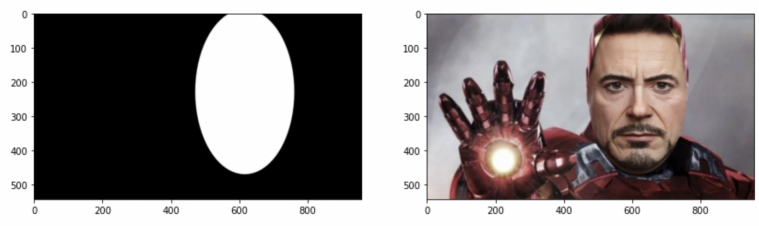
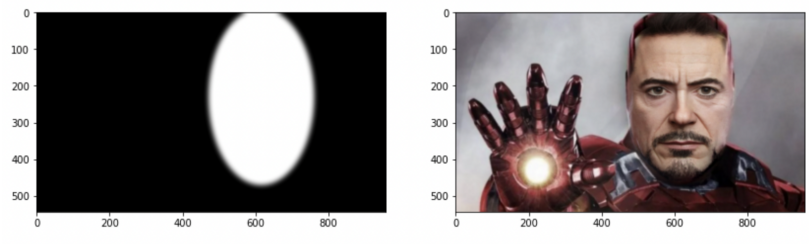
Project 2 Write Up

For the most part, we collaborated on all aspects of the project. When implementing the pyr_build and pyr_reconstruct helper functions, we both attempted to follow the pseudocode, and we went to office hours together to get our laplacian_blend to produce the correct output with the apple/orange toy model image. When attempting to operate a laplacian blend between Tony Stark and Iron Man, Minh was able to crop and align the images so that we could compare regions of interest for us to be able to call our laplacian_blend function on it. We also worked on the hybrid image together.

The images we used were obtained from Google Images and transferred from our local machines into the Deepnote repository. As a preliminary step, we used cv2.resize to crop the images, and we stored the points corresponding to the helmet of the Iron Man image as our region of interest. We were also able to create an ellipse mask using the roi_from_points and ellipse_mask_from_roi functions. Similar steps were taken for the Tony Stark image, but we also had to call warp_helper_function to make sure the size of the Tony Stark image was the same as the Iron Man image. To produce our final output, we created another ellipse mask using the cv2.GaussianBlur function so that the boundary between the two images combined would appear more natural. We then called the laplacian_blend function we previously implemented with the new ellipse mask and was successfully able to create a laplacian pyramid blending between Iron Man and Tony Stark.

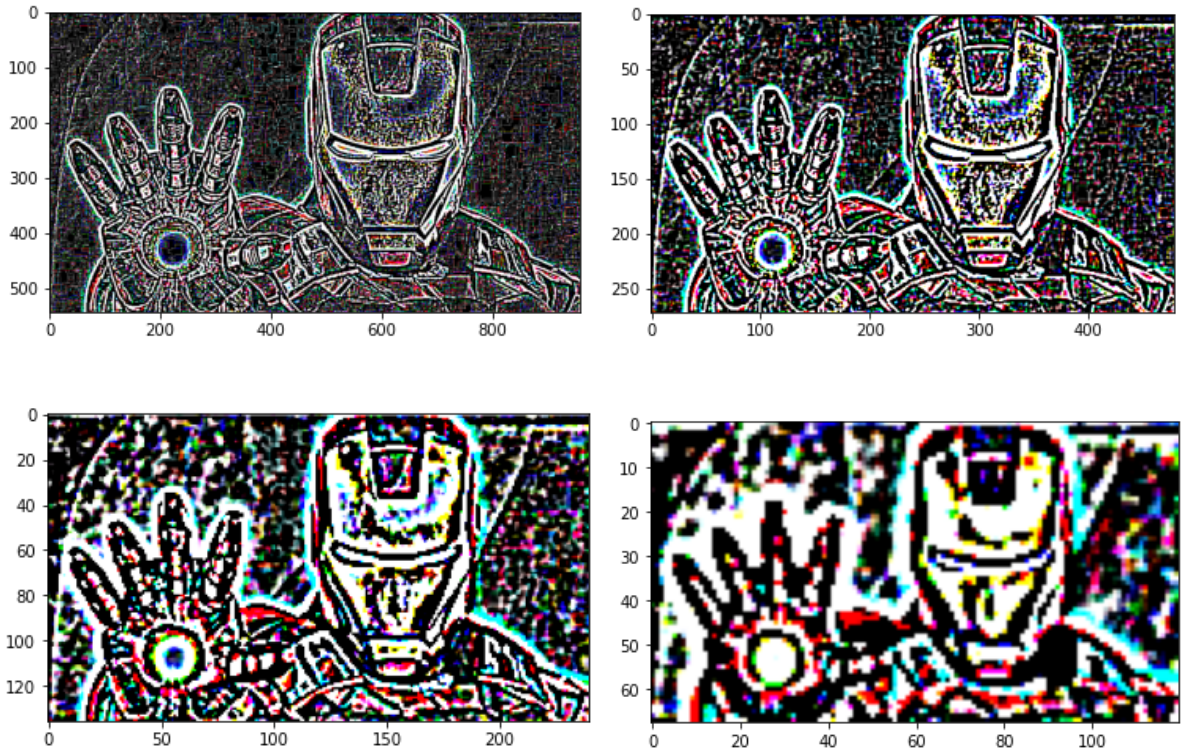


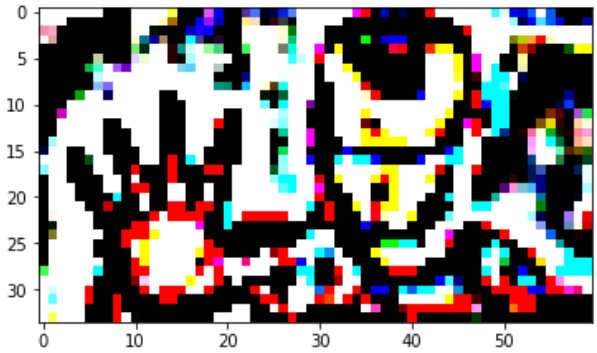
(Alpha Blending Output)



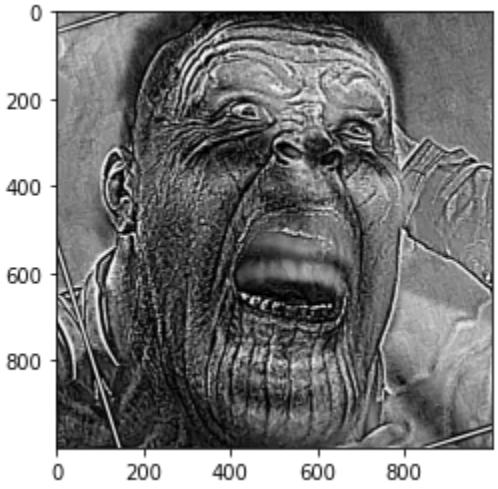
(Laplacian Pyramid Blending Output)

Laplacian pyramid blending blends low-frequency content over a larger distance than high-frequency content in order for the laplacian images to be reconstructed properly. In the images shown below, the images become lower frequency with each frame so that when it is reconstructed with a certain mask in the laplacian_blend function, we would be able to see a more natural blend between the two images, rather than the distinct cutoff that we see in normal alpha blending.





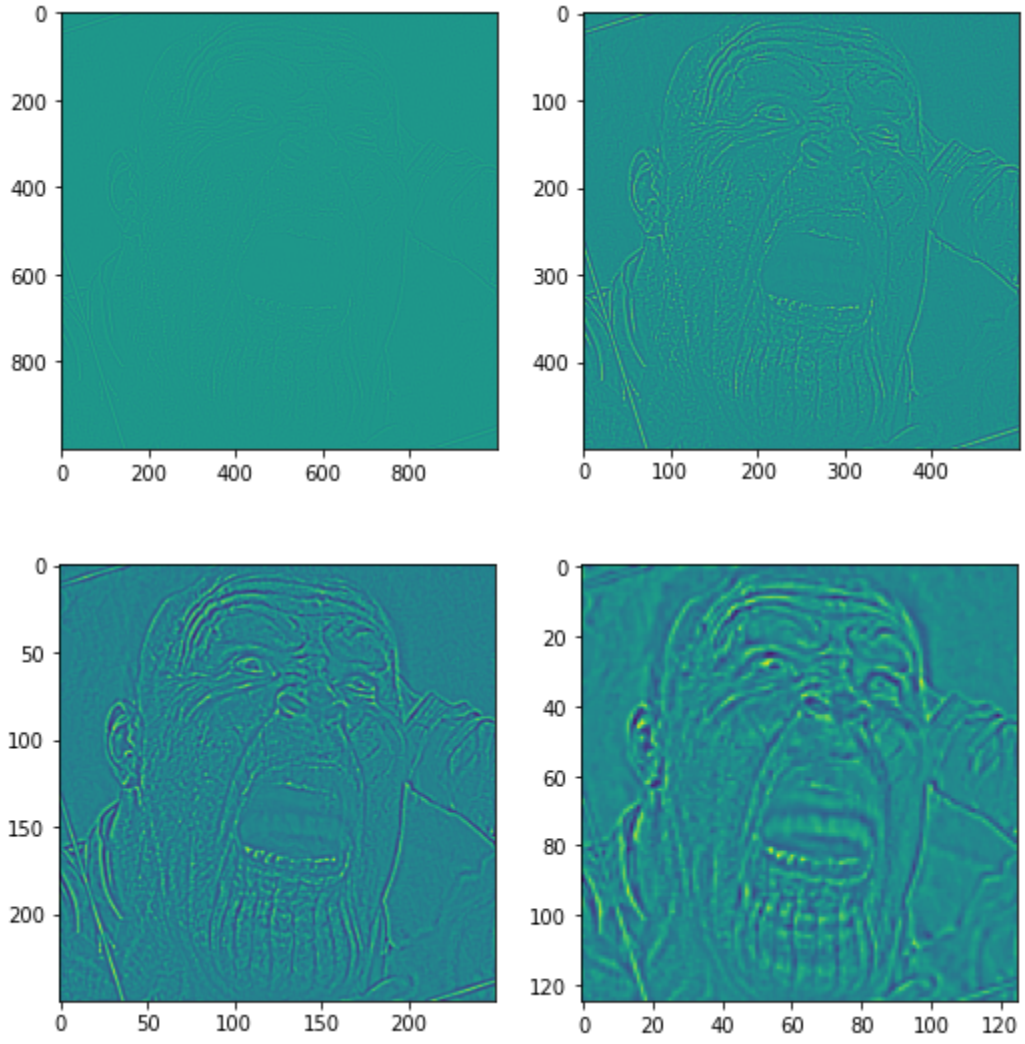
(Laplacian images created by pyr_build, images become lower frequency with each frame)

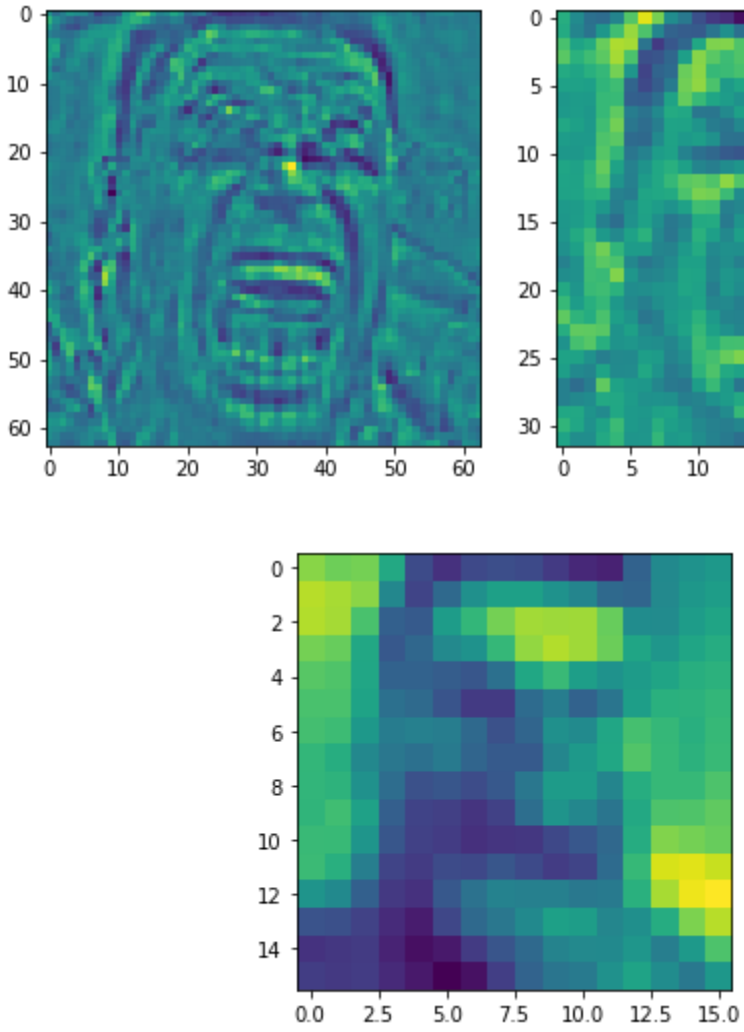


(Hybrid image output)

SigmaA is used to blur the background image; the higher the value of SigmaA, the more high frequency information we are filtering out of the background image. SigmaB was used to get rid of the low frequency information of the second image; the higher the value of SigmaB, the more high frequency values we will save. The higher the value of k, the more significant (weight) the values of high frequency are in the second image. In order to make the high frequency values more significant when looking at the picture up close, we increased the value of k to 20, SigmaA to 21, and SigmaB to 11.

When displaying our image at full size, we were only able to see the second image (due to high frequency values) up until around two and a half meters from the screen. This distance was fairly consistent for both of us.





(Laplacian pyramid)