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CS 445 - Project 3: Gradient Domain Fusion

Complete the claimed points and sections below.

Total Points Claimed	**[120] / 160**

Core

1. Toy Problem	[20] / 20
2. Poisson blending	[50] / 50
3. Mixed gradients	[20] / 20
4. Quality of results / report	[10] / 10

B&W

5. Color2Gray	[20] / 20
6. Laplacian Pyramid Blending	[0] / 20
7. More gradient domain processing	[0] / 20

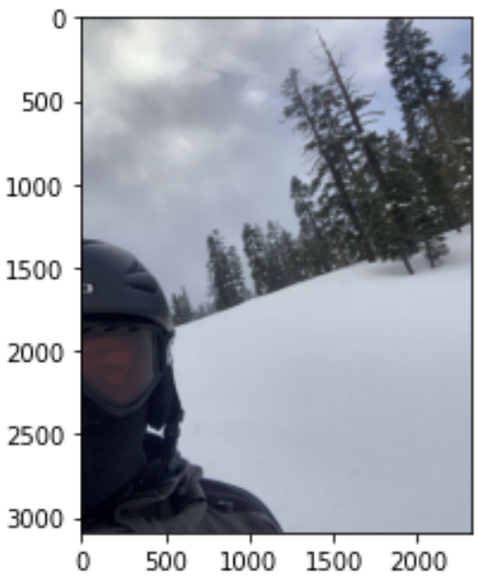
1. Toy problem

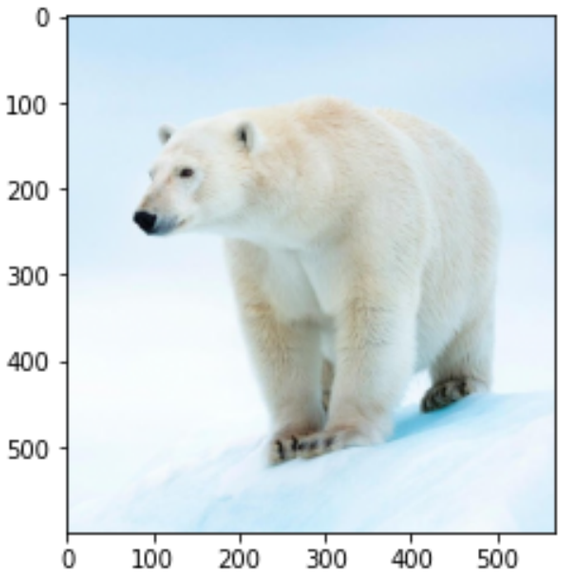
Max error is: 8.07367729466213e-06

2. Poisson blending

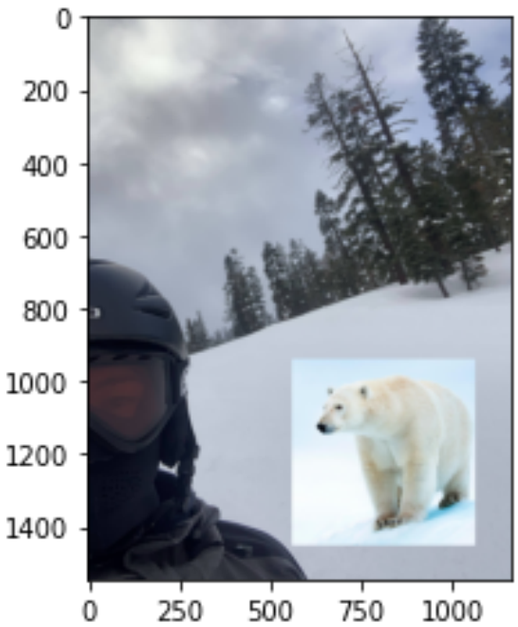
Your favorite blending result, including:

1) Background and Object images, respectively



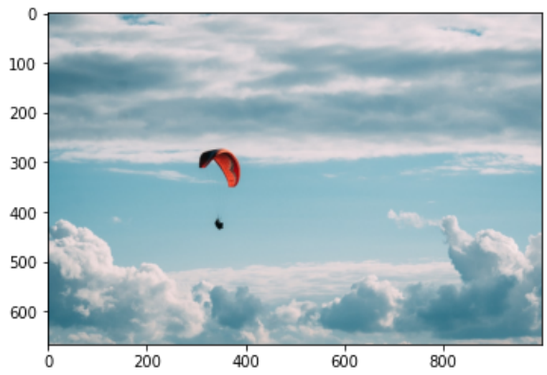


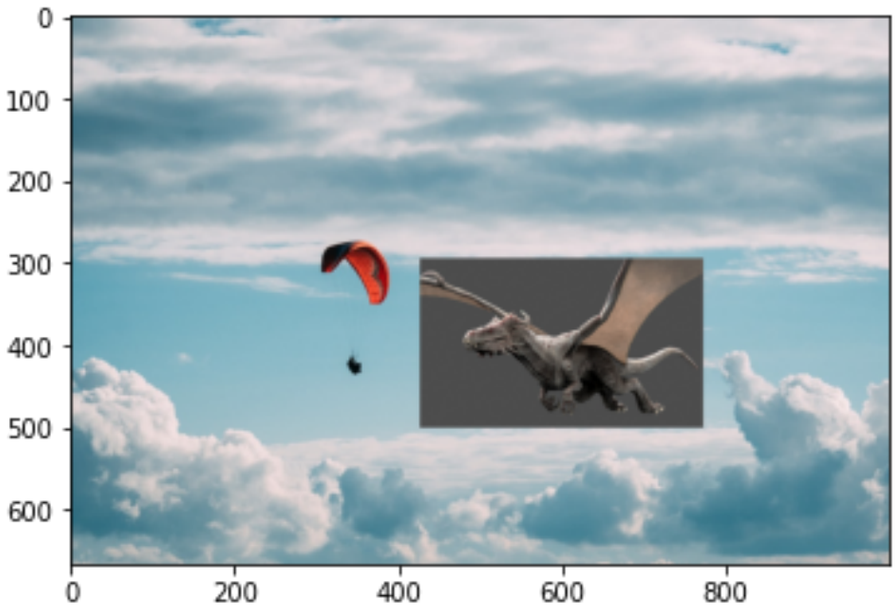
2) Pasted image with source pixels directly copied onto target background region



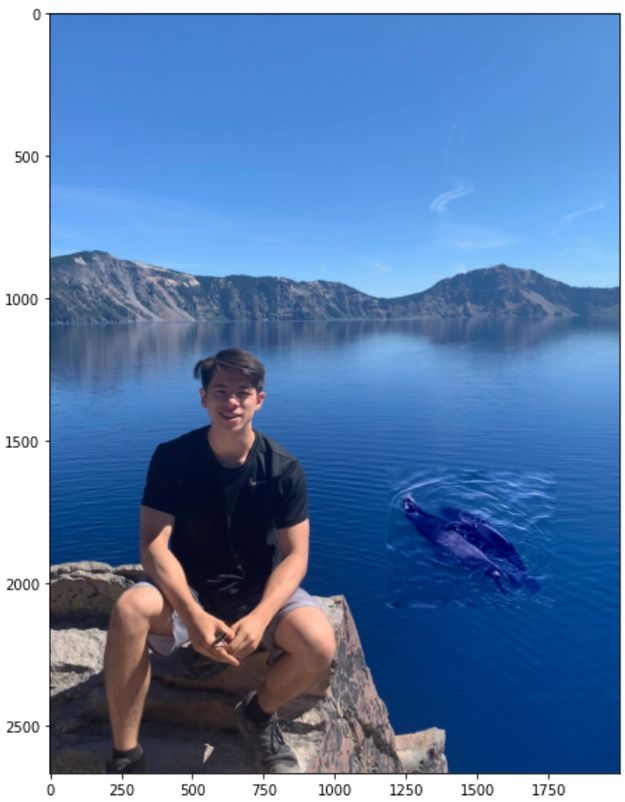
3) Final blend result. (30 pts)

At least one more good result (10 pts)





At least one failure case, where the result is bad. Explain why it doesn't work. (10 pts)

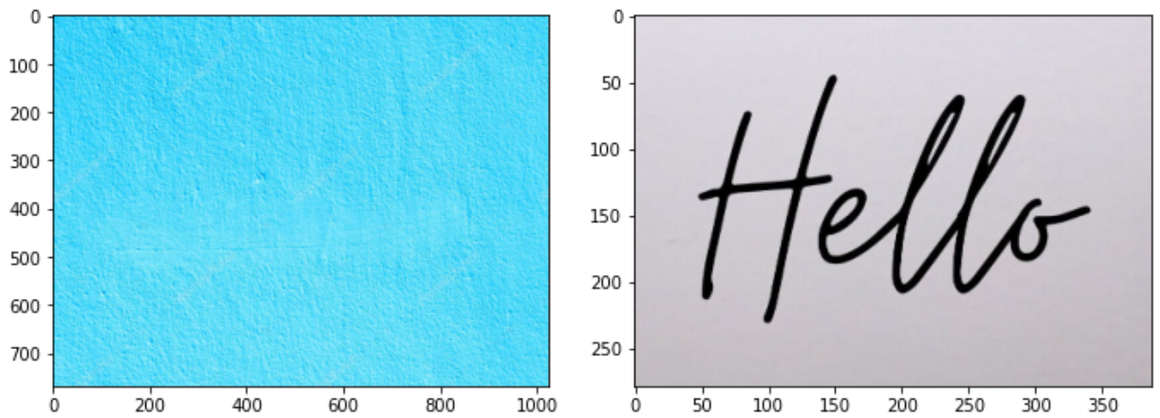


This result was poor because the object image had strong gradients surrounding the seals due to ripples in the water. Since the gradients were transferred to the output image, they don't match up nicely with the still water in the background image, making the rectangular mask outline quite apparent.. The result would have been much improved if the object image had still water surrounding the seals, or if the mask had been selected such that it very closely matched the shape of the seals. That would have been pretty tedious in google colab (without the interactive tools) so I opted to use a simple mask instead, which didn't produce the results I had hoped for.

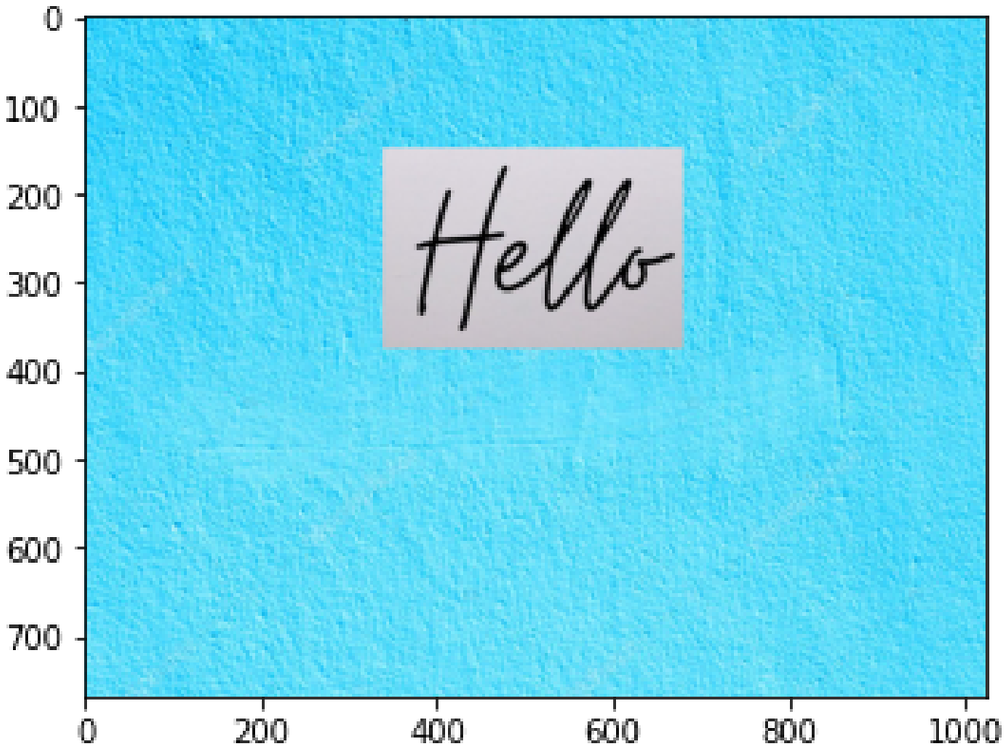
3. Mixed gradients

Using your own images (not sample images), include at least one result with:

1) Background and object images;

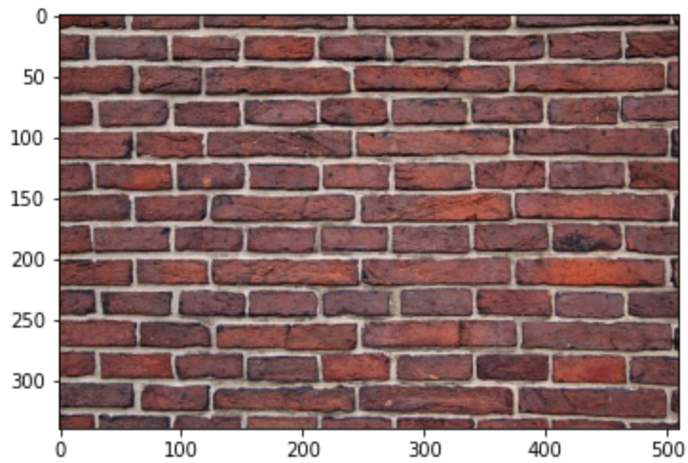


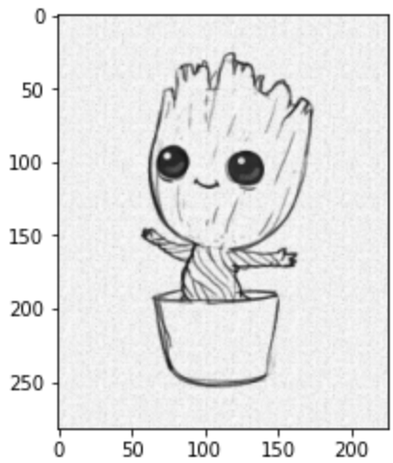
2) Pasted image with source pixels directly copied onto target background region;

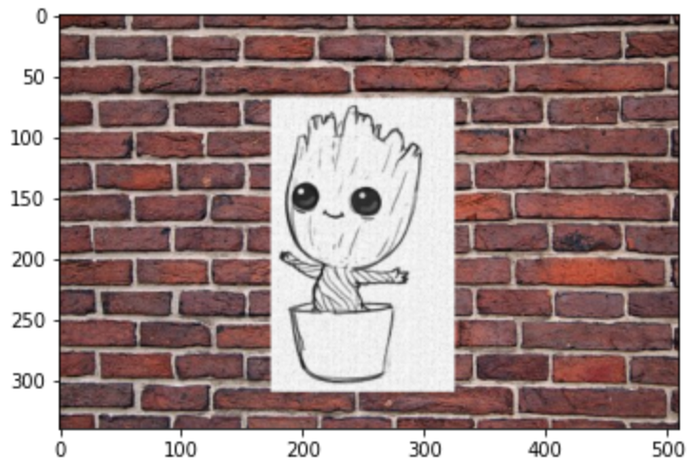


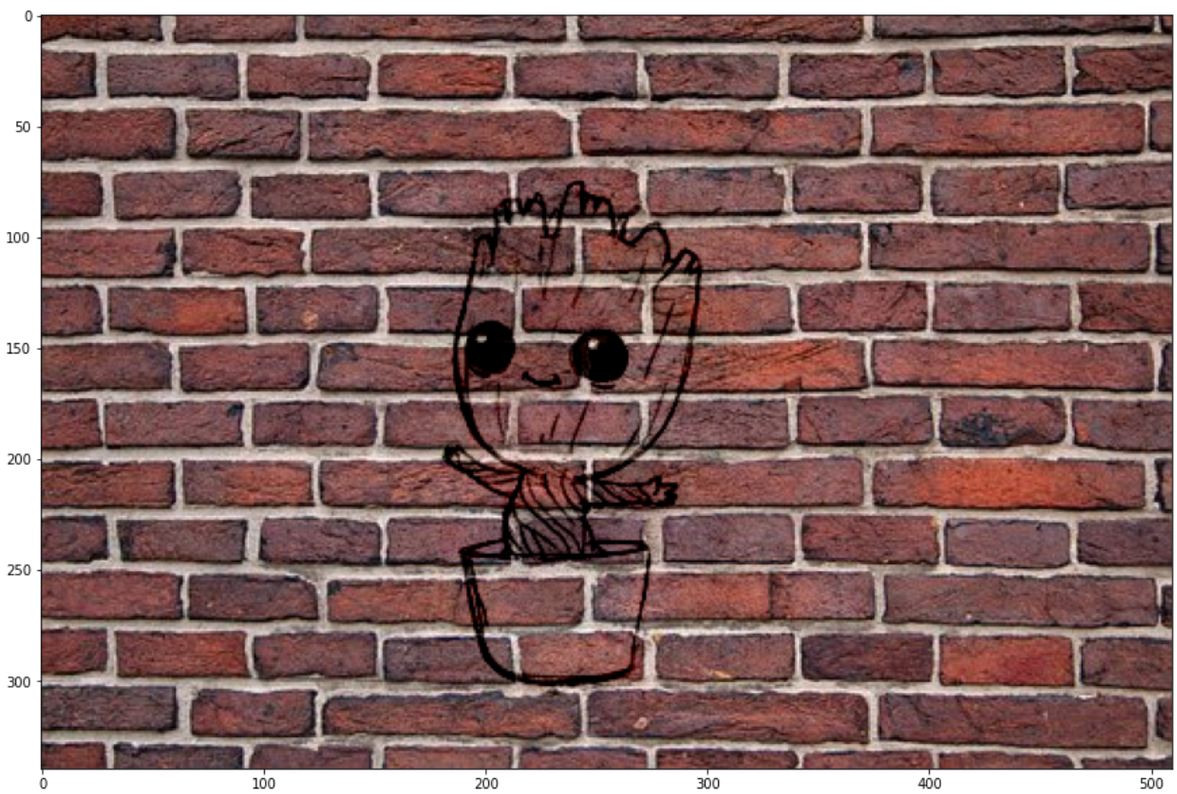
3) Final blend result.

Additional Result:







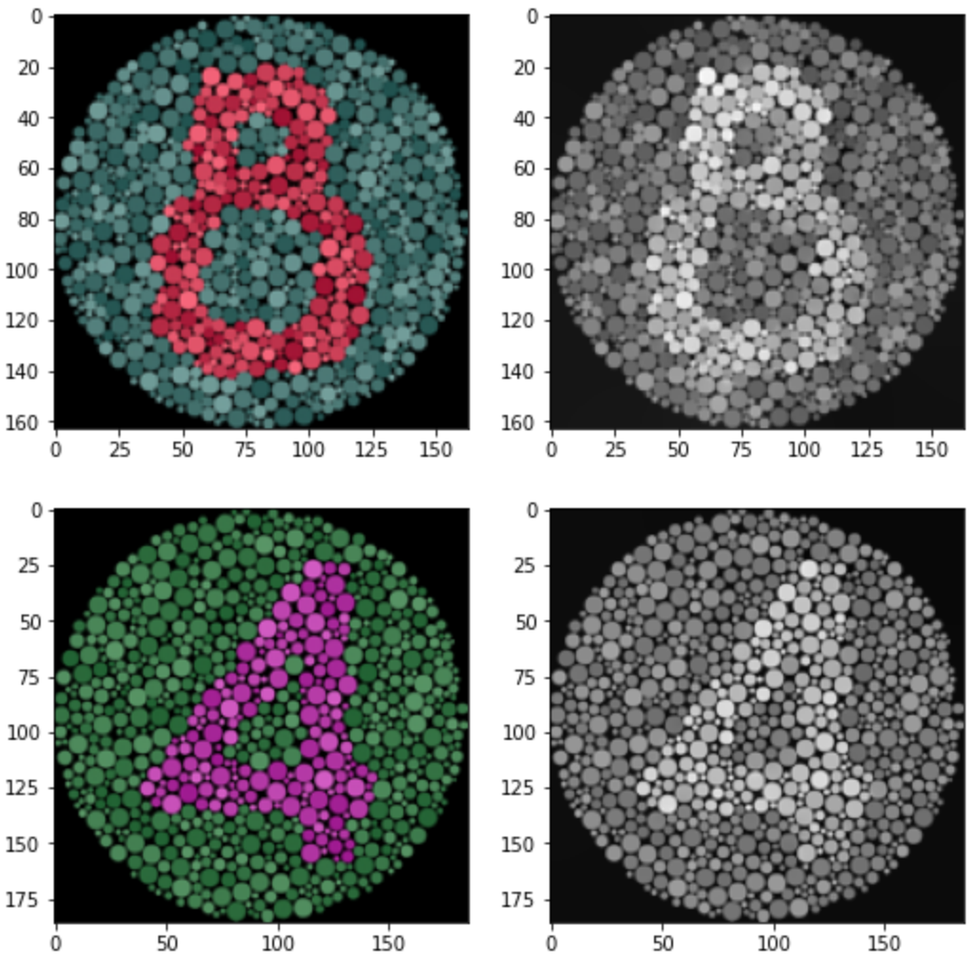


4. Quality of results / report

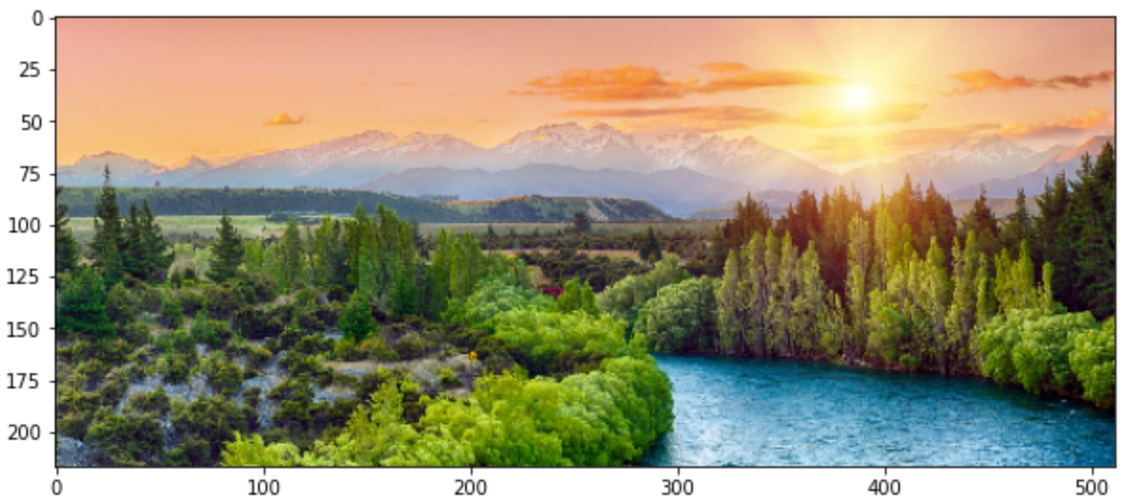
Nothing extra to include (scoring: 0=poor 5=average 10=great).

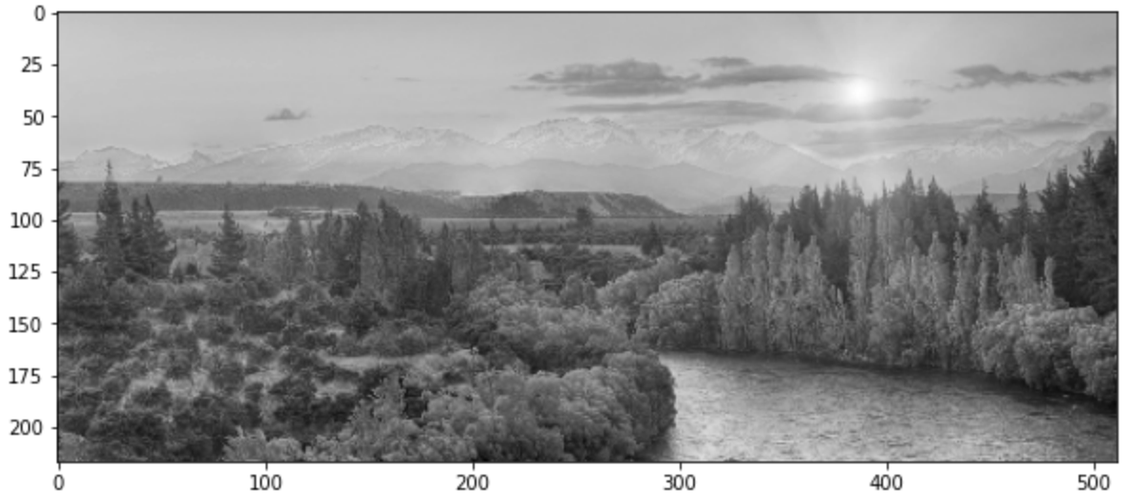
5. Color2Gray (B&W)

Color and grayscale of colorBlind8.png and colorBlind4.png, where grayscale is created by your code



Color and grayscale of one natural image, where grayscale is created by your code





Explain your method/constraints:

In order to consider gradients when creating the grayscale images, I followed the provided hint and used a combination of the toy image reconstruction and mixed gradients. Similar to the toy reconstruction, I created a set of least squares constraints that seeks to find a target image that minimizes the difference in gradients between the original and recreated image. In this grayscale algorithm, however, I implemented a mixed gradients approach. For each pixel pair in x and y the function identifies the color channel (R,G,B) with the highest magnitude gradient, and aims to minimize the difference between this gradient and the target image gradient. As a result, each pixel pair gradient in the output image closely matches the most significant corresponding gradient in the original image, maintaining gradients and thus making the 4 and 8 visible in the grayscale image produced above.

6. Laplacian Pyramid Blending (B&W)

Include

- For at least one example, compare copy-paste, poisson, and laplacian pyramid blending. Include the object and background source images, and the blended results for each method. You can use different masks for different methods.

7. More gradient domain processing applications (B&W)

Include

- Show at least one example for each method that you implement. Explain the constraints used for each method. Something relatively complex like colorization is worth full points. Simpler applications like non-photorealistic rendering can also be worth full points if multiple variations are shown or clever methods used.

Acknowledgments / Attribution

List any sources for code or images from outside sources

Wall:
https://www.inc.com/wanda-thibodeaux/how-talking-to-your-wall-will-supercharge-your-pub.html

Nature:
https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.nathab.com%2Fblog%2F&psig=AOvVaw27sAkfy6fF3VO-uDnrmB5j&ust=1666834042376000&source=images&cd=vfe&ved=0CAwQjRxqFwoTCMiyjOre_PoCFQAAAAAdAAAAABAH

Dragon:
https://www.google.com/url?sa=i&url=http%3A%2F%2Fwww.zbrushcentral.com%2Ft%2Fflying-dragon%2F354049&psig=AOvVaw3vnxuacug5IAT7QyLC9pC2&ust=1666837184829000&source=images&cd=vfe&ved=0CAwQjRxqFwoTCLiuncbq_PoCFQAAAAAdAAAAABAD

Groot:
https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.pinterest.com%2Fshrinkinggrandma%2Fbaby-groot-drawing%2F&psig=AOvVaw1R6ZAr8kQpwehMNHDDt_jq&ust=1666837229181000&source=images&cd=vfe&ved=0CAwQjRxqFwoTCPiQ0Nvq_PoCFQAAAAAdAAAAABAD

Polar Bear:
https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.worldwildlife.org%2Fspecies%2Fpolar-bear&psig=AOvVaw2WRAa76vLaRZVPgfYBggtk&ust=1666837255243000&source=images&cd=vfe&ved=0CAwQjRxqFwoTCJjZy-bq_PoCFQAAAAAdAAAAABAD

Parachuter:
https://www.google.com/url?sa=i&url=https%3A%2F%2Funsplash.com%2Fs%2Fphotos%2Fparachute&psig=AOvVaw0XkXdhrpymkLsIEoN395Mw&ust=1666837270490000&source=images&cd=vfe&ved=0CAwQjRxqFwoTCJjggfDq_PoCFQAAAAAdAAAAABAH

Brick Wall:
https://www.google.com/url?sa=i&url=https%3A%2F%2Fpixabay.com%2Fimages%2Fsearch%2Fwall%2F&psig=AOvVaw3A9C2TU883_tryTabKje9X&ust=1666837367435000&source=images&cd=vfe&ved=0CAwQjRxqFwoTCNDc95_r_PoCFQAAAAAdAAAAABAD

Blue Wall:
https://www.google.com/url?sa=i&url=https%3A%2F%2Fdepositphotos.com%2F31244613%2Fstock-photo-blue-wall-background.html&psig=AOvVaw14-HYmJ9nRTLWxpY3ddQ6L&ust=1666837441921000&source=images&cd=vfe&ved=0CAwQjRxqFwoTCPCTjcDr_PoCFQAAAAAdAAAAABAD

“Hello” Whiteboard
https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.ebay.com%2Fitm%2F401609387299&psig=AOvVaw2sNHYwVtDuShEMt6Y9QhNT&ust=1666837542005000&source=images&cd=vfe&ved=0CAwQjRxqFwoTCJDhxO7r_PoCFQAAAAAdAAAAABAD