer() & expand\_layer()**

- **What is the significance of using  $a = 0.4$  for the generating kernel?**  
Using a value of  $a=0.4$  ensures that the weighting function holds a gaussian distribution. By doing so, the kernel will resemble a gaussian low-pass filter, which will blur high frequency information (like edges). This will remove aliasing and keep jagged edges from showing when the image is reduced.
- **Why does the output of `expand_layer` have to be multiplied by 4?**  
When convolution is applied after padding an image's rows and columns by a factor of two with black pixels, the image will turn out more black since the average density of the image is closer to 0 (black). In order to compensate for this, the final output after the convolution in the `expand_layer` will have to be multiplied by four to retain values closer to its original color density.

# Successes and Improvements

1. Did your blended image come out as you expected? Explain.

No, the blend did not come out as I would have liked. I was hoping the monkey would have a denser color to it, but the blending really affected the final output, making him look ghostly.

2. What were you most happy about with the final result? Be specific.

I was happy with the color intensity of the monkey's mouth, eyes, and the striped parts of the bowtie. Furthermore, I like out the masked edges of the bowtie blended in with the couch. It kept its color while looking seamlessly in place.



# Successes and Improvements

**3. What improvements would you make to improve your final blended image (from template slide 5)? Even if you have great results, what part of the process could be improved?**

**I believe the blend would have been more effective if I had taken a “white” image with similar colors as the “black” image. That way more similar pixel information would be blended together, resulting in a more intense and less ghostly output.**

# Resources

- Aliasing. (2019, February 09). Retrieved February 11, 2019, from <https://en.wikipedia.org/wiki/Aliasing>
- Hopkins, M., Reeber, E., Foreman, G., & Suermondt, J. (1999, January 07). Retrieved February 2, 2019, from <https://archive.ics.uci.edu/ml/datasets/spambase>
- Slate, D. J. (1991, January 01). Retrieved February 03, 2019, from [https://archive.ics.uci.edu/ml/datasets/Letter Recognition](https://archive.ics.uci.edu/ml/datasets/Letter+Recognition)