Homework 2 Writeup

Instructions

- Describe any interesting decisions you made to write your algorithm.
- Show and discuss the results of your algorithm.
- Feel free to include code snippets, images, and equations.
- Use as many pages as you need, but err on the short side If you feel you only need to write a short amount to meet the brief, th
- **Please make this document anonymous.**

Image Filtering

For image filtering, without FFT-based convolution and with zero padding, I first checked the shape of given kernel. If it is not odd dimension, it raises error. Next step is padding the image. I added an option *zero_pad=False* for the mode of pad. If it is false, the mode is reflect which makes it as cv2.BORDER_REFLECT_101. I divided cases for color image and grayscale image, as the number of channels is different. To perform convolution, I used the formula of $h[m,n] = \sum_{k,l} f[k,l][m-k,n-l]$ for not FFT-based convolution. For FFT-based convolution, $g * h = F^{-1}[F[g]F[h]]$ is used. Kernel needed to be zero padded for FFT, to become the same dimension of original image. After zero padding, I shifted the kernel so that the center of kernel get to the top left. The result of image filtering is in Figure 1.

Hybrid Image

To get the low frequency image, I used my my_filter_2D function using the given kernel. For high frequency image, I subtracted the low frequency image from original one. By adding the high and low frequency image, I got the hybrid image. The result is shown in Figure 2.

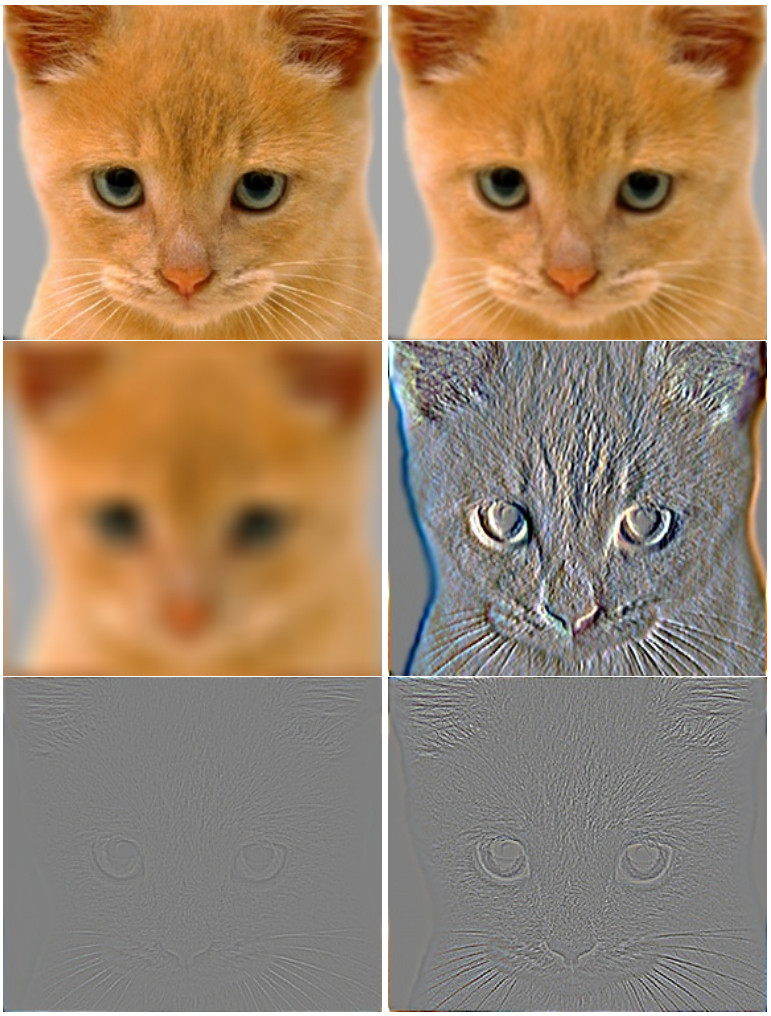

Figure 1: These are identity image, blur image, large blur image, sobel image, high pass image, and laplacian image from left to right, top to bottom.

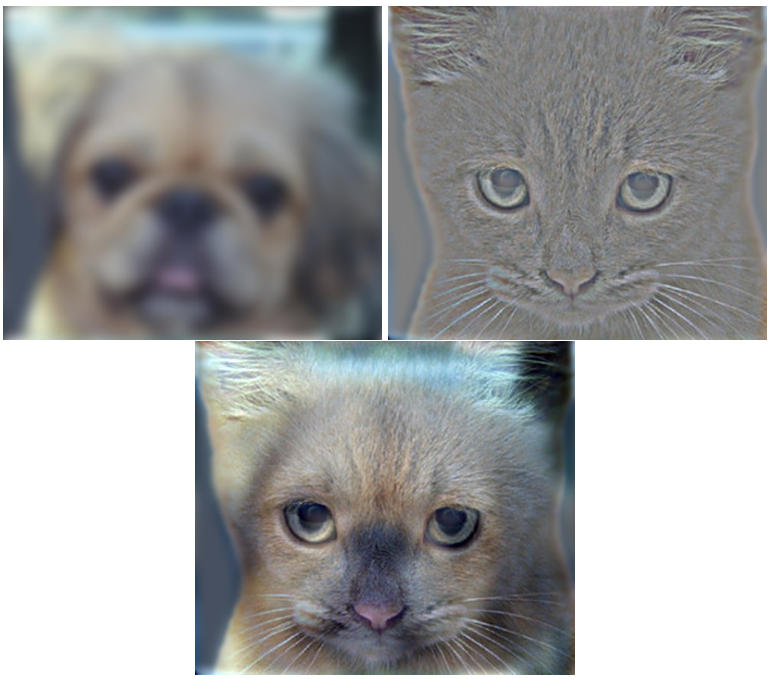

Figure 2: Hybrid image