

SYE 671 Assignment 1 Writeup

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Image Filtering and Hybrid Images

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Part 1: Convolution Implementation

The code was implemented based on the equation for 2D convolution:

$$(f * g)[m, n] = \sum_{i, j} f[m, n]g[i - m, j - n] \quad (1)$$

The code is included in the submitted notebook in Part 1. Because the image is padded with zeros, the output filtered images tend to also have surrounding black pixels. This is because the convolution kernel may overlap these pixels and include them in the output. Several filters were tested in the submitted notebook.

Part 2: Hybrid Image Generation

Generating the low frequency image was straightforward:

```
low_frequencies = my_imfilter(image1, kernel)
```

Generating the high frequency involved subtracting a low frequency image from the original image:

```
high_frequencies = image2 - my_imfilter(image2, kernel)
high_frequencies = high_frequencies - np.min(high_frequencies)
high_frequencies = high_frequencies / np.max(high_frequencies)
```

Results are presented in the submitted notebook.