

Assignment 3

Dated: February 22, 2025, submission due: March 7, 2025

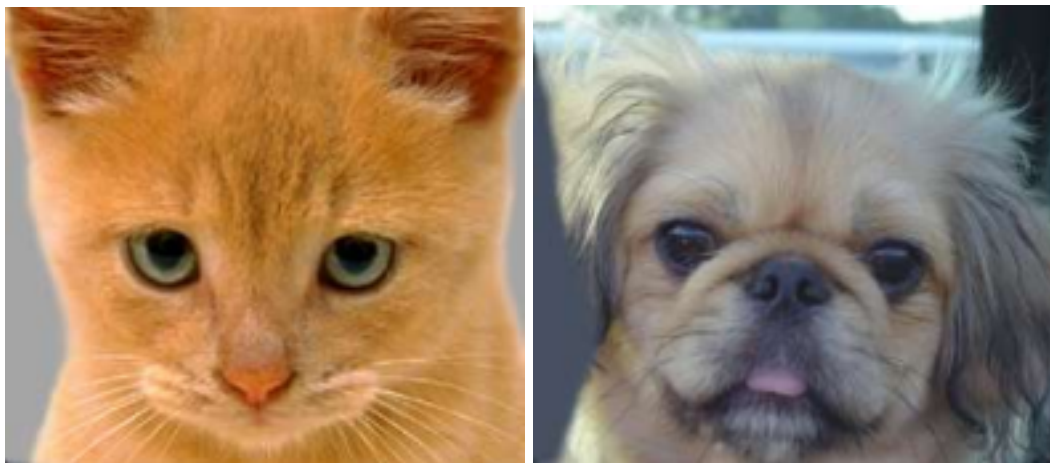
Q1. Hybrid Images

A hybrid image is a picture that combines the low-spatial frequencies of one picture with the high spatial frequencies of another picture producing an image with an interpretation that changes with viewing distance. The basic idea is that high frequency tends to dominate at a closer distance, but as you move away only the low frequency (smooth) part of the signal can be seen. By blending the high frequency portion of one image with the low-frequency portion of another, you get a hybrid image that leads to different interpretations at different distances. An example of a hybrid image is shown below.



(a) A Hybrid Image

The image shown above is the hybrid of two images as given below:



low-pass (blurred) and high-pass versions of these images look like this:

The



The high frequency image is actually zero-mean with negative values so it is visualized by adding 0.5. In the resulting visualization, bright values are positive and dark values are negative.

The above results are shown for color images. Now you have to do the following operations initially for generating hybrid using two *grayscale images*:

1. Generate hybrid images using *spatial filtering techniques*. You are required to show the experiments done using simple filters (also vary their parameters like mask size) and results obtained for each of them. Make a note of your observations.
2. Use Gaussain Filters to perform image smoothing. Note the variations by changing the filter size, and σ or the images.
3. Study and make use of Gaussain Pyramids and Laplacian Pyramids for mixing the two images.
4. Implement Laplacian Pyramids with Bilateral filters and use them with Gaussain Pyramids for the same (extra).
5. Design a way to do the same mixing in frequency domain.

Generate and report hybrid color images using the best set of filters obtained for spatial and frequency domain using color images.

Note:. Original and self-coded programs will be marked higher. Use your own choice of images to make funny or artistic hybrids.

The best hybrid and its chosen parameters will be judged!

Q 2. Hough-Transformation

Perform Hough-Transform for circle detection on the image X. You can use build in functions.

