Blending for gesture recognition

Reason:

- Synthetic image dataset generation
- Reducing the cost of data collection and labeling

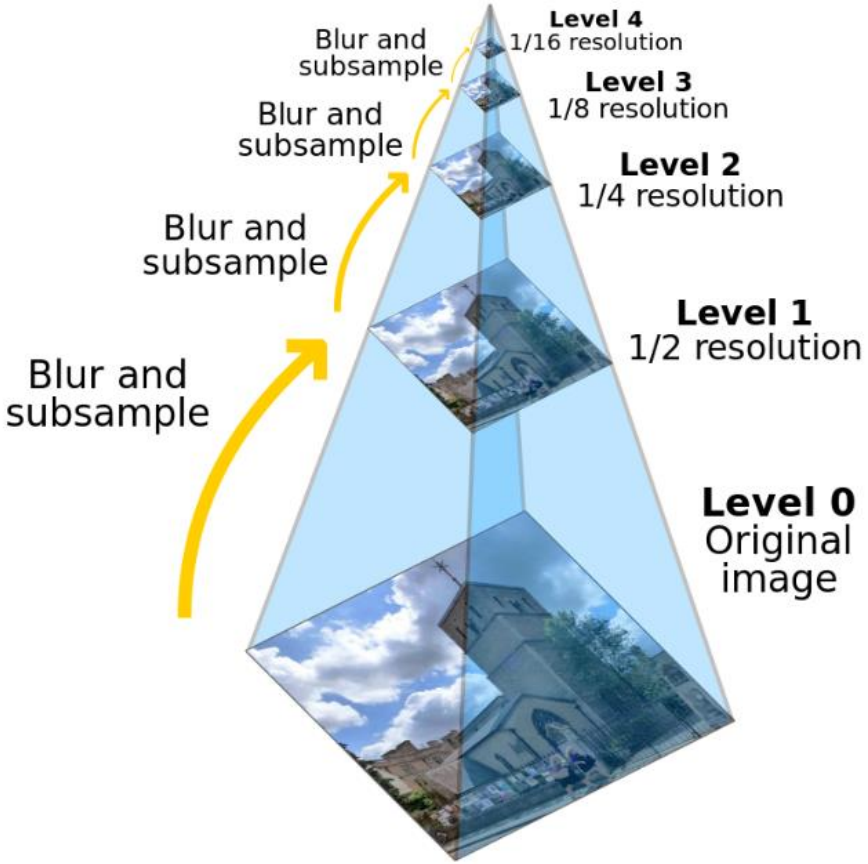
Objective:

- we want to see if a seamless and more natural looking synthesized image can still be recognized properly
- Is a better blending method really beneficial

Image blending

Shawson Hsiao

Image Pyramids



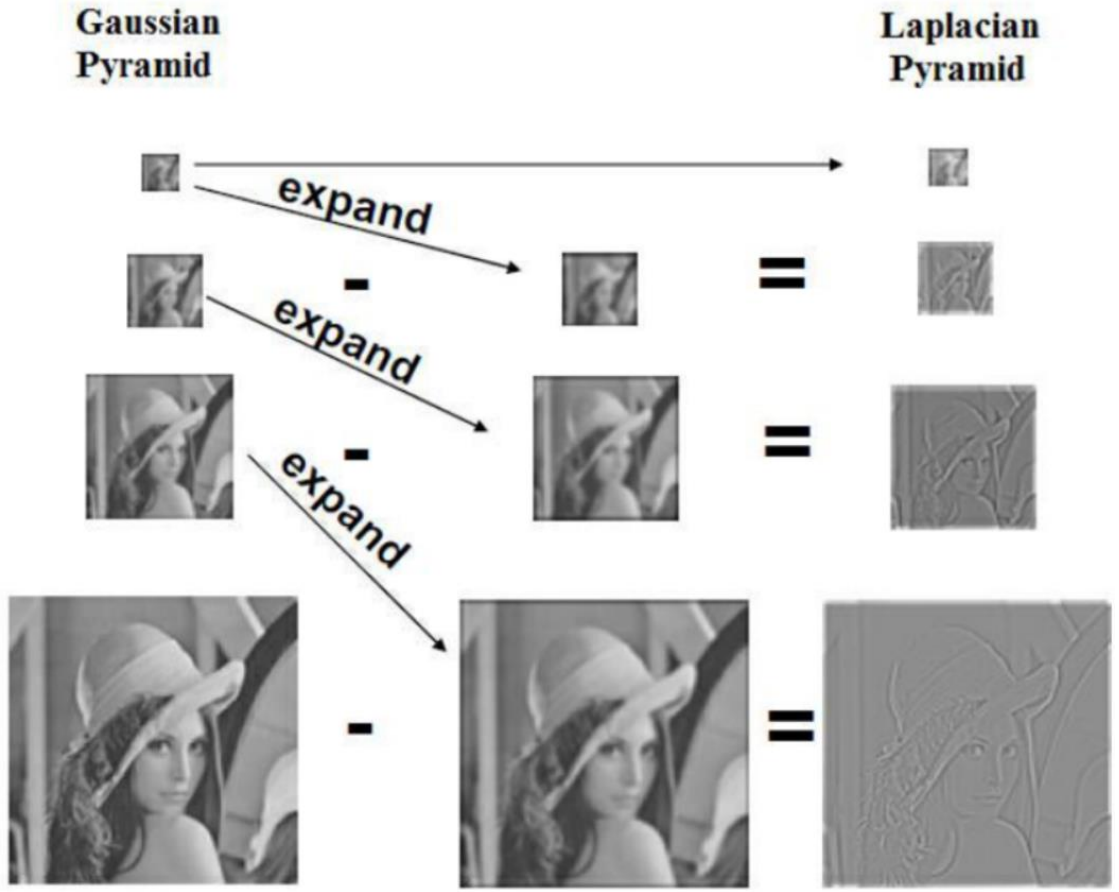
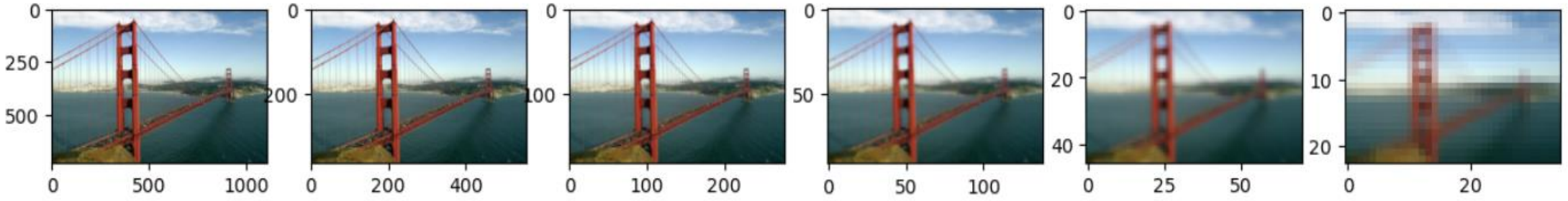
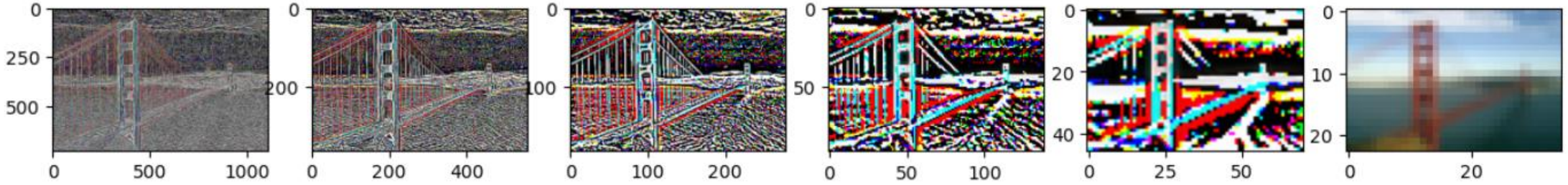


Image Pyramids

Gaussian Pyramid

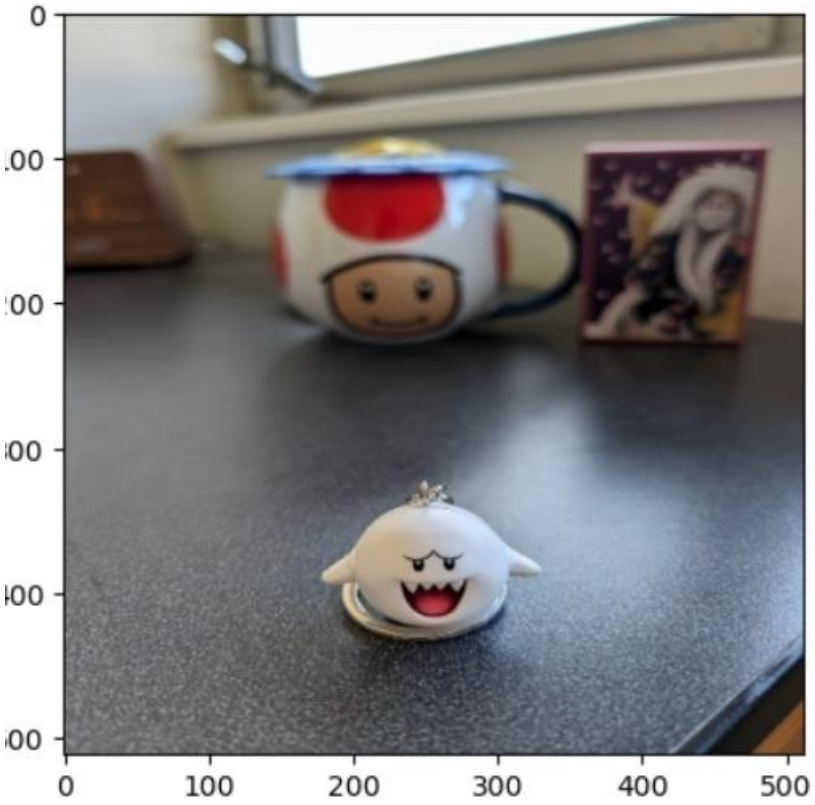


Laplacian Pyramid

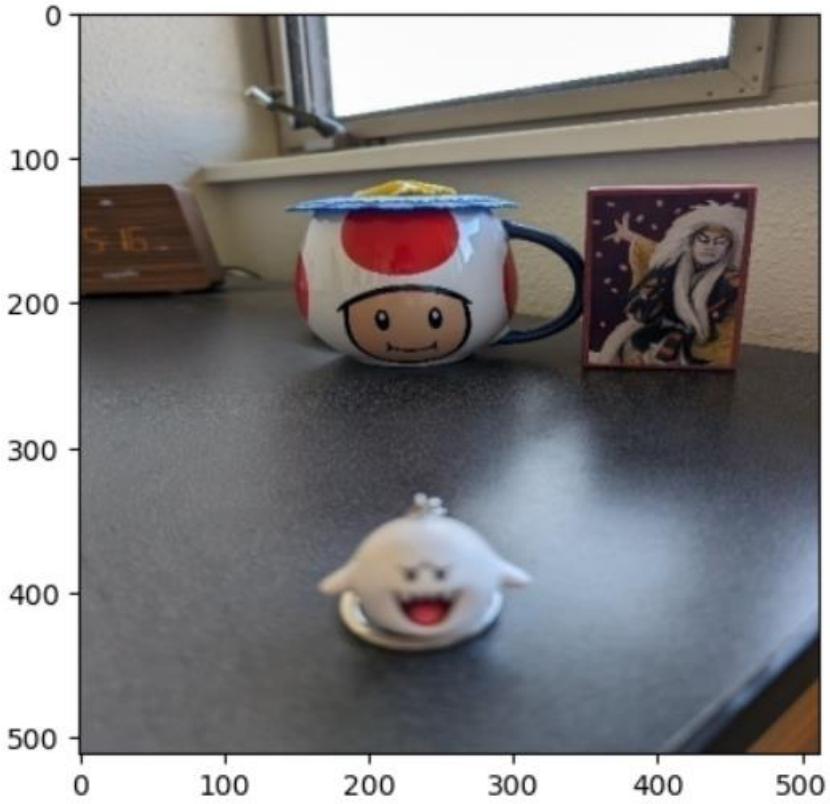


Pyramid blending

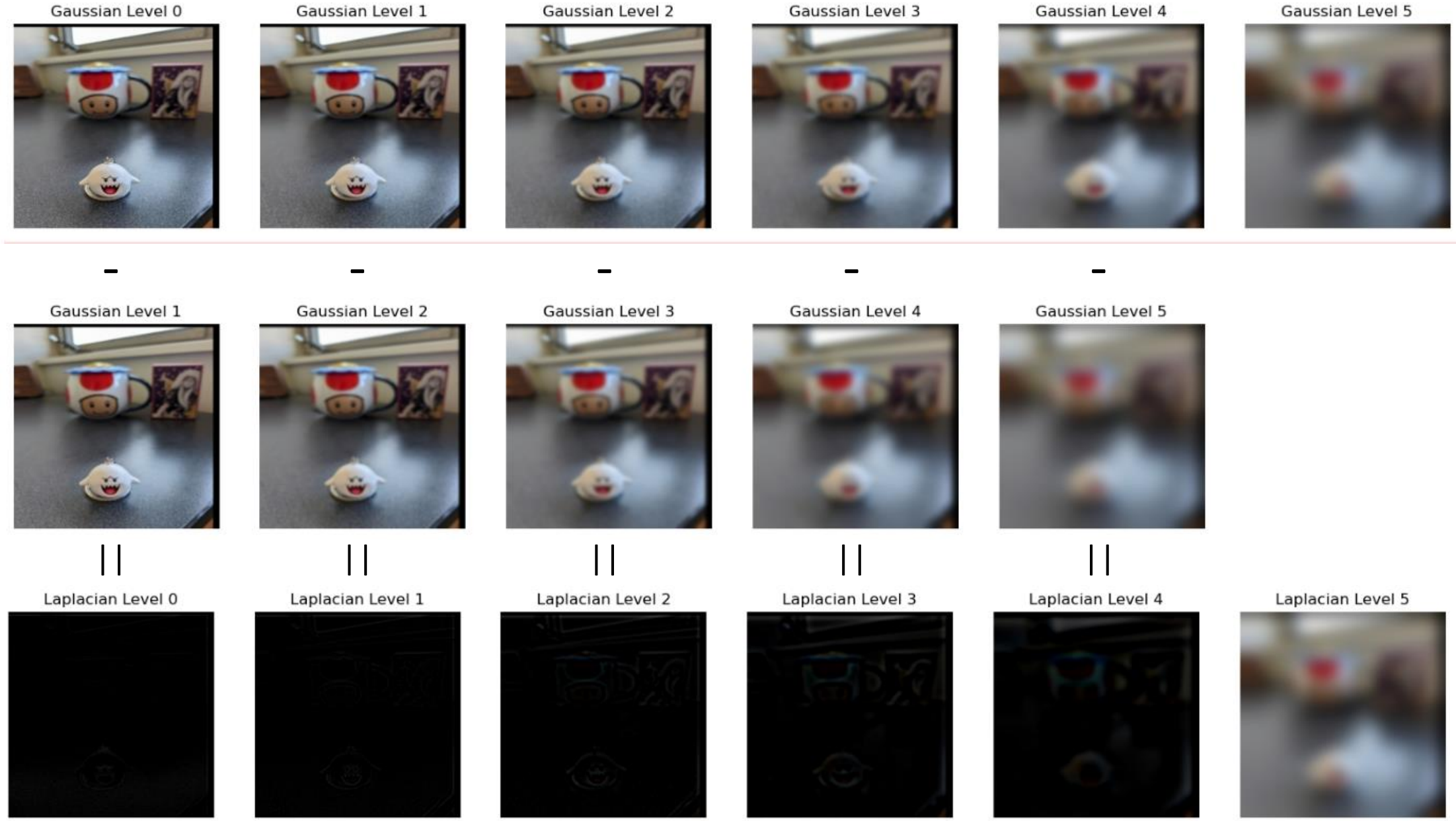
Create a fully in-focus image



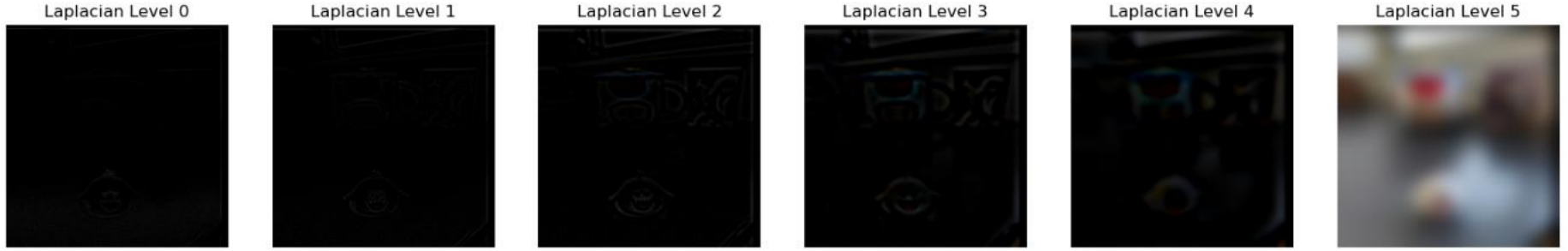
Near



Far

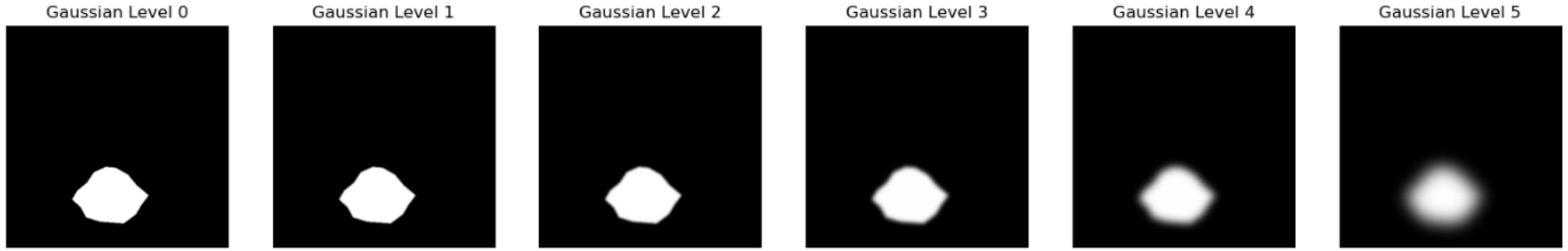

Gaussian Level 0
Gaussian Level 1
Gaussian Level 2
Gaussian Level 3
Gaussian Level 4
Gaussian Level 5
-
-
-
-
-
Gaussian Level 1
Gaussian Level 2
Gaussian Level 3
Gaussian Level 4
Gaussian Level 5
=
=
=
=
=
Laplacian Level 0
Laplacian Level 1
Laplacian Level 2
Laplacian Level 3
Laplacian Level 4
Laplacian Level 5

La(Left)



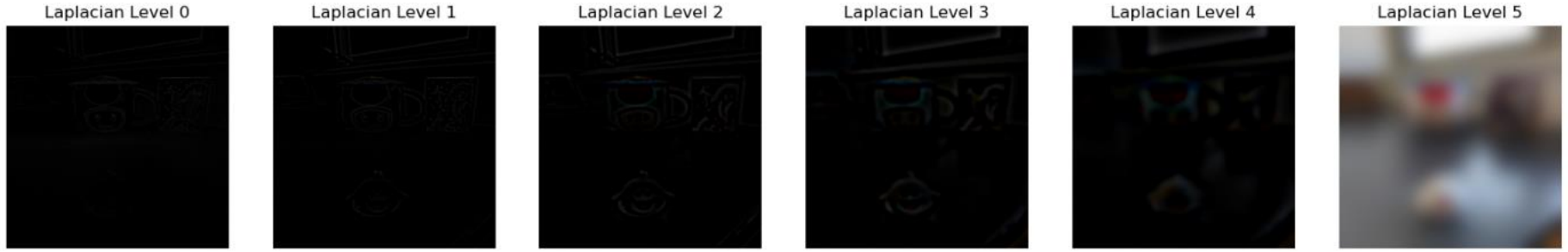
X

G(Mask)



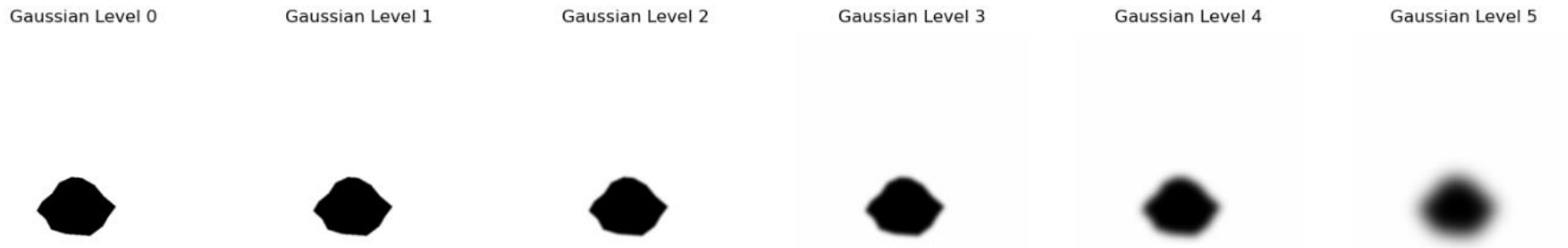
+

La(Right)



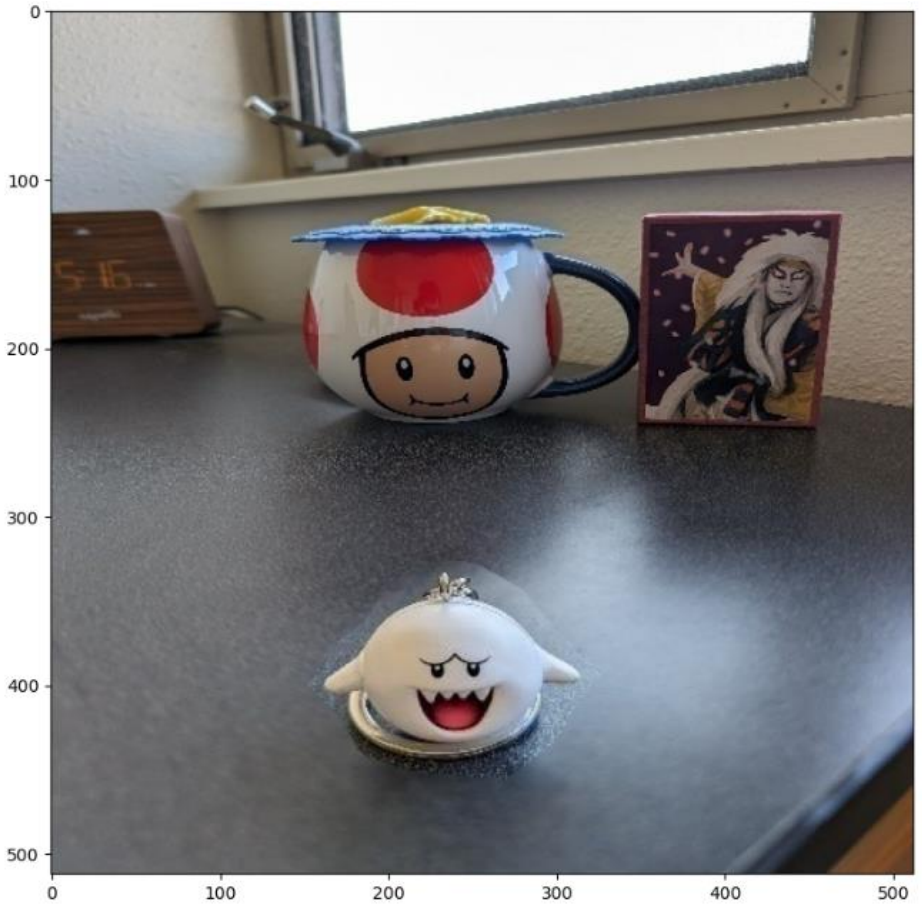
X

G(1-Mask)

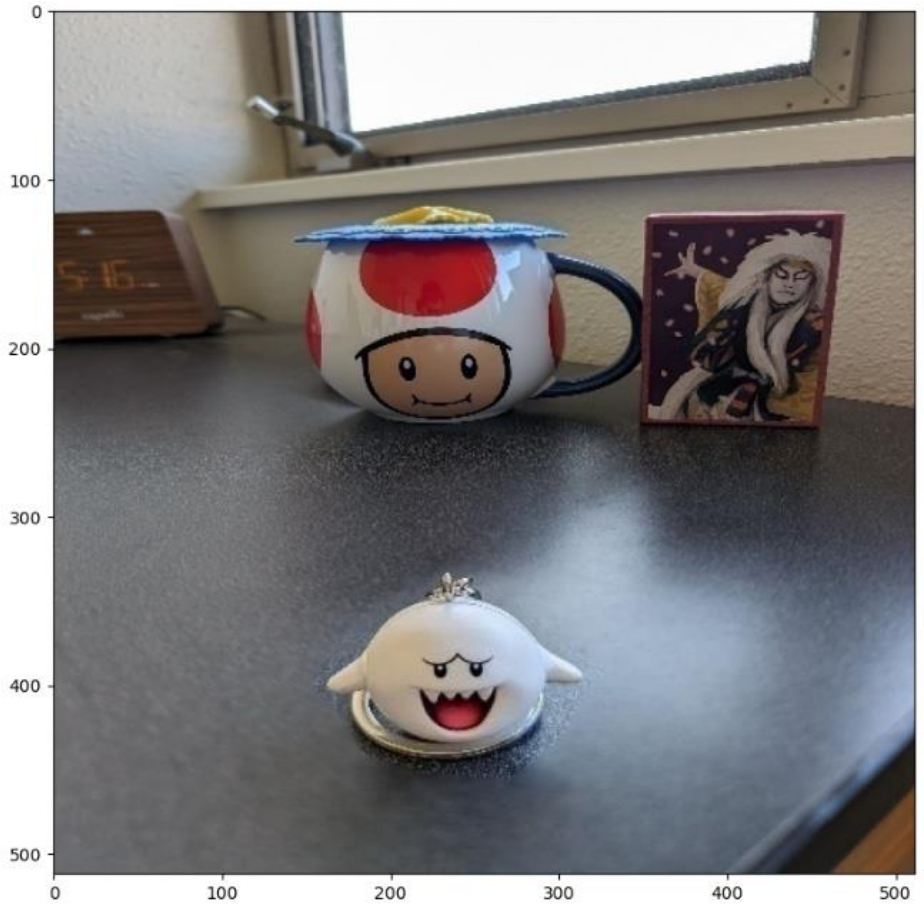


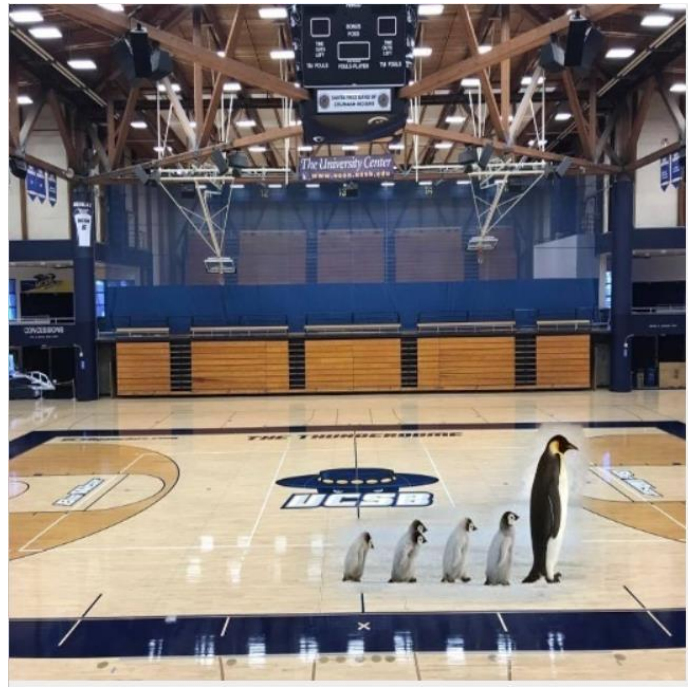
Pyramid blending

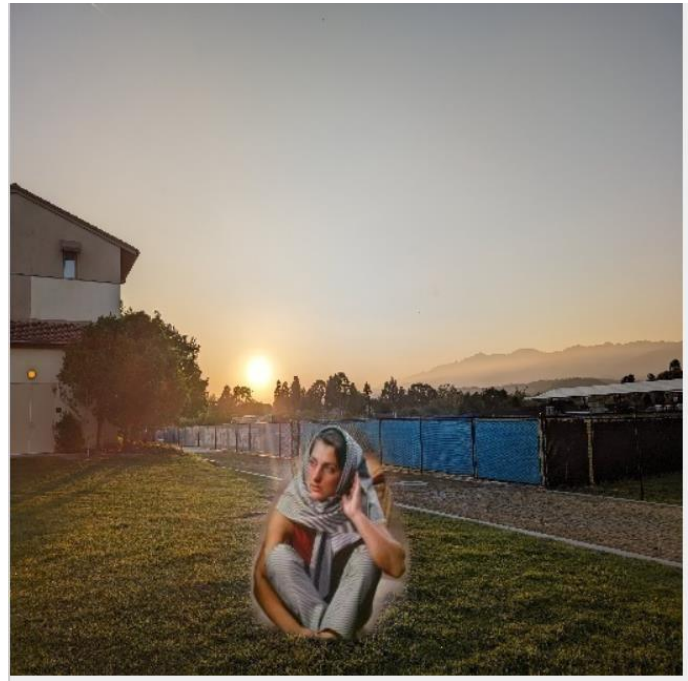
Naive



Pyramid

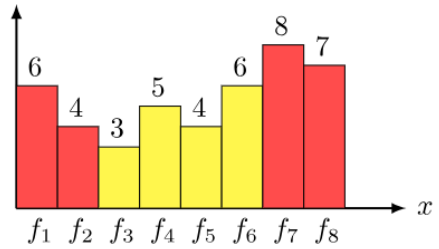



The University Center
UCSB

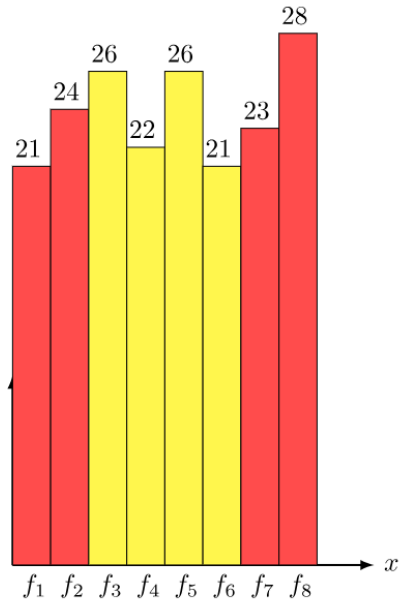


Poisson Blending

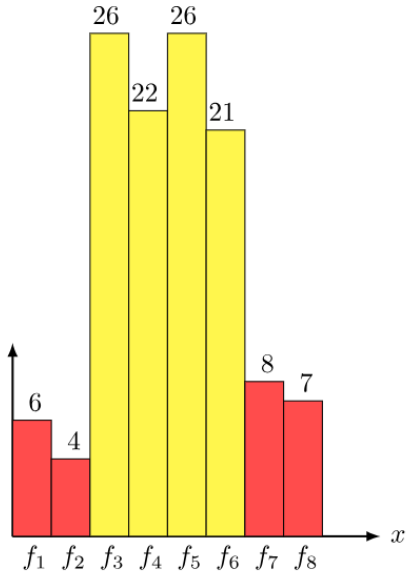
- Naive blending causes the discrepancy



Target(background)



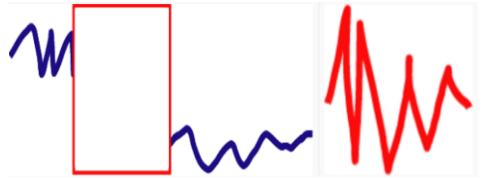
Resource

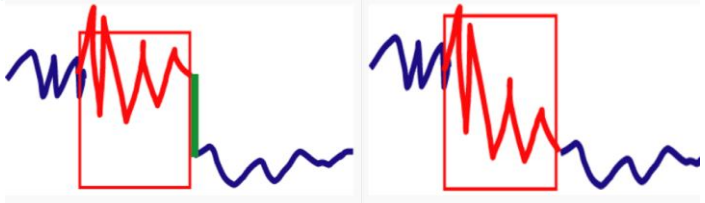


Result

- We are not working on the pixel value but the rate of change – gradients!

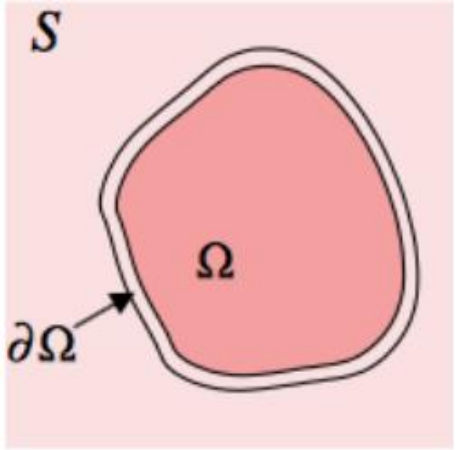
Poisson Blending





- Gradients captures the edges information
- Make the gradients inside the blending area as similar as the resource (The overall contour remains)
- The pixel values of the border remain the same as the background (The hue follows the background)
- Use the pixel value of the background image and follow the pattern of the resource’s gradients to regenerate the picture in the blending area

Poisson Blending



- It's more like we "grow" the whole image with the border

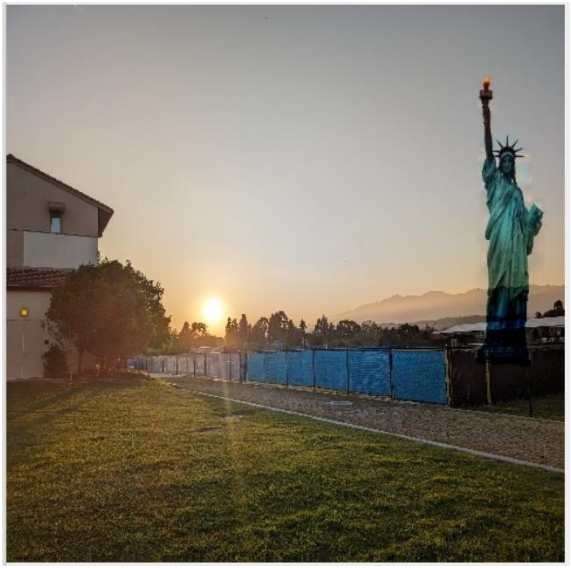
- Not like frequency domain blending by which we blend the two images in multiple frequency bands, gradient-domain blending artificially regenerates the image

Successful examples





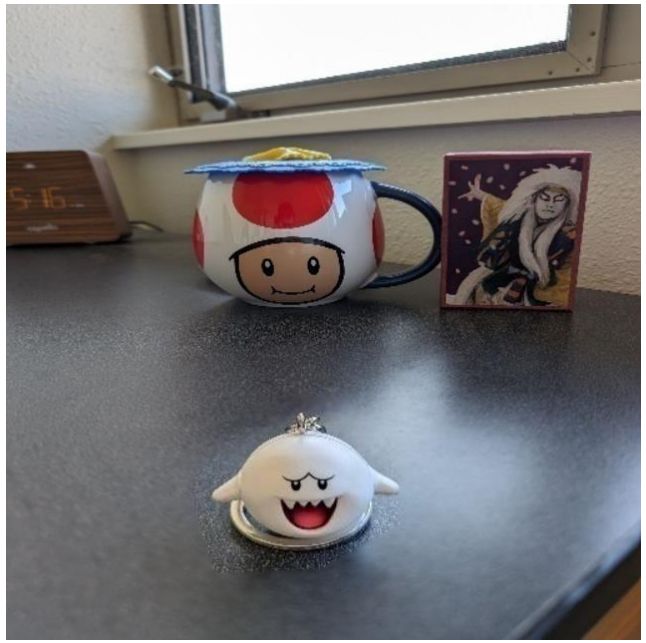


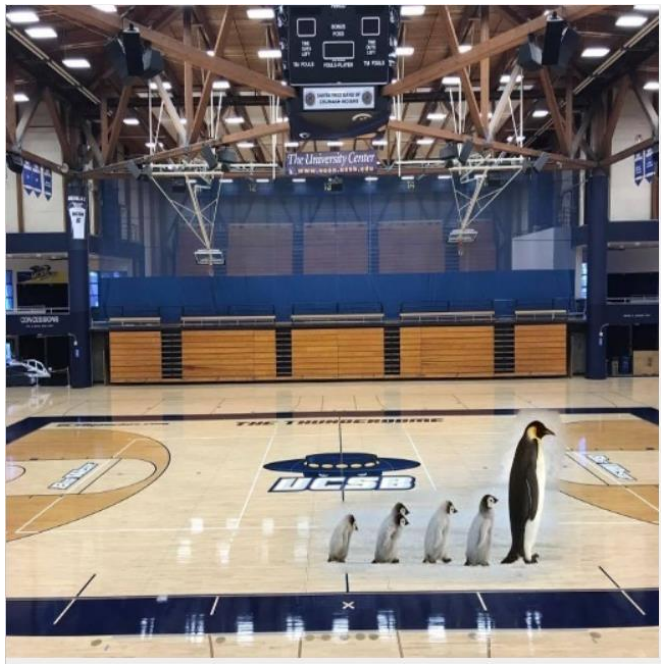



Fail examples

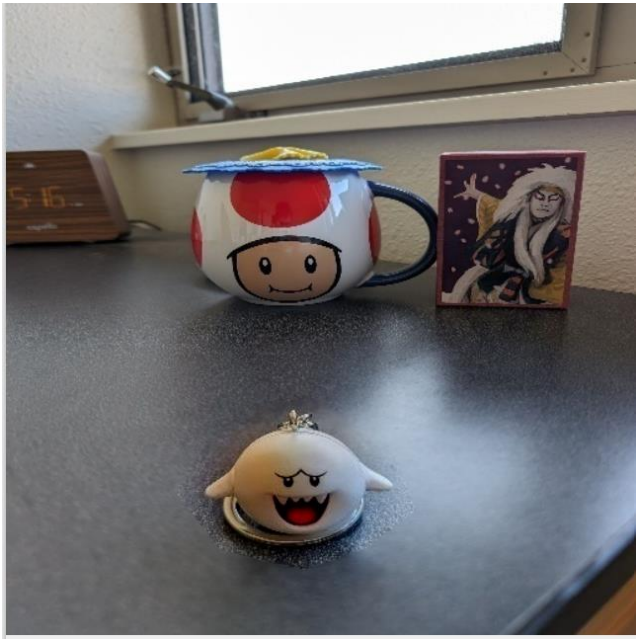
Comparison

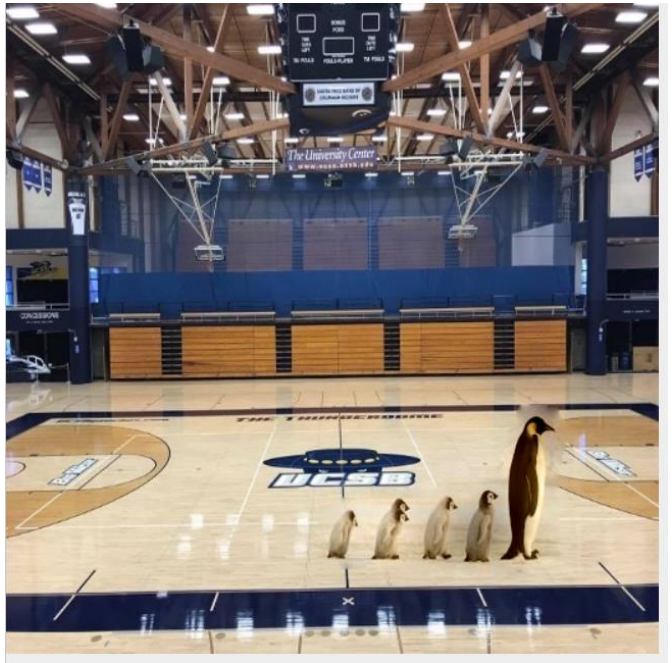
Pyramid



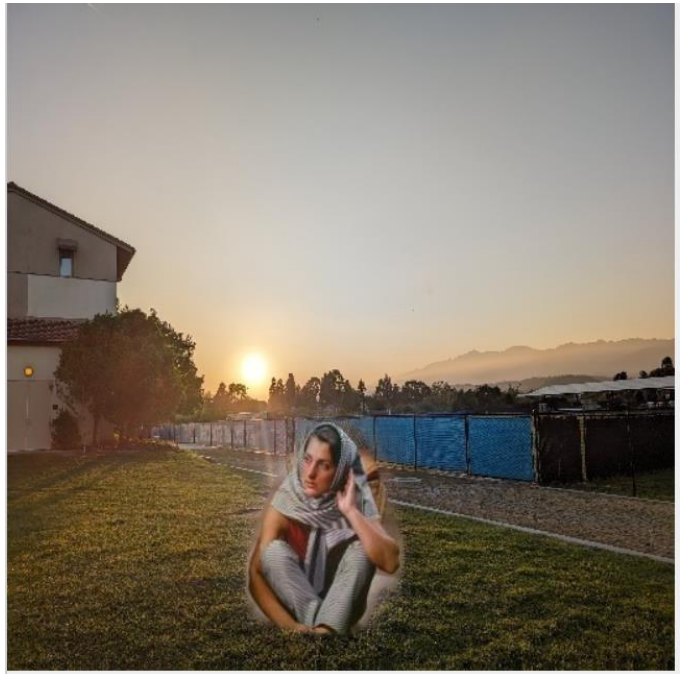


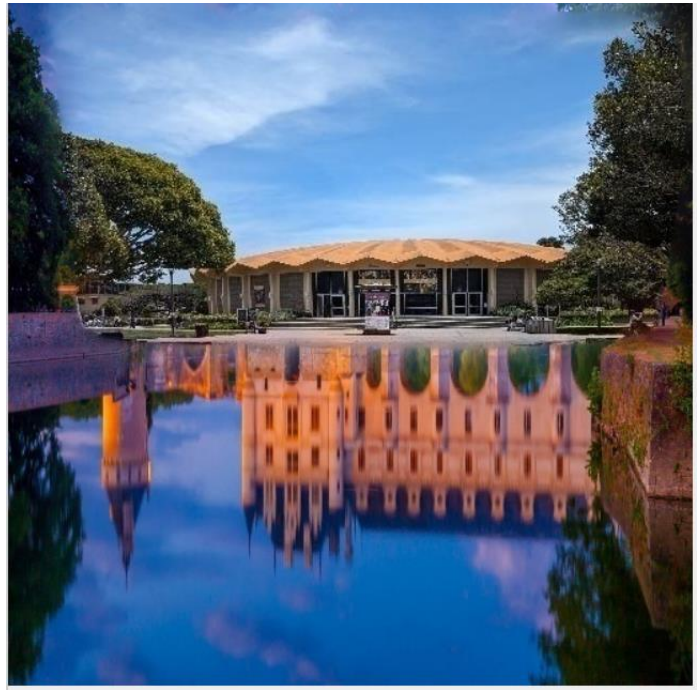
Poisson



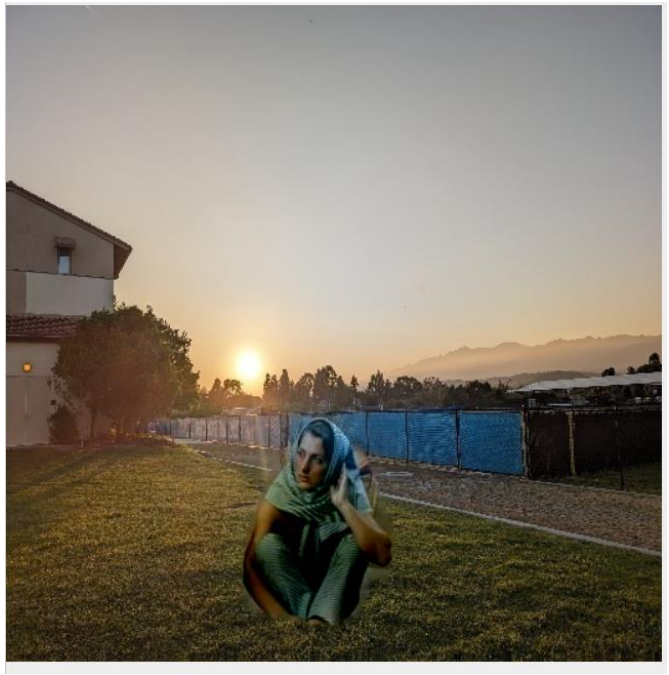


Pyramid





Poisson



Conclusion

Pyramid blending

pros:

1. Much faster

2. Not restricted to the background

Cons:

1. Need to be windowed well to get a good result

2. Does not get a good blending when the color is very different with the background

Conclusion

Poisson blending

pros:

1. Have a more natural-looking and seamless result

Cons:

1. Takes lots of time for approximation

2. Be prone to a bad result when encounters a mismatched border

3. Might accumulate noise(black in the middle) when the cropping area is too large

Code Demo