AIN432 Assignment3

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1 Introduction

Image blending is a technique in which two or more images are combined together to create a new, composite image. This can be done in various ways, such as by blending the colors or tones of the images together, or by overlaying one image on top of another with varying levels of transparency. Image blending can be used for a variety of purposes, such as to create special effects, to combine multiple images into a single composite image, or to create a seamless transition between two images.

2 Image Blending Techniques

There are several techniques that can be used for image blending. Some common techniques include:
1- Alpha blending, in which one image is overlaid on top of another with varying levels of transparency. This can be used to create a smooth transition between two images, or to combine multiple images into a single composite image.
2- Color blending, in which the colors of the images are combined together to create a new, composite color. This can be done using various techniques, such as averaging the colors of the images together, or using a weighted average to give more importance to certain colors.
3- Tone blending, in which the tones (or luminance values) of the images are combined together to create a new, composite tone. This can be used to create special effects, such as merging a bright image with a dark image to create a high-contrast composite image.
4- Pyramids (Laplacian and Gaussian), in which the images are resampled at multiple scales, and the resulting images are blended together using one of the above techniques. This can be used to create smooth transitions between images at different scales, such as when zooming in or out on an image.
In this assignment, image blending was applied using Laplacian and Gaussian pyramids.

3 Image Blending Using Pyramids

3.1 Detailed Information About The Pyramid Technique

Image blending using Gaussian and Laplacian pyramids is a technique in which two or more images are combined together to create a new, composite image. In this technique, each image is first decomposed into a pyramid of sub-images using both Gaussian and Laplacian pyramids. The Gaussian pyramid is used to represent the lower-frequency, smooth variations in the image, while the Laplacian pyramid is used to represent the higher-frequency, detailed variations in the image.

To blend the two images, the Gaussian and Laplacian pyramids for each image are combined by taking the weighted average of each corresponding level of the pyramids, with the weights determined by the desired level of blending. The final blended image is then reconstructed by collapsing the resulting pyramid.

This technique can be useful for blending images because it allows for the preservation of both the smooth variations and the detailed variations in the resulting blended image. It also allows for a smooth transition between the two

images, which can be useful for creating seamless composites or for creating special effects. Additionally, using both Gaussian and Laplacian pyramids for image blending can make the blending process more flexible and versatile, since each pyramid can be blended independently to control the level of detail and smoothness in the final blended image.

3.2 Application Steps of The Pyramid Method

1. Build Laplacian pyramids for each image.
2. Build a Gaussian pyramid for each region mask.
3. Blend each level of pyramid using region mask from the same level

$$L_{12}^i = L_1^i.R^i + L_2^i.(1 - R^i)$$

$$R^i : Region\ mask$$

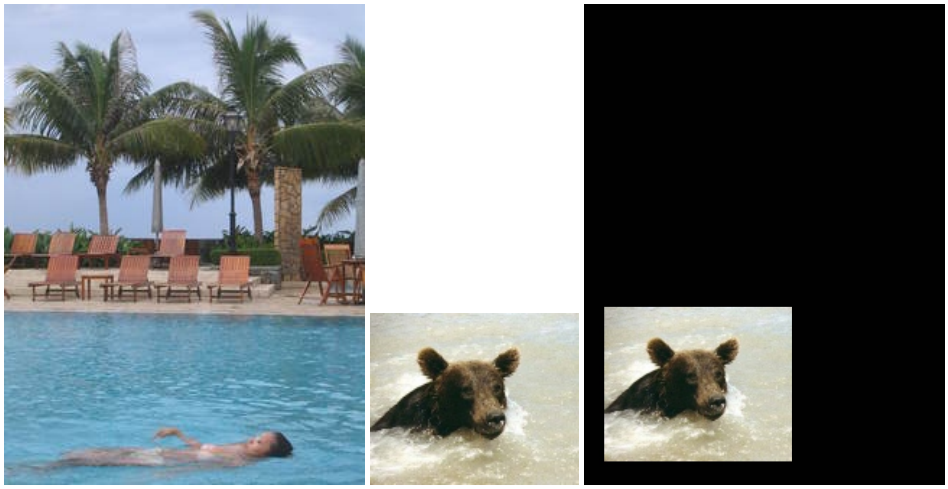
$$L_1 : Laplacian\ pyramid\ of\ first\ image$$

$$L_2 : Laplacian\ pyramid\ of\ second\ image$$

4. Collapse the pyramid to get the final blended image.

3.3 Discuss Result Images

Good Result



Source image original target image Edited target image

Result Images

Pyramid levels=3 Pyramid levels=7 Pyramid levels=10

Bad Result

Source image Target image

Result Images

Pyramid levels=3 Pyramid levels=7 Pyramid levels=10

As can be seen in the sample results above, there are both good results and bad results in the image blending process with the pyramid model.There are several reasons why image blending with pyramids can produce poor results. One reason is that the pyramid construction and blending process can introduce artifacts and blurring into the final blended image, especially at the low-resolution levels of the pyramid. Another reason is that the technique does not take into account the relative positions and orientations of the input images, which can lead to misalignments and distortions in the blended image like a this bad result. Finally, the technique assumes that the input images have similar content, which is not always the case in practice. These factors can all contribute to poor quality results when using image blending with pyramids.

The number of pyramid levels in image blending can affect the quality of the final blended image. Generally speaking, using more pyramid levels can produce more detailed and accurate results, but it can also be computationally expensive. On the other hand, using fewer pyramid levels can produce results more quickly, but the results may be less detailed and accurate.In the results, as the pyramid level increased, the degree of compatibility increased up to certain levels. Of course, not every increase has been reflected positively.

4 Conclusion

Image blending with pyramids is a useful technique that can be applied in a variety of situations where multiple images need to be combined. However, it is important to consider its limitations and to carefully evaluate the results to ensure that they are of sufficient quality for the intended application.