Assignment 2: Hybrid Images
Name: Varsha Sureshkumar Maurya
NinerId: 801100600

Creating Hybrid Images by using two different images

In this assignment we are trying to create a hybrid image by super imposing two images by passing one image through a low pass filter and passing the second image through a high pass filter. The low pass filter will usually only allow the lower frequencies to pass and attenuate higher frequencies thereby making the image smoother. The high pass filter on the contrary will allow the higher frequencies to be passed and only attenuate the lower frequencies thereby helping us detect sharp edges. The hybrid image is finally obtained by adding both the image obtained from LPF and HPF.

Algorithm:

1. Read the input image for LPF and convert it into grey-scale image. $I_{greyLPF}$
2. Reshape the image to have proper scale
3. Read the input image for HPF and convert it into grey-scale image. $I_{greyHPF}$
4. Reshape the image to have proper scale
5. Pass the resultant image through LPF. In this case we are using Gaussian LPF with variable sigma. $I_{lpf} = \text{imgaussfilt}(I_{greyLPF})$.
6. Generate the HPF by subtracting the LPF image from the original image. $I_{hpf} = I_{greyHPF} - \text{imgaussfilt}(I_{greyHPF})$.
7. Generate the final hybrid image by adding both the lpf and hpf image.

$$I_{hybrid} = I_{lpf} + I_{hpf}$$

Validation:
To validate the image, I tried to zoom in the image and could see the HPF clearly and when I zoom out the image, I was able to see the LPF clearly.

Results:

(fig. 1 – when hybrid image is zoomed out)

(fig. 2 – when hybrid image is zoomed in)

Reference:

[1]. Oliva, Aude, Antonio Torralba, and Philippe G. Schyns. "Hybrid images." ACM Transactions on Graphics (TOG). Vol. 25. No. 3. ACM, 2006.