Homework Writeup

Instructions

- This write-up is intended to be 'light'; its function is to help us grade your work and not to be an exhaustive report.

- Be brief and precise.

- Please describe any non-standard or interesting decisions you made in writing your algorithm.

- Show your results and discuss any interesting findings.

- List any extra credit implementation and its results.

- Feel free to include code snippets, images, and equations. Below are useful markup templates for these.

- **Please make this document anonymous.**

Declaration of Generative AI Use

Reminder of Course Policy

- The use of GenAI tools (e.g., ChatGPT, Grammarly, Bard) for completing any part of this course is discouraged.

- Using these tools is not needed to be successful in the class and could be detrimental to your learning experience.

- If you use them, you must cite the tool you used and explain how you used it.

- If you do not cite the tool, it is an academic code violation.

- We will be using special tools to detect cases of unattributed GenAI use.

Student Declaration

Have you used generative AI tools to complete this assignment:

YES ☐ NO ■

If you answered YES above, describe what tools you used and what parts of the assignment you used them for below:
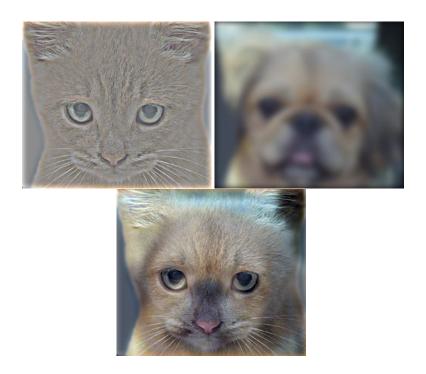
Assignment Overview

For this assignment, I had to code 2 functions: imhybrid and genhybridimage. The first has an input of an image and a kernel that is used to convolve the image. The output is the convolved image that has passed through the kernel/filter. The second has an input of 2 images and a cutoff frequency. This function used the imfilter function to perform the high pass and low pass filterations before these 2 filtered images were brought together as a hybrid image.

Implementation Detail

For the imhybrid function, I took in the kernel and flipped it twice (lr and ud) because it is the same as rotating it 180 degrees. This was followed by an exception that would be thrown if one of the dimensions of the kernel was of odd dimension. In order to actually filter the images, I created an if else statement depending on the number of dimensions in the image (2 vs 3). Within these, I used the general equation for correlation (because the filter has already been flipped twice) to determine the equations in this function. I used the floor division operator because it allowed me to keep the int characteristic of the values. For the genhybridimage function I used the imfilter function to filter out the high frequencies from the first image by blurring. I then did the same thing for the second image, but subtracted this blurred image from the original to get the high frequencies image. When added together, these images made the hybrid image.

Result