

COMP 546 HW 2

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[colab notebook link](#)

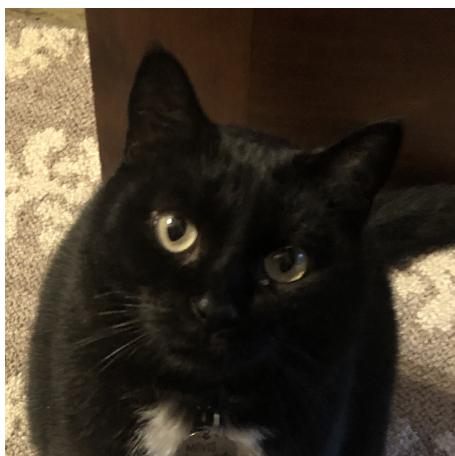
I did not collaborate with anyone.

1.0 Hybrid Images

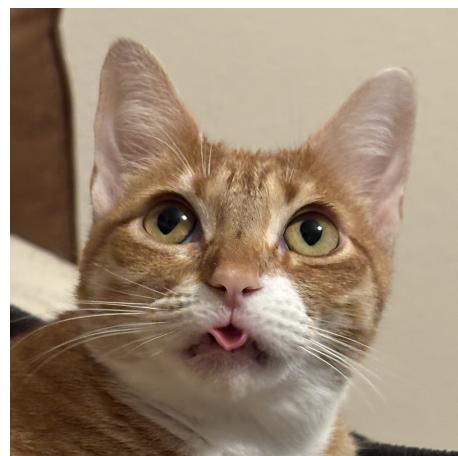
1.1

** see colab notebook **

1.2



(a) Picture A: Mavis



(b) Picture B: Hazel

Figure 1: Two Cute Cats

By increasing sigma and the kernel size, the image is blurred more strongly. In the picture C, this would result in seeing more of image A. Decreasing these parameters leads to less blur and seeing much more of image B.



(a) Picture C



(b) Picture C Downsampled

Figure 2: Two Cute Cats

1.3

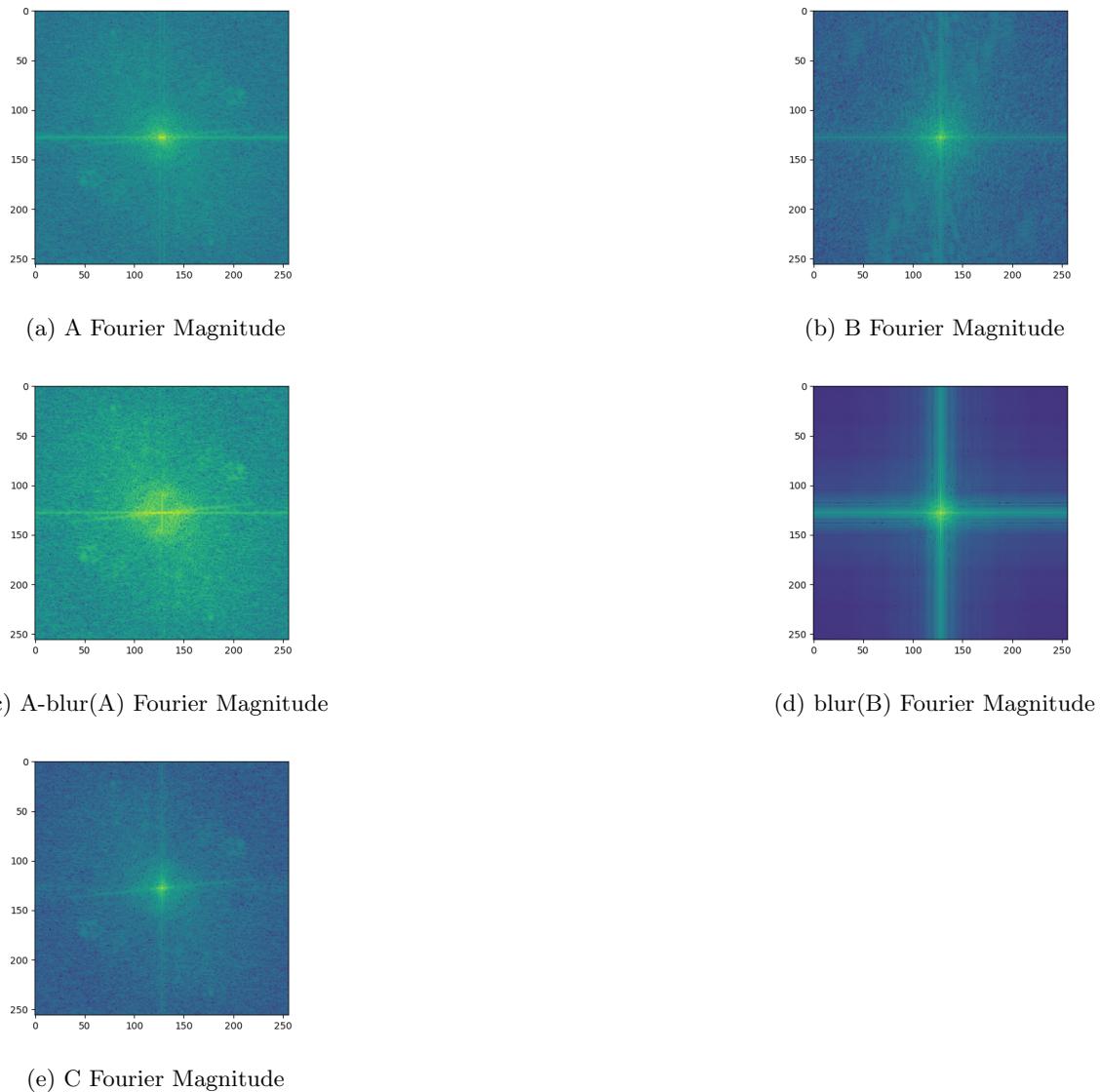


Figure 3: Fourier Spectra

1.4

- $K_1 = I_2$, this is a Laplacian filter which sharpens the image
- $K_2 = I_4$, this filter highlights horizontal edges
- $K_3 = I_3$, this filter highlights vertical edges
- $K_4 = I_1$, as this kernel is like a Gaussian filter which blurs
- $F_1 = I_3$, this Fourier shows high horizontal frequencies
- $F_2 = I_4$, this Fourier shows high vertical frequencies
- $F_3 = I_1$, this Fourier shows a low pass filter with high frequencies filtered out
- $F_4 = I_2$, this Fourier shows a high pass filter with high frequencies amplified

1.5

We can apply a Fourier transform to both images, and divide the blurred Fourier image by the original Fourier image. This is because convolution in image space is equivalent to multiplication in Fourier space. From this division, we can complete an inverse Fourier transform to resolve the original kernel used.

2.0 Laplacian Blending

2.1

** see colab notebook **

2.2

** see colab notebook **

2.3



(a) Picture A Laplacian Pyramid

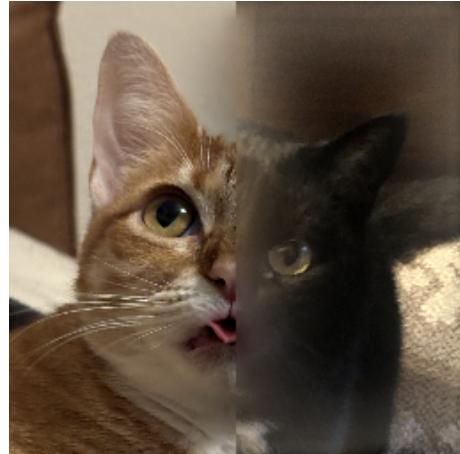


(b) Picture B Laplacian Pyramid

Figure 4: Two Cute Cats



(a) Mask Laplacian Pyramid



(b) Final Blended Image

Figure 5: Two Cute Cats

2.4

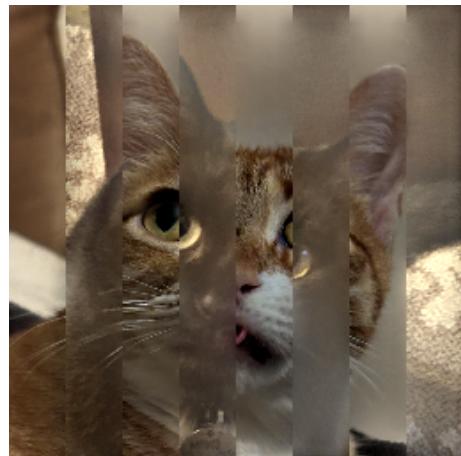


Figure 6: Blended Image With New Mask

3.0 Pulse Estimation From Video

3.1

** see colab notebook **

3.2

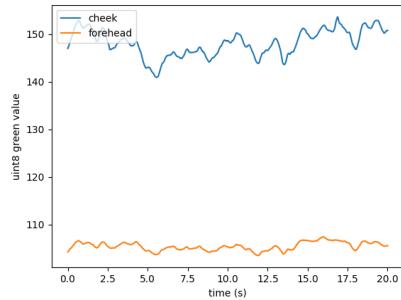


Figure 7: PPG Graph

3.3

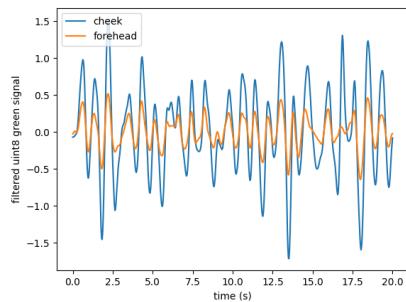


Figure 8: Filtered PPG Graph

3.4

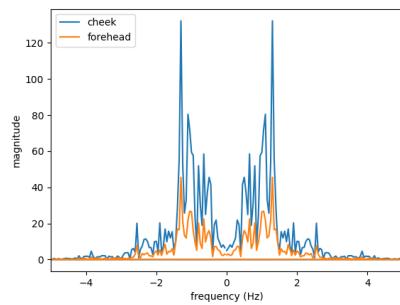


Figure 9: Filtered PPG Fourier Graph

3.5

The cleaner spectrum belongs to the cheek, which makes sense given that its signal was brighter. The maximum frequency is: 1.3 Hz or 78.0 beats per minute. This means that Alice is probably human.