# **Image Inpainting**

## Image Reconstruction

A close up of the moon

Description automatically generated with medium confidence A close up of the moon

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Description automatically generated with medium confidence

Figure 1: Results of Reconstruction

The 5 images above were reconstructed using second derivatives of our source image. From left to right, the images have the following properties:

1. First image: This is a reconstruction of the ground truth and has an error of 2.3219e-13
2. Second image: This image is globally brighter and has an error of 3.0191e-13
3. Third image: This image is brighter on the left side and has an error of 3.6543e-13
4. Fourth image: This image is brighter on the bottom side and has an error of 3.6579e-13
5. Fifth Image: This image is brighter in it’s bottom right corner and has an error of 2.8544e-13

## Poisson Blending

1)

### A picture containing sky, outdoor, grass, sunset Description automatically generated A white airplane in the sky Description automatically generated with low confidence

Figure 2: Background and Source Images

The images shown above in figure 2 were chosen as background and source images for Poisson blending. The following images (Figure 3 and Figure 4) show the cloning and blended images.

A picture containing sky, outdoor, grass, sunset

Description automatically generated

Figure 3: Cloning Image

A helicopter flying over a field

Description automatically generated with medium confidence

Figure 4: Image after Poisson Blending

2)

A person surfing on the waves

Description automatically generated with low confidence A whale jumping out of the water

Description automatically generated

Figure 5: Background and Source Images

A picture containing water, outdoor, black, ocean

Description automatically generated

Figure 6: Cloning image

A picture containing water, outdoor, ocean, mammal

Description automatically generated

Figure 7: Image after Poisson Blending

3)

A city next to a body of water

Description automatically generated with medium confidenceA picture containing nature, cloud

Description automatically generated

Figure 8: Background and Source Images

A city next to a body of water

Description automatically generated with medium confidence

Figure 9: Cloning image

A picture containing outdoor, mountain, nature, city

Description automatically generated

Figure 10: Image after Poisson Blending

**Notes:**

Poisson Blending code is not optimized due to lack of time. Several lines of code can be reduced by making helper functions and function calls. As a result, the code runs very slowly on larger pics with large amounts of pixels. The case of a mask boundary pixel having 3 out of mask neighbours is dealt by just equalling the pixel to a constant value in the target image.