

Image Blending using Image Pyramids

1. Overview of the Problem:

Image blending is a technique used to combine two different images in a seamless manner, creating a composite image that appears natural and cohesive. The challenge lies in achieving a blend that does not show abrupt transitions between the source images. For this project, we employ image pyramids, specifically Gaussian and Laplacian pyramids, to facilitate a smooth transition between images.

2. Approach and Methodology:

Our approach utilizes the concept of image pyramids for blending two images:

Loading Images and Mask: We start by loading two source images (a jet and clouds) and a mask image.

Creating Gaussian Pyramids: For each image and the mask, we create a Gaussian pyramid. This pyramid is a series of progressively reduced images, each lower level having reduced resolution and details.

Forming Laplacian Pyramids: From the Gaussian pyramids, we generate Laplacian pyramids for the two source images. The Laplacian pyramid captures the image details lost between levels in the Gaussian pyramid.

Blending Process: We blend each level of the Laplacian pyramids according to the mask image at the corresponding Gaussian level. This ensures a smooth transition between the images.

Reconstruction: The final step involves reconstructing the blended image from the blended Laplacian pyramid by expanding and adding the pyramid levels.

Throughout the process, we use OpenCV for image processing and matplotlib for displaying images.

3. Results and Observations:

Gaussian Pyramid Visualization: For both source images and the mask, we observed the resolution reduction and smoothing at each level of the Gaussian pyramid.

Laplacian Pyramid Visualization: The Laplacian pyramids highlighted the detailed differences between successive Gaussian levels, essential for capturing the unique features of each source image.

Blended Pyramid Levels: At each level of the blended pyramid, the images showed a gradual and natural transition, indicating the effectiveness of our blending technique.

Reconstructed Image: The final reconstructed image presented a blend of the jet and clouds, without abrupt transitions.

4. Comments:

The project demonstrates the efficacy of image pyramids in image blending. The use of Gaussian and Laplacian pyramids enables a gradual transition between images, leading to a natural-looking blend. This technique can be particularly useful in applications like photo editing, computer graphics, and visual effects where seamless image integration is crucial.

5. Images:

(Here, you would include the images generated at each step: Gaussian pyramid levels, Laplacian pyramid levels, blended pyramid levels, and the final reconstructed image.)

Gaussian Level 1



Gaussian Level 2



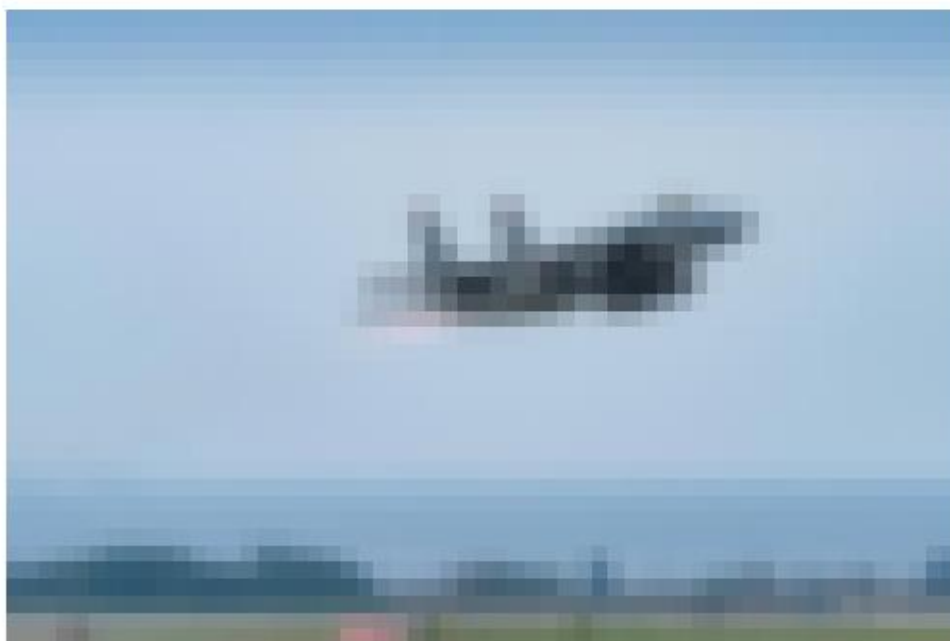
Gaussian Level 3



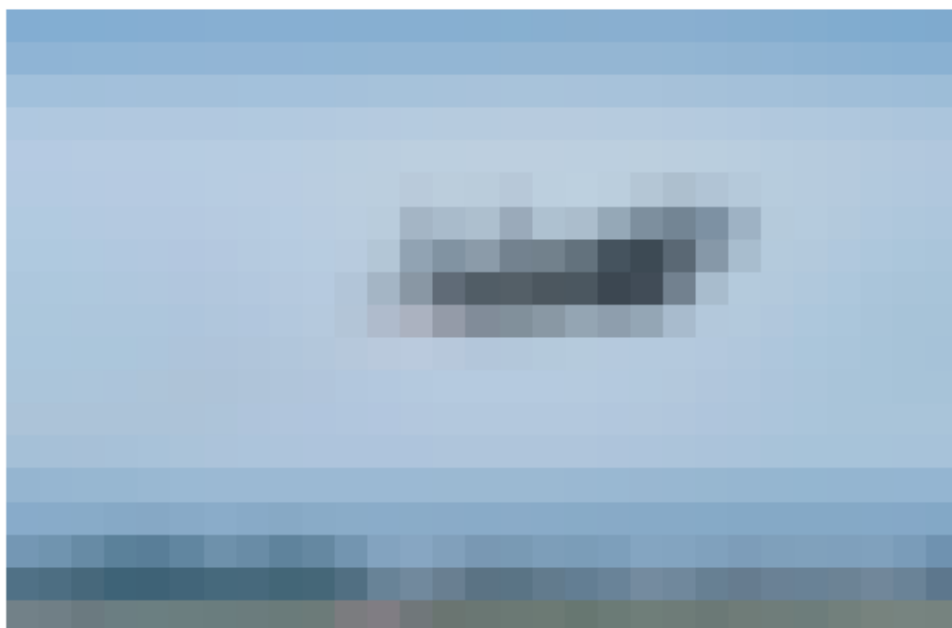
Gaussian Level 4



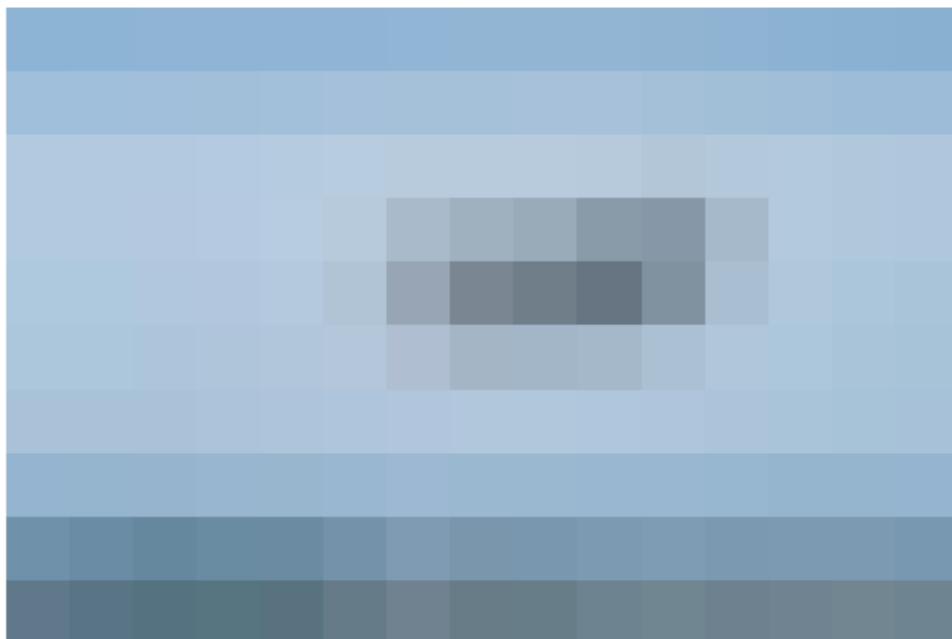
Gaussian Level 5



Gaussian Level 6



Gaussian Level 7



Gaussian Level 1



Gaussian Level 2



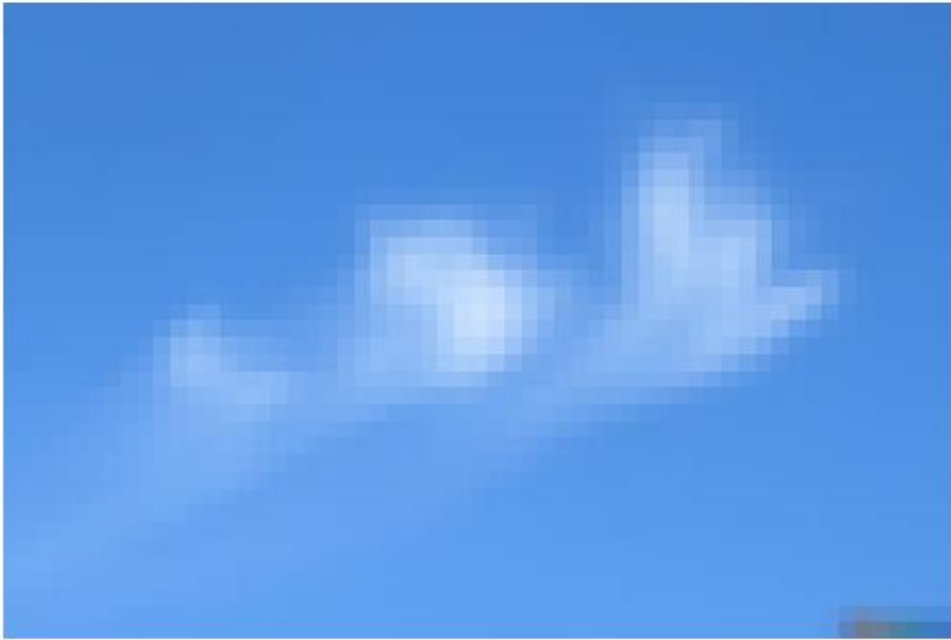
Gaussian Level 3



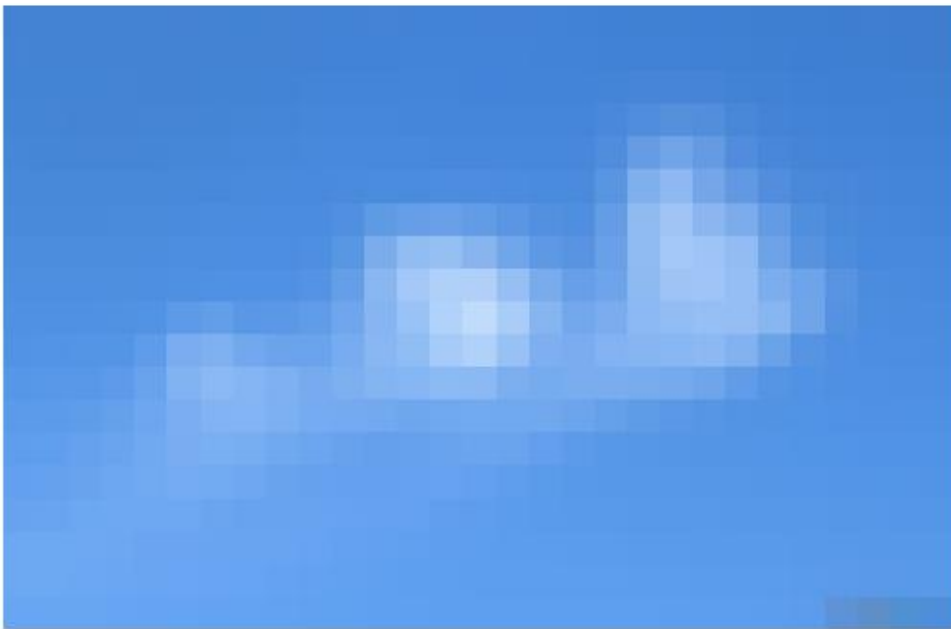
Gaussian Level 4



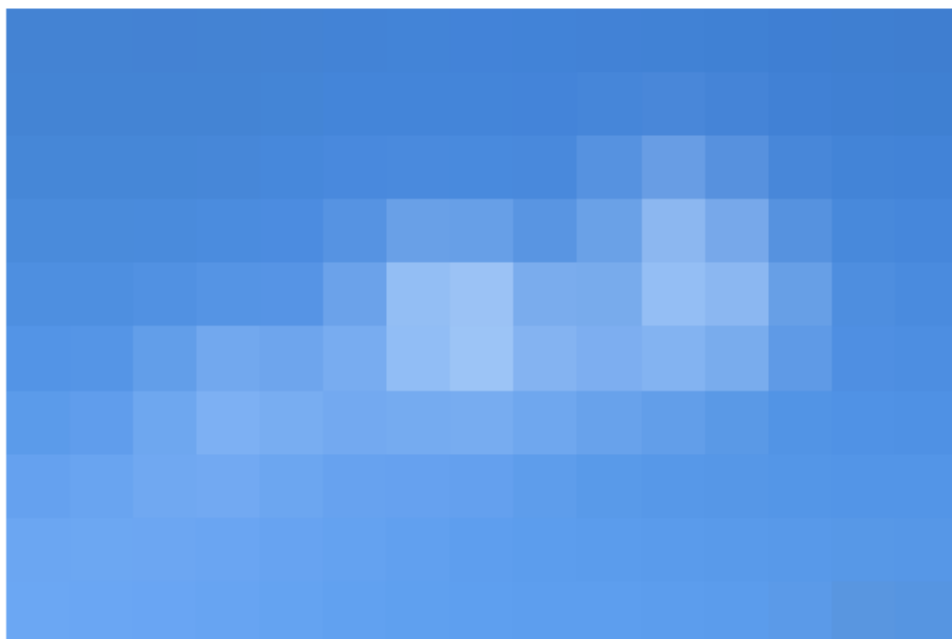
Gaussian Level 5



Gaussian Level 6



Gaussian Level 7



Gaussian Level 1



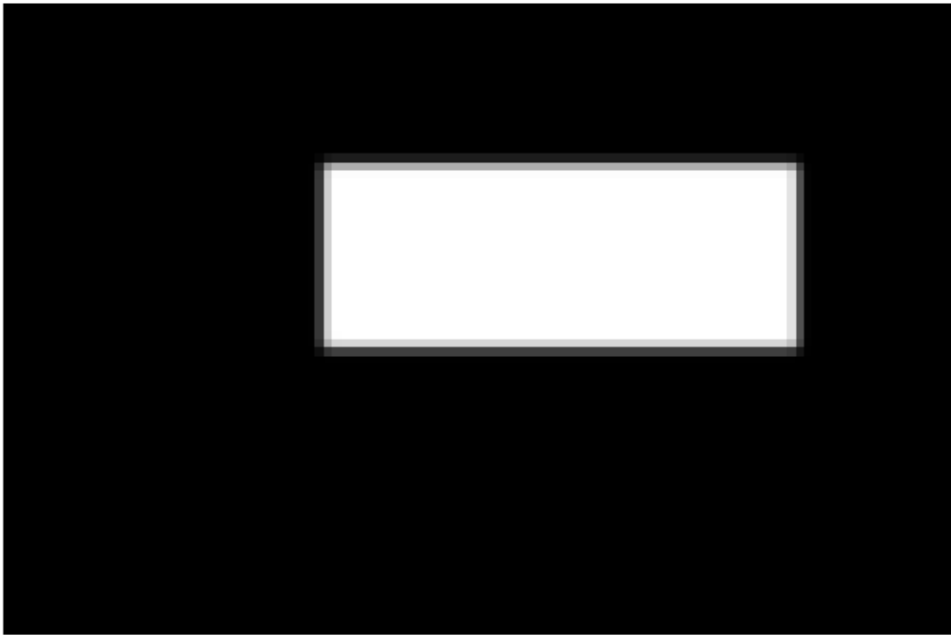
Gaussian Level 2



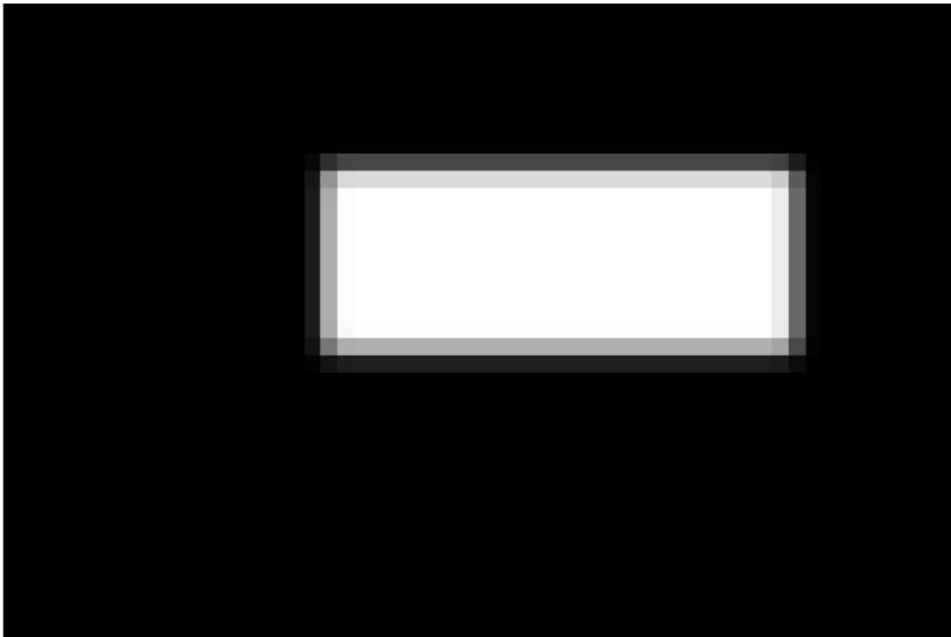
Gaussian Level 3



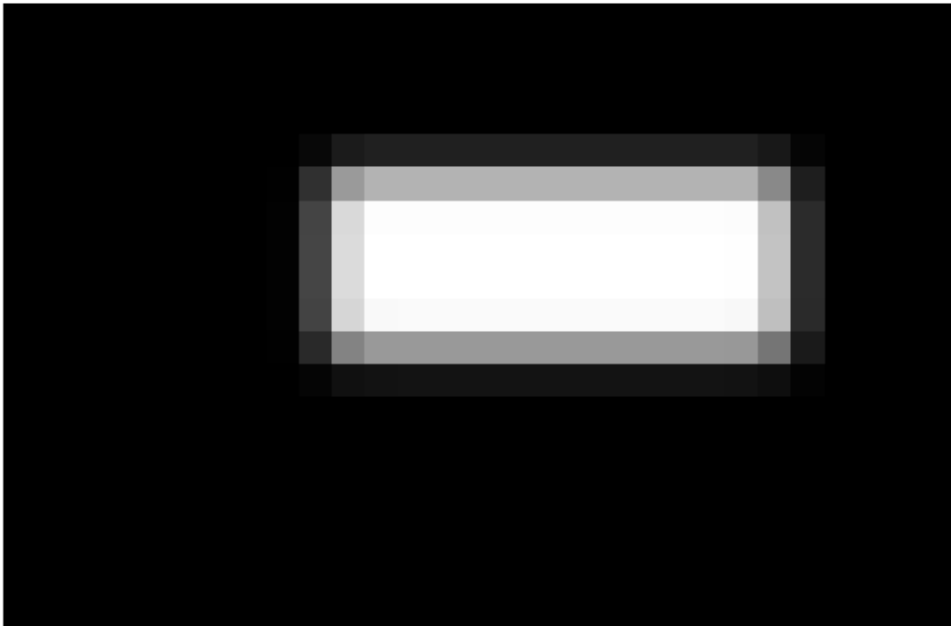
Gaussian Level 4



Gaussian Level 5



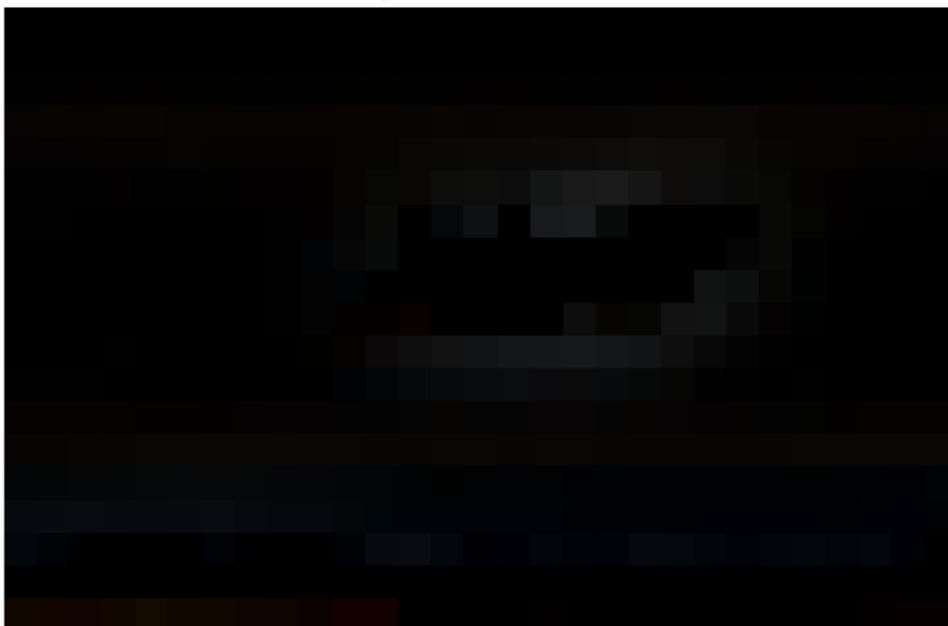
Gaussian Level 6



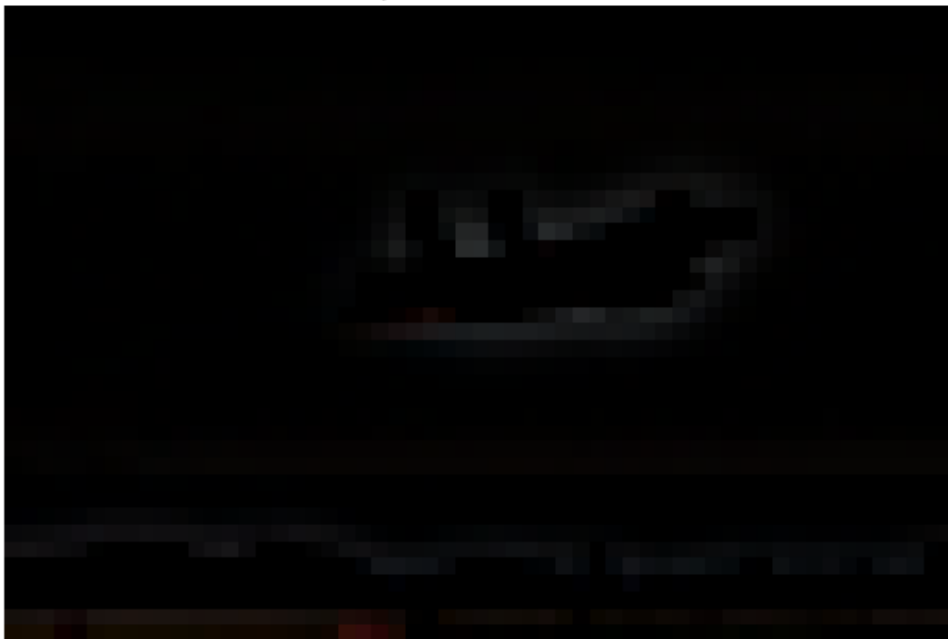
Gaussian Level 7



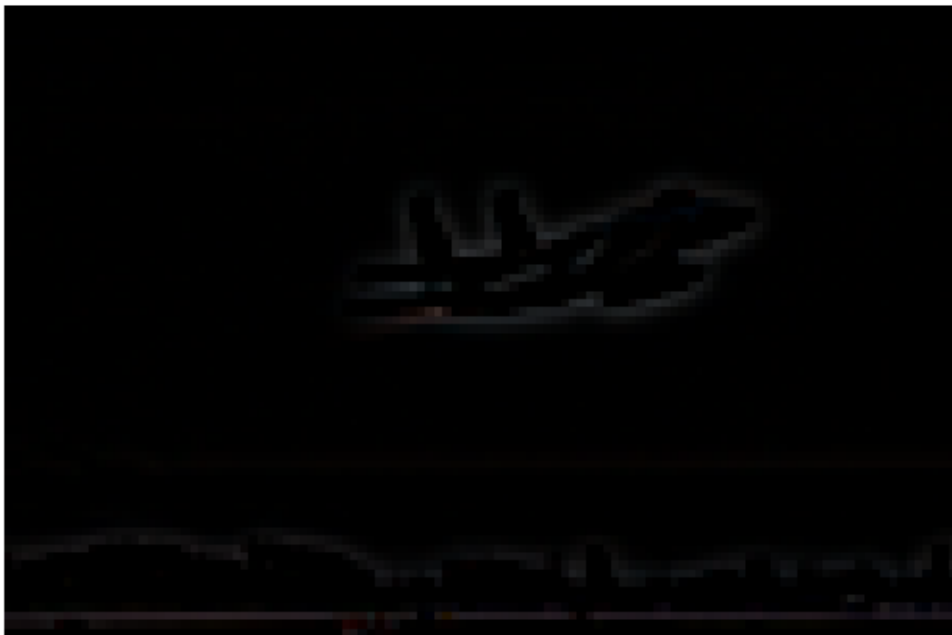
Laplacian Level 1



Laplacian Level 2



Laplacian Level 3



Laplacian Level 4



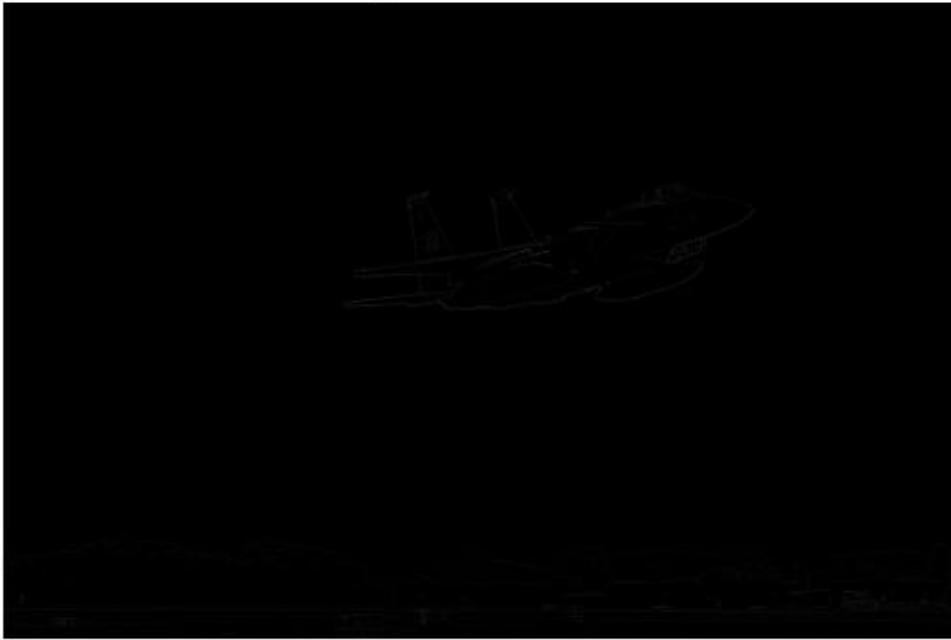
Laplacian Level 5



Laplacian Level 6



Laplacian Level 7



Laplacian Level 1



Laplacian Level 2



Laplacian Level 3



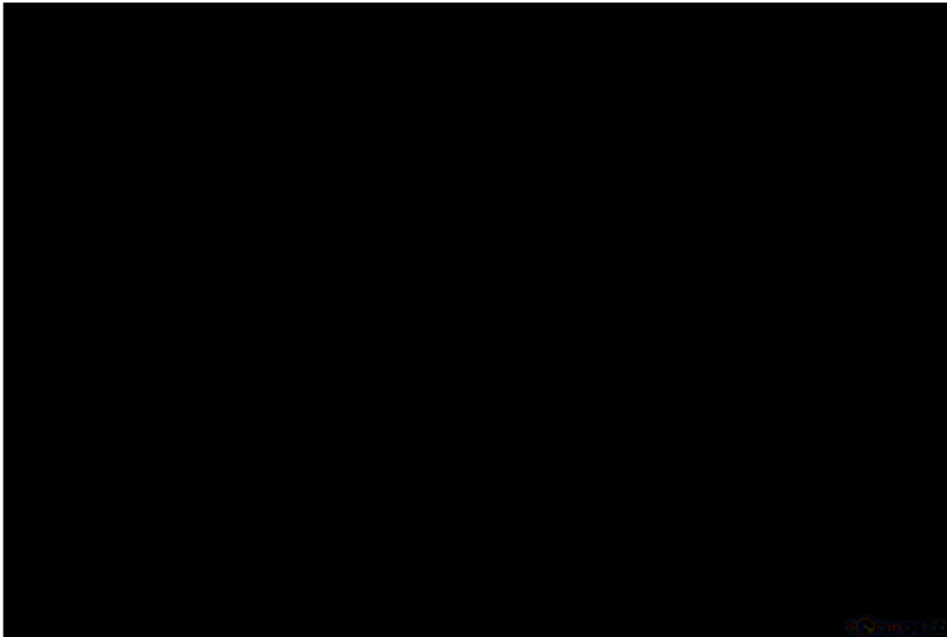
Laplacian Level 4



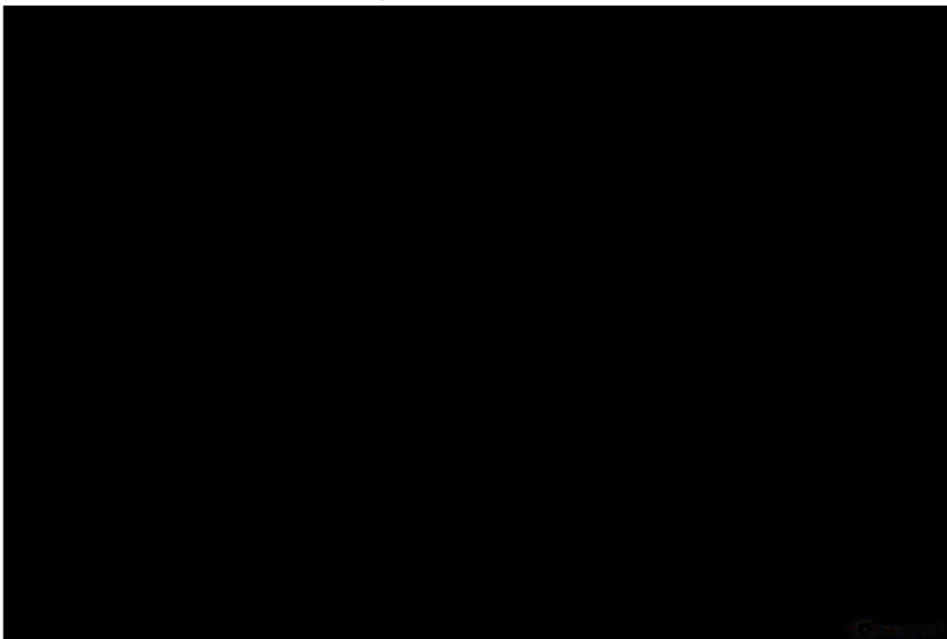
Laplacian Level 5



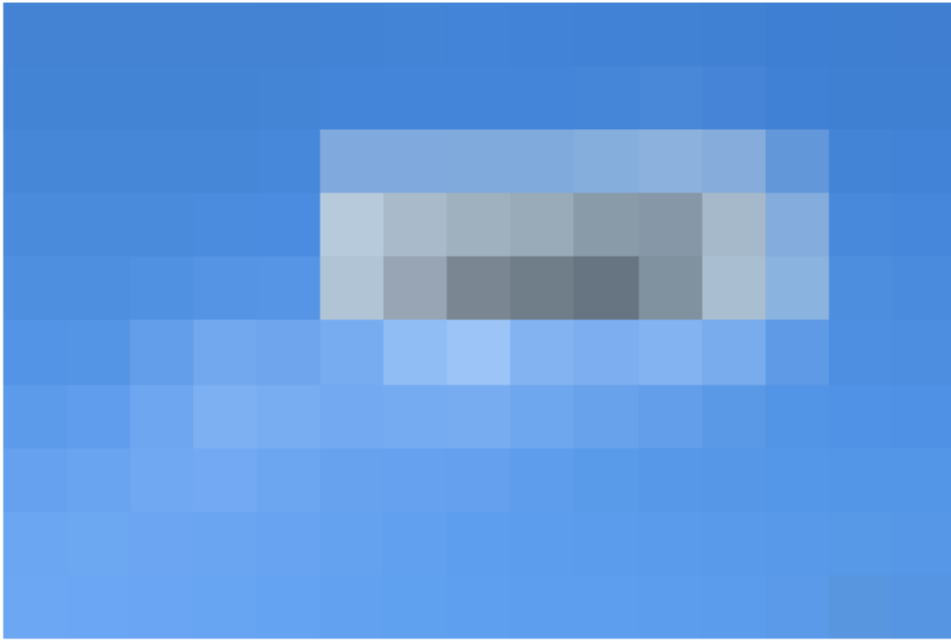
Laplacian Level 6



Laplacian Level 7



Blended Level 1



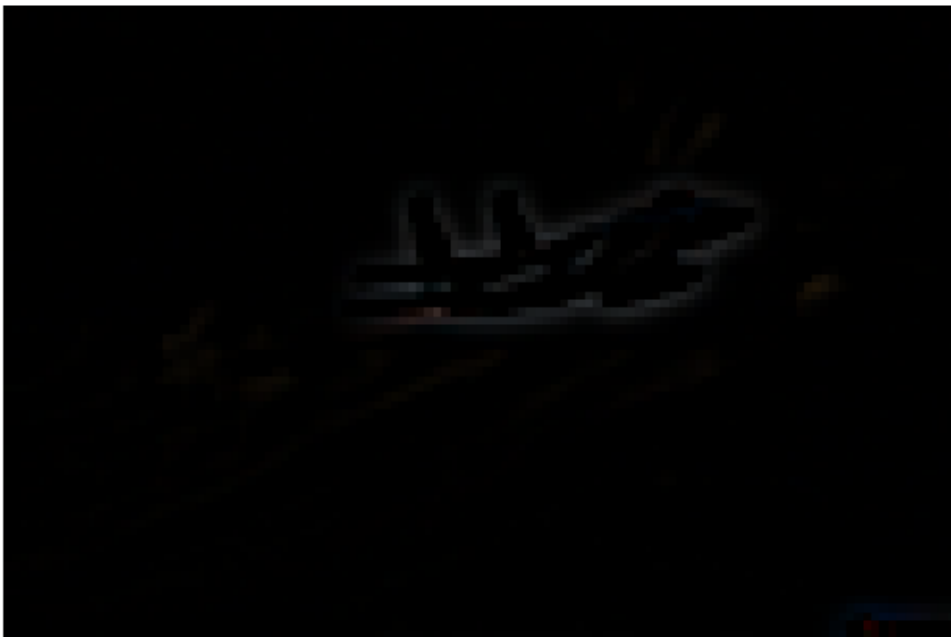
Blended Level 2



Blended Level 3



Blended Level 4



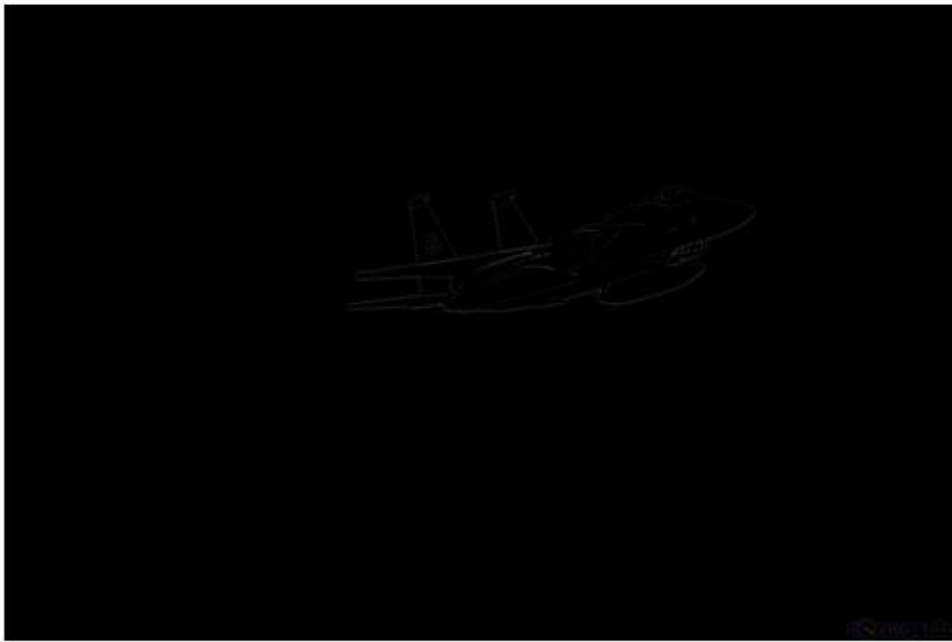
Blended Level 5



Blended Level 6



Blended Level 7



Blended Level 8



Reconstructed Image

