

Complete the claimed points and sections below.

Total Points Claimed [110] / 130

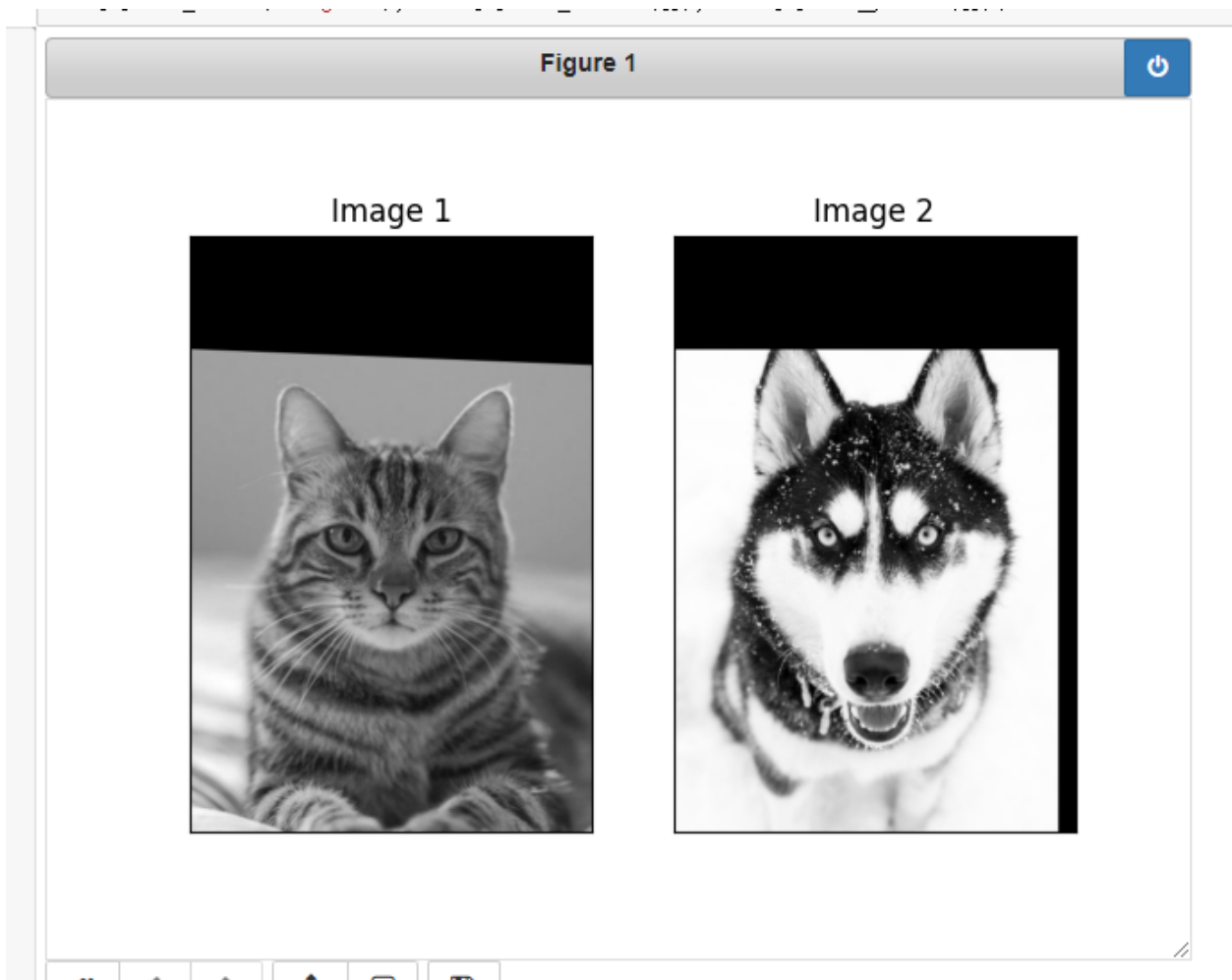
- 1. Hybrid image main result
 - a. Main result and description [45] / 45
 - b. FFT images of main result [15] / 15
- 2. Hybrid images: two additional results [10] / 10
- 3. Image enhancement tasks (3rd is B&W)
 - a. Contrast enhancement [10] / 10
 - b. Color enhancement [10] / 10
 - c. Color shift [10] / 10
- 4. Quality of results / report [10] / 10
- 5. Color Hybrid Image w/ explanation (B&W) [] / 5
- 6. Gaussian / Laplacian Pyramids (B&W) [] / 15

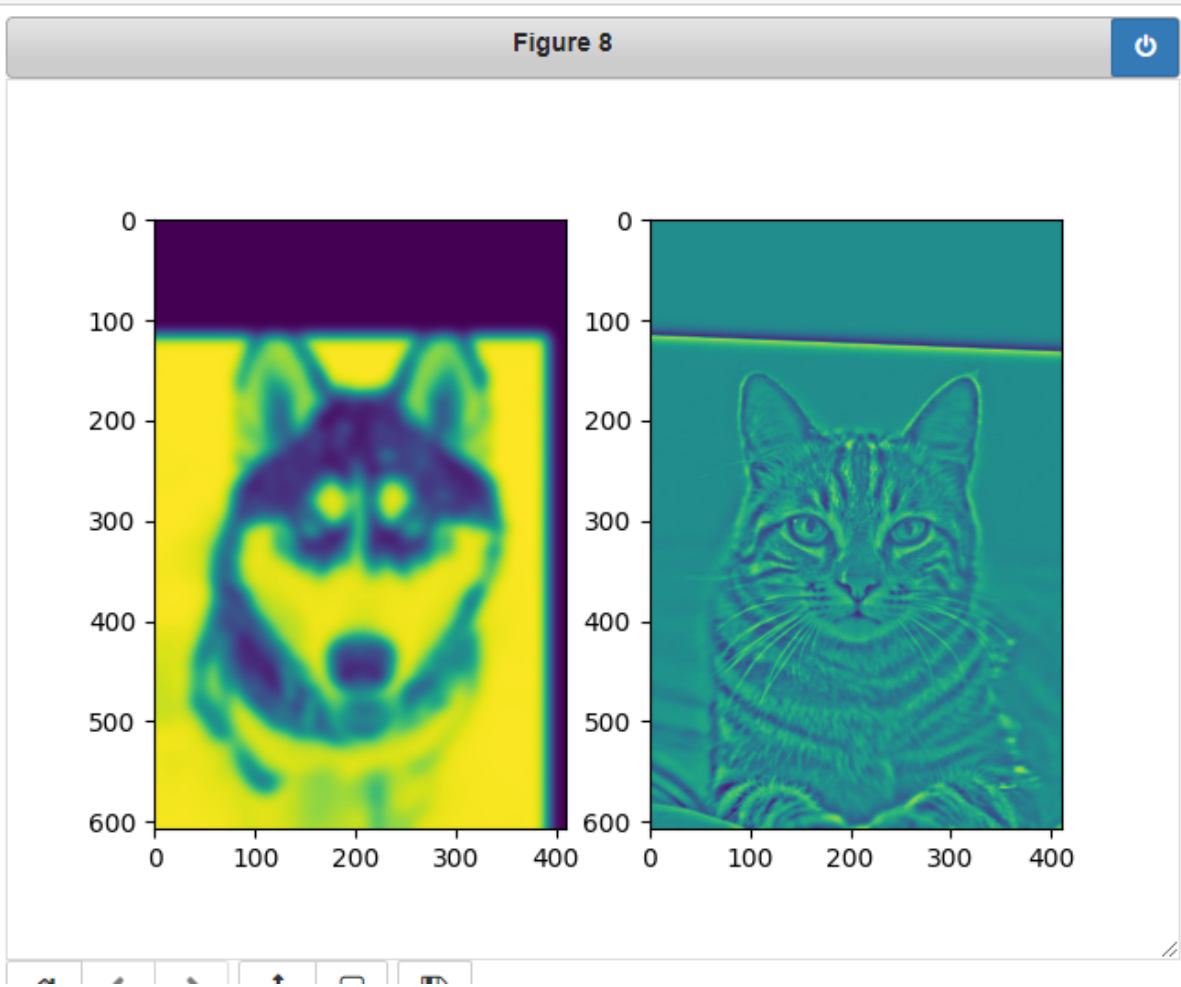
1. Hybrid image main result

Include

- Original and filtered input images

Cat is high; dog is low

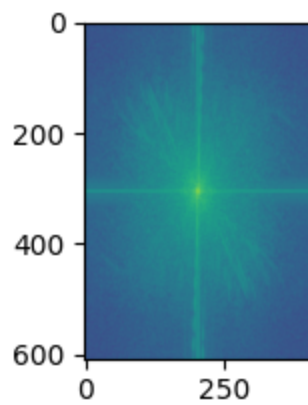
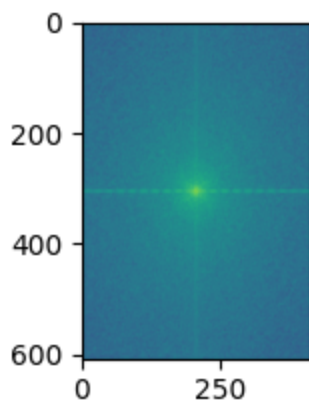




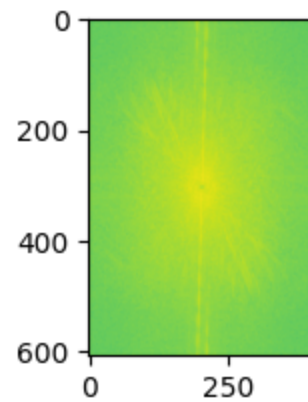
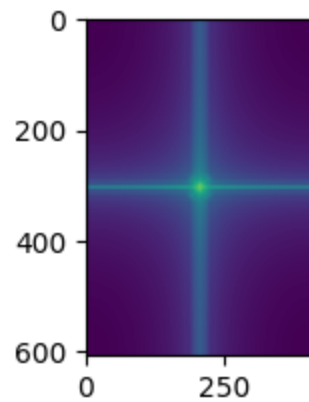
- Hybrid image result



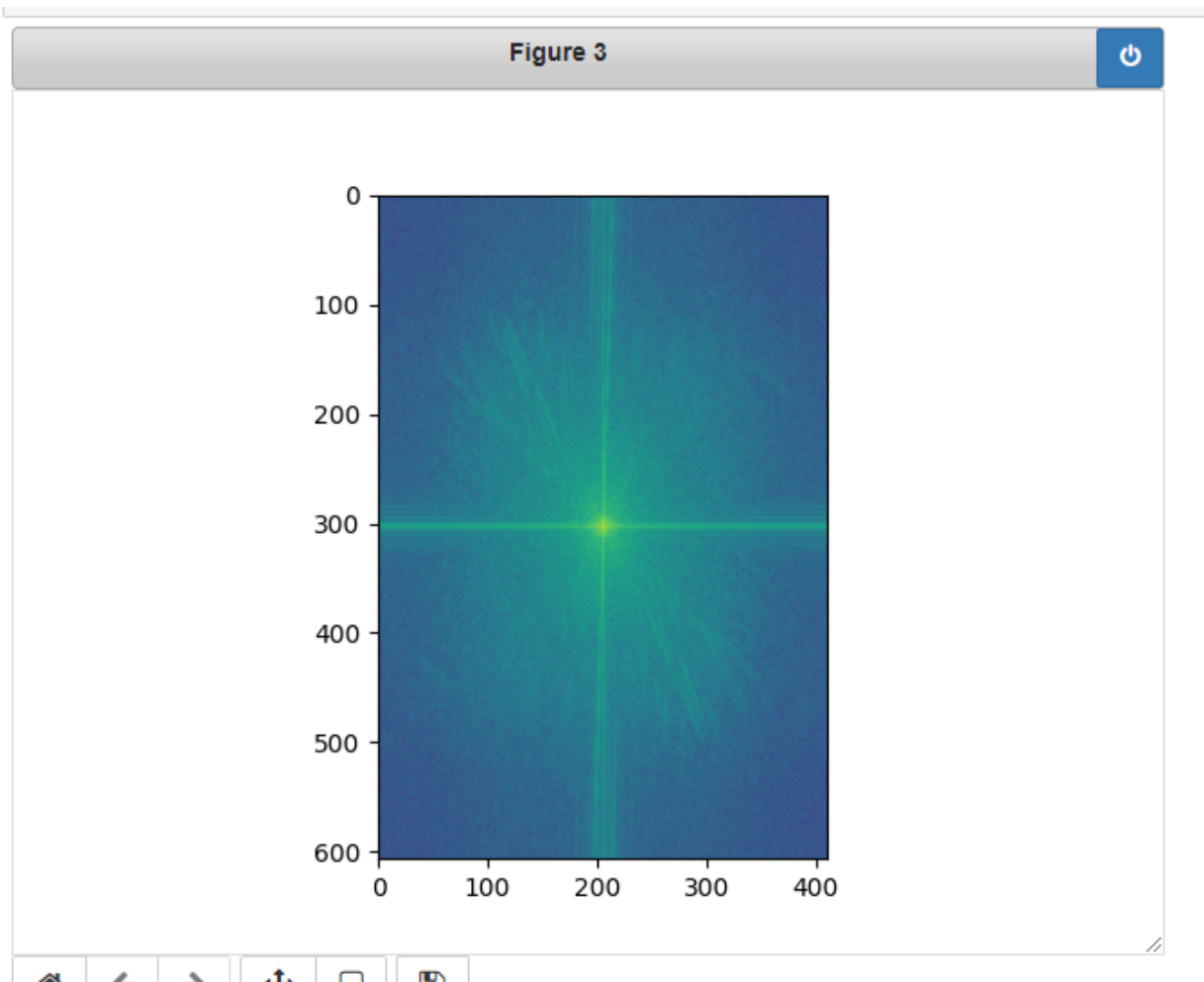
- FFT images of each original and filtered image and the hybrid image
- FFT original dog & cat**



FFT filtered dog & cat



FFT hybrid image



- Description in a few sentences of how it works using the included images as illustrations. Explain parameter settings and any clever ideas that are incorporated.

First, get the fft of the images and two kernels with different sigma. Then, get the dot product of the fft and the kernel to filter the image. Lastly, invert the fft to get the partial images and hybrid the two outcomes together.

Originally, both images have average fft. After filtering, dog has relatively low fft values while cat has relatively high fft values. This means that dog only remains low-frequency parts and cat remains only high-frequency parts. The difference in fft values makes these two images being able to blend. The hybrid fft values is similar to the original two fft values, making it looks like a normal image, but actually it contains the info from two different images.

- All results must be based on your own images (can be from web with attribution, but not provided samples)

2. Hybrid image additional results

Include

- At least two additional results (may not use provided samples). For each, include the input and hybrid image (do not need to show filtered or FFT images)

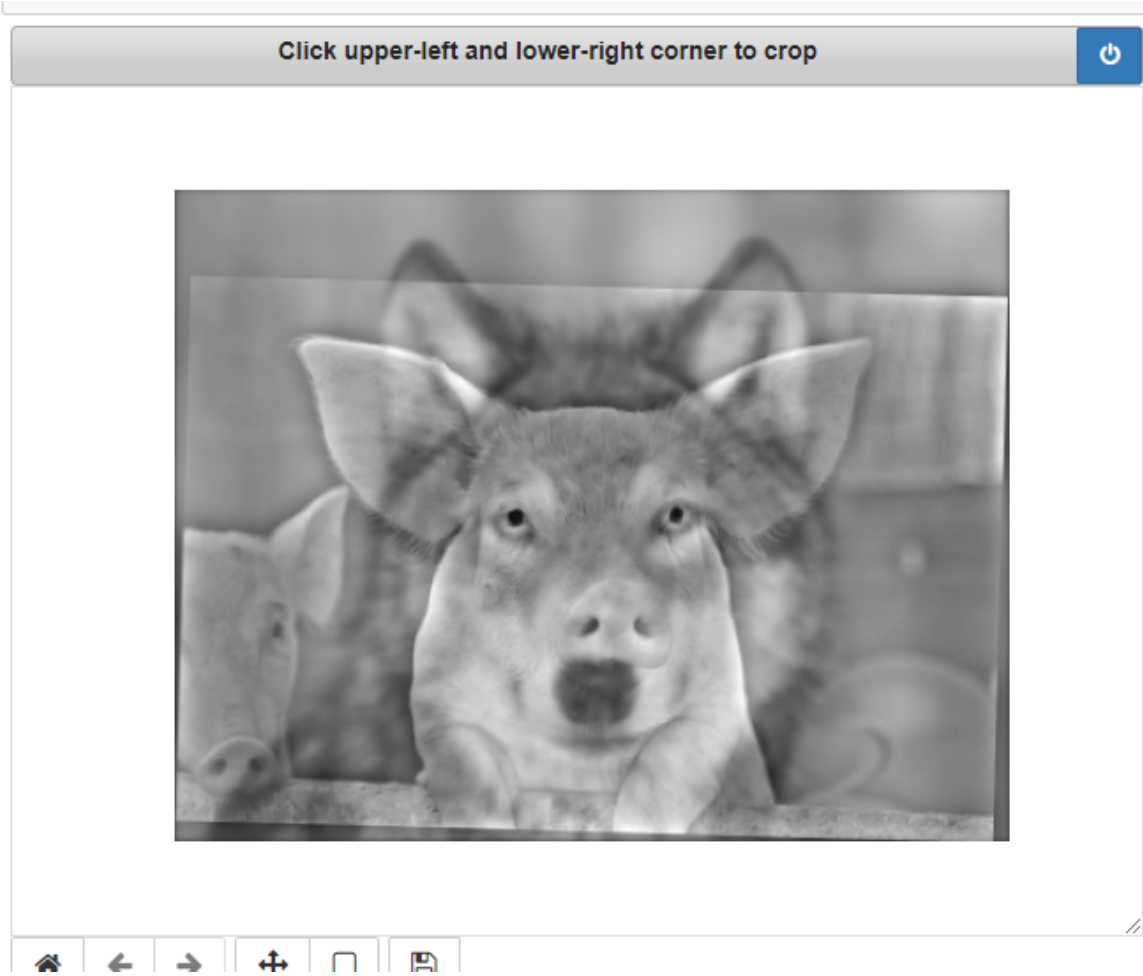
Pig & Wolf

Image 1



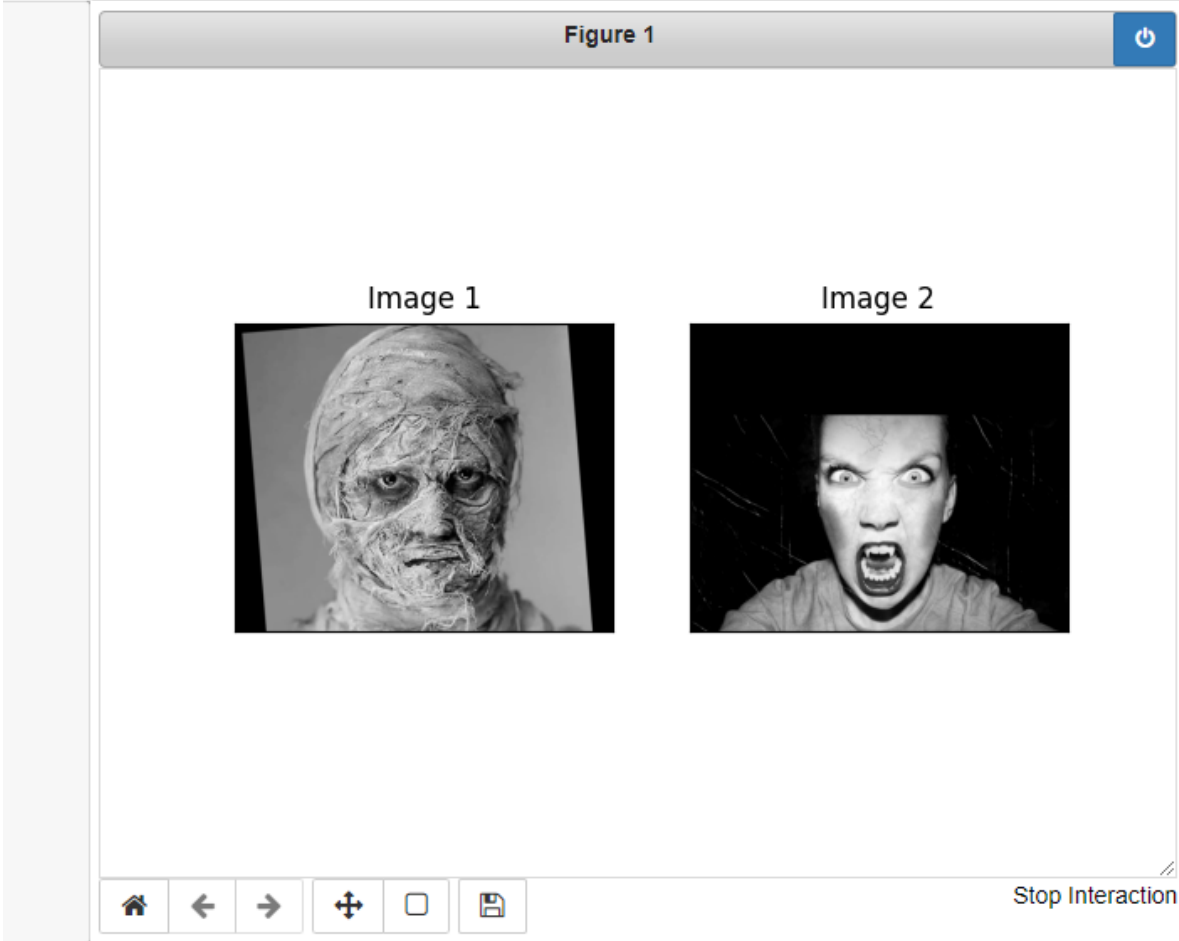
Image 2

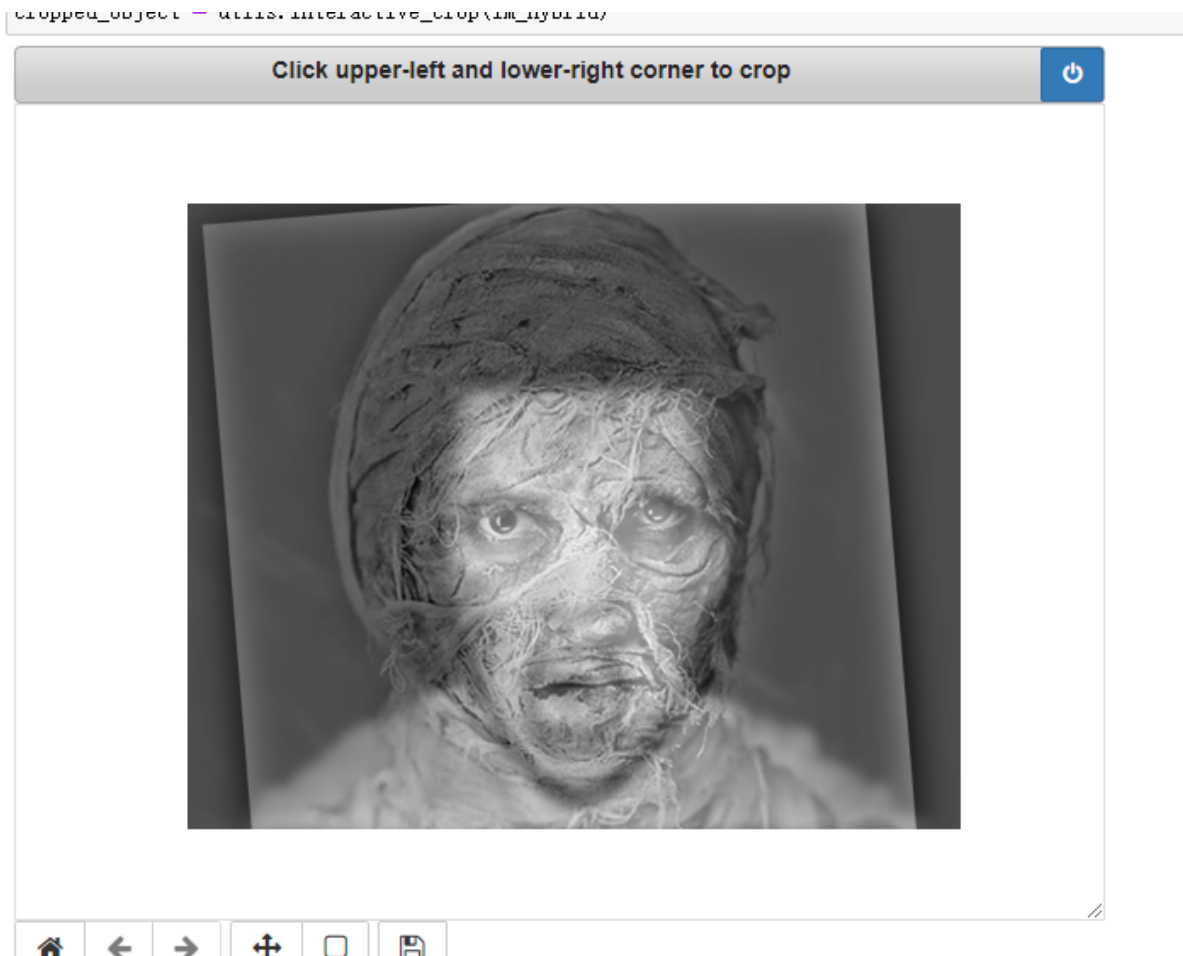




Mummy & Vampire

```
axes[1].set_title('Image 2'), axes[1].set_xticks([]), axes[1].set_yticks([]);
```





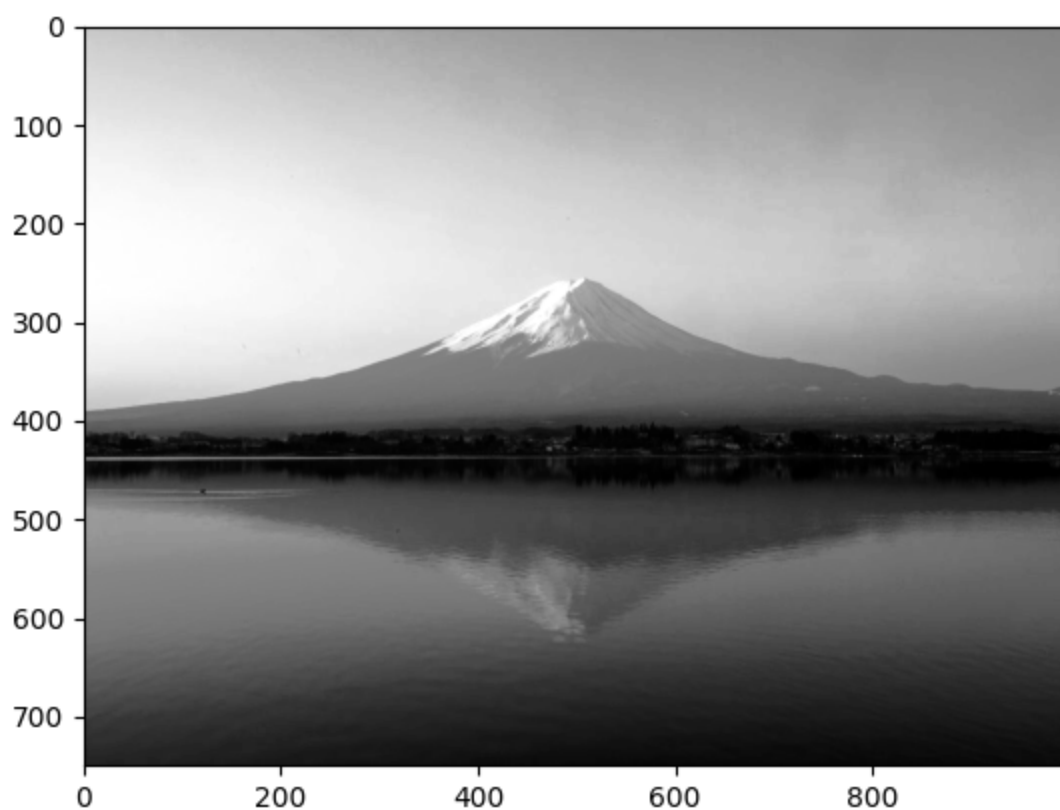
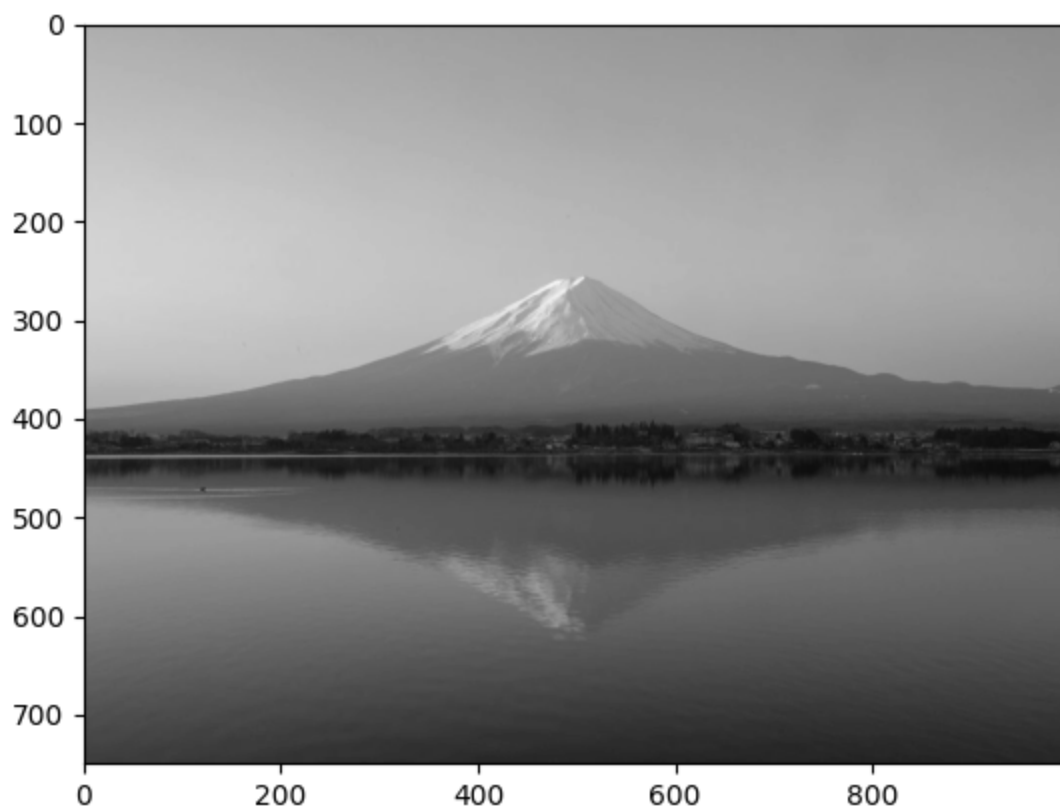
3. Image enhancement tasks (2 required, 3 for B&W)

Include

- For at least two out of three enhancement tasks (each is worth 10 points), display original image, modified image, and explanation of how the image was modified

Contrast Enhancement

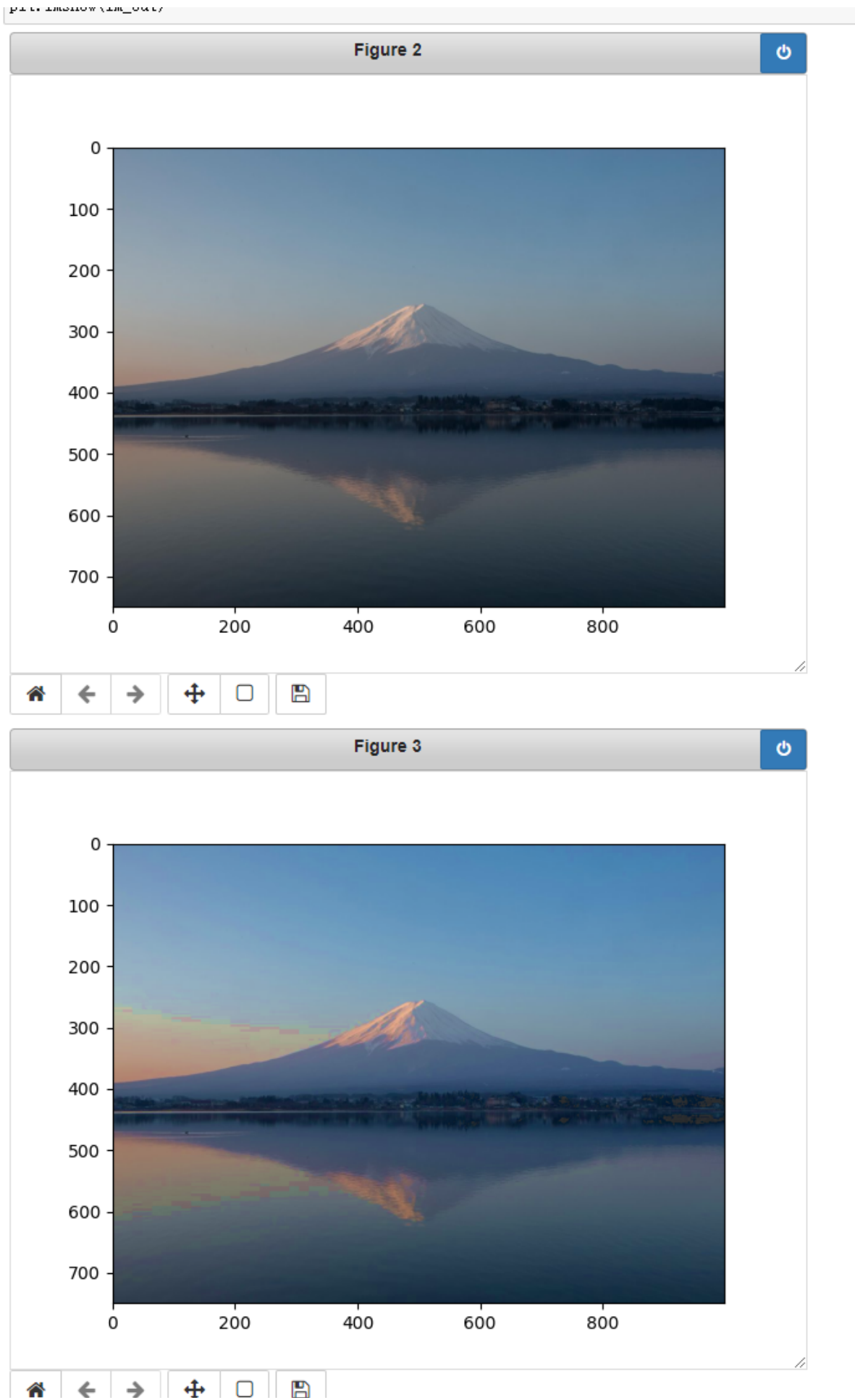
I used histogram equalization, which is a common way to increase the overall contrast of an image. By doing this, the brightness of pixels will be distributed more evenly on the image, but the maximum and minimum contrast will not be affected.



Color Enhancement

In hsv, s stands for saturation and v stands for value(brightness.) We want the color to be more vivid, but we don't want to change the intensity. So what I did is to increase the saturation to

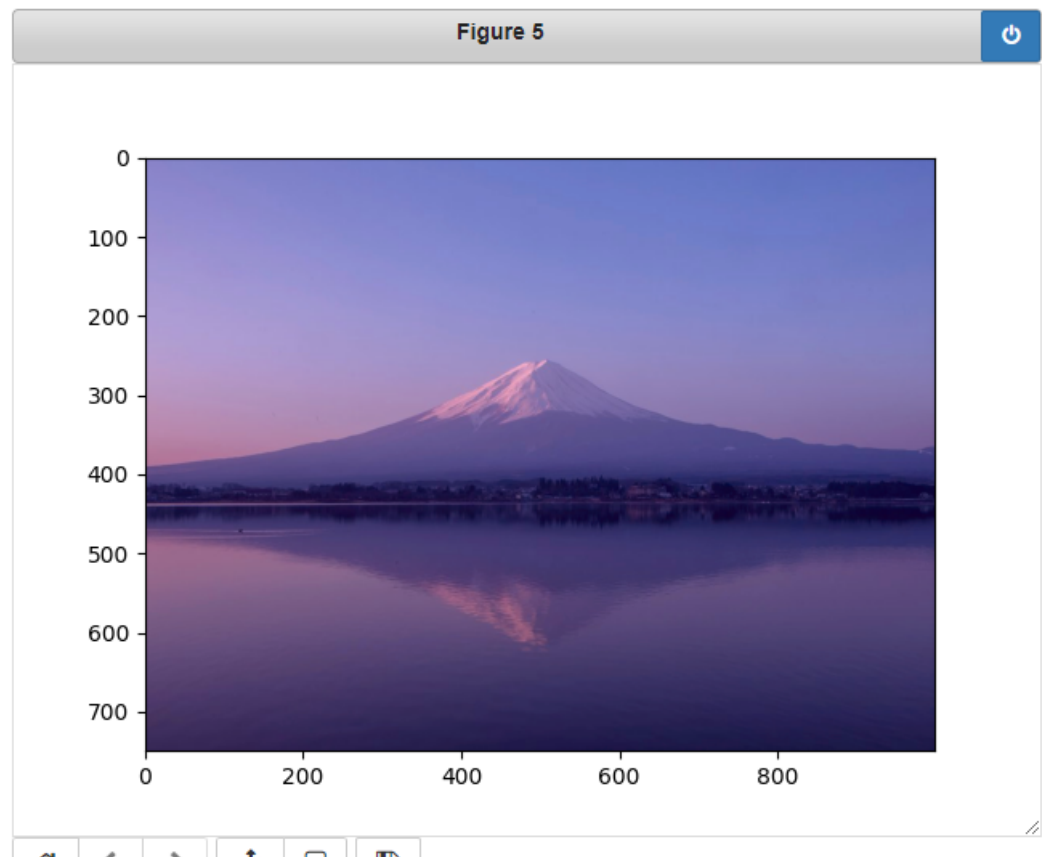
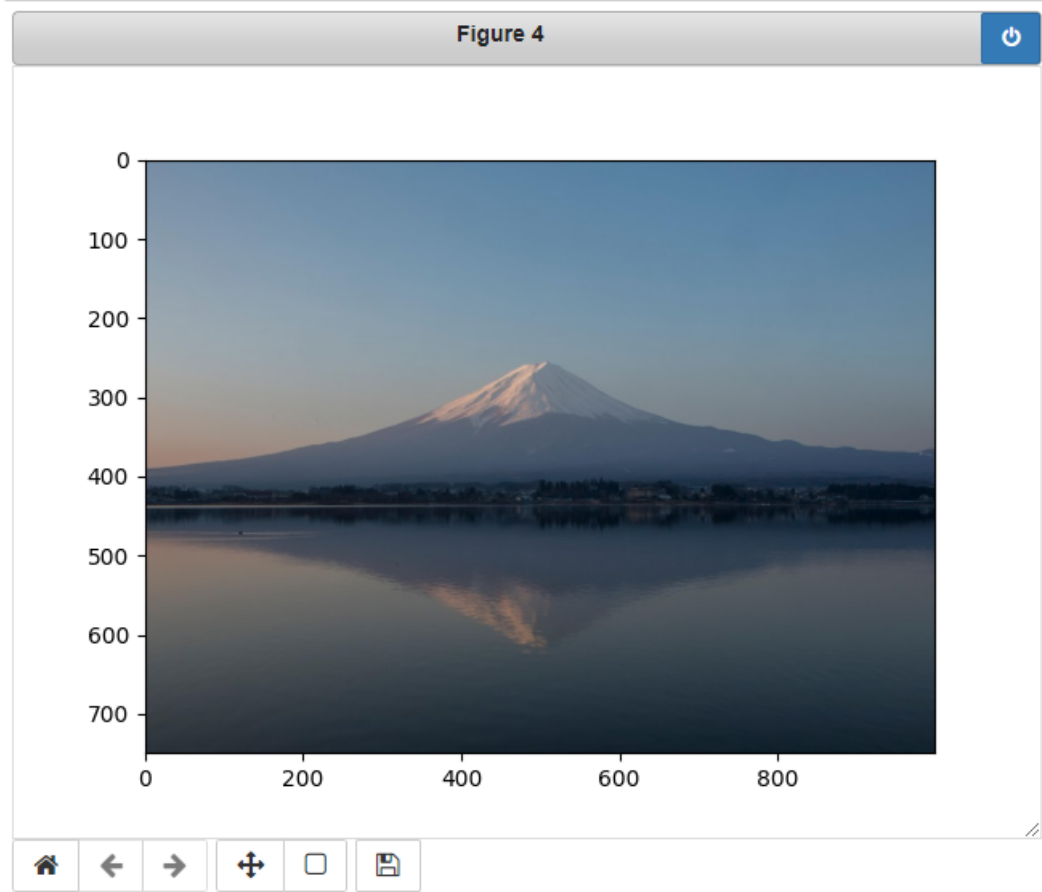
make each color more attractive. I also increased the value a little bit to comply with the change of saturation.



Color Shift

In CIELAB color space, a determines red and green, and b determines yellow and blue. We want more red and less yellow, so just increase a and decrease b. The effect is good.

```
plt.figure()
plt.imshow(im_out)
```



4. Quality of results and report

Nothing extra to include.

Overall good.

5. Color hybrid result (B&W)

Include

- Original images, hybrid image
- Explanation of method: Is it better to use color for the low-pass, the high-pass, or both?

6. Gaussian and Laplacian Pyramids (B&W)

Include

- Gaussian pyramid of main hybrid image result (can be one row of images)
- Laplacian pyramid of main hybrid image result (another row of images)

Acknowledgments / Attribution

List any sources for code or images from outside sources

[Cute Pig Leaning On Railing Of His Cot Stock Photo - Download Image Now - iStock \(istockphoto.com\)](#)

[Grey Wolf Portrait Stock Photo - Download Image Now - iStock \(istockphoto.com\)](#)

[2021: The year in medical research \(medicalnewstoday.com\)](#)

[Coronavirus: Cat owners fear pets will make them sick - BBC News](#)

[Mummy Makeup | Martha Stewart](#)

[image \(640×800\) \(meredithcorp.io\)](#)

[Why Mount Fuji Endures As a Powerful Force in Japan | Travel | Smithsonian Magazine](#)