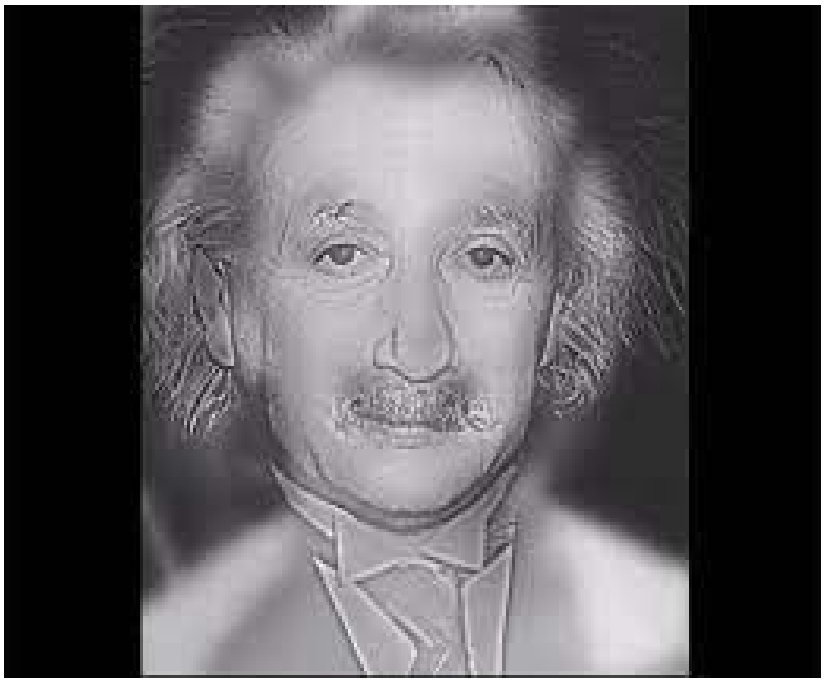
Lab 4 - Marilyn Einstein
Due 10/8/2024

1 Introduction

The "Marilyn Einstein" image was designed by a MIT research group to provides insight into how the human brain processes images and is a good visual way to depict signal processing. Depending on your distance and eye site you will see two different images. Either a blurry picture of model Marilyn Monroe or a sharp image of Albert Einstein. This is done by taking a high pass filter on none image and a low pass filter on a second image and combining the two images.

Just like in wireless communication (radio waves and wifi) high signals appear to be sharper but travel less distance and struggle to go through objects (wifi, 5G, squinting your eyes while looking at the image), while low signals appear blurrier but travel further distance and can retain information traveling through objects more easily (ham radio waves).



Steps to complete this lab:

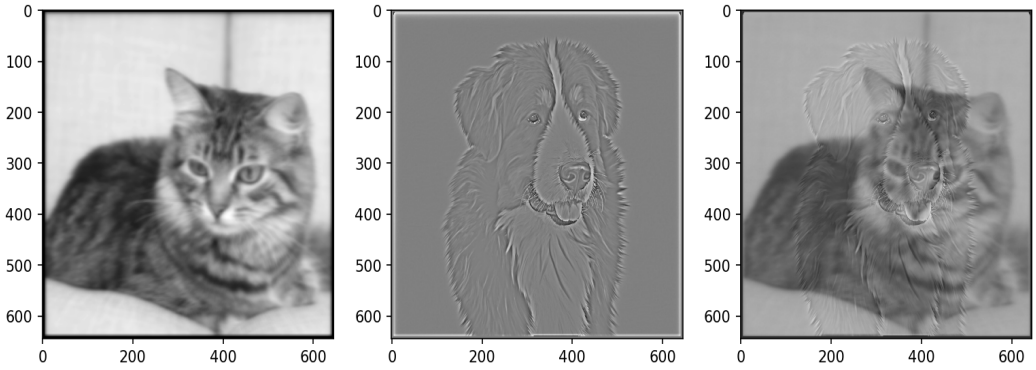
- Find two images that are of **equal size** that you want to combine.
- **(you can implement this step if you want, but it was not covered in class and will not be graded)** Calculate and apply a Fourier transform filter on both images. (you will get better results if you apply a Fourier transform, but it still works without applying one).
- Apply a 11x11 neighborhood filter to both images to create a low pass image of them. (the larger the filter, the better the results).
- Create a high pass filter of the second image by, taking the (original (padded image) subtracting it's low pass version and adding 127 to it.
- Combine both images
- Hidden step (you must figure this out).
- Display your output in a 3x1 matplotlib graph showing the low pass filter image, high pass filter image, and the combined images.

You must write your own code.

2 Grading (Out of 100 points)

- 10 Points : Add your name and date to the beginning of your code.
- 10 Points : Use appropriate comments throughout your code.
- 20 Points : Low pass filter works
- 20 Points : High pass filter works
- 20 Points : You figured out the hidden step
- 20 Points : Results are shown in a 3x1 grid with matplotlib with titles for each sub graph (see example output).

Example output



3 How to turn in

You must submit a zip folder that includes all files, folders, and images that are required to run your program. Name the zip folder "Lab4-Lastname.zip" and upload it to canvas

Good Luck Cat!