AIN 432 - Introduction to Computer Vision Laboratory

HACETTEPE UNIVERSITY

Department of Computer Engineering

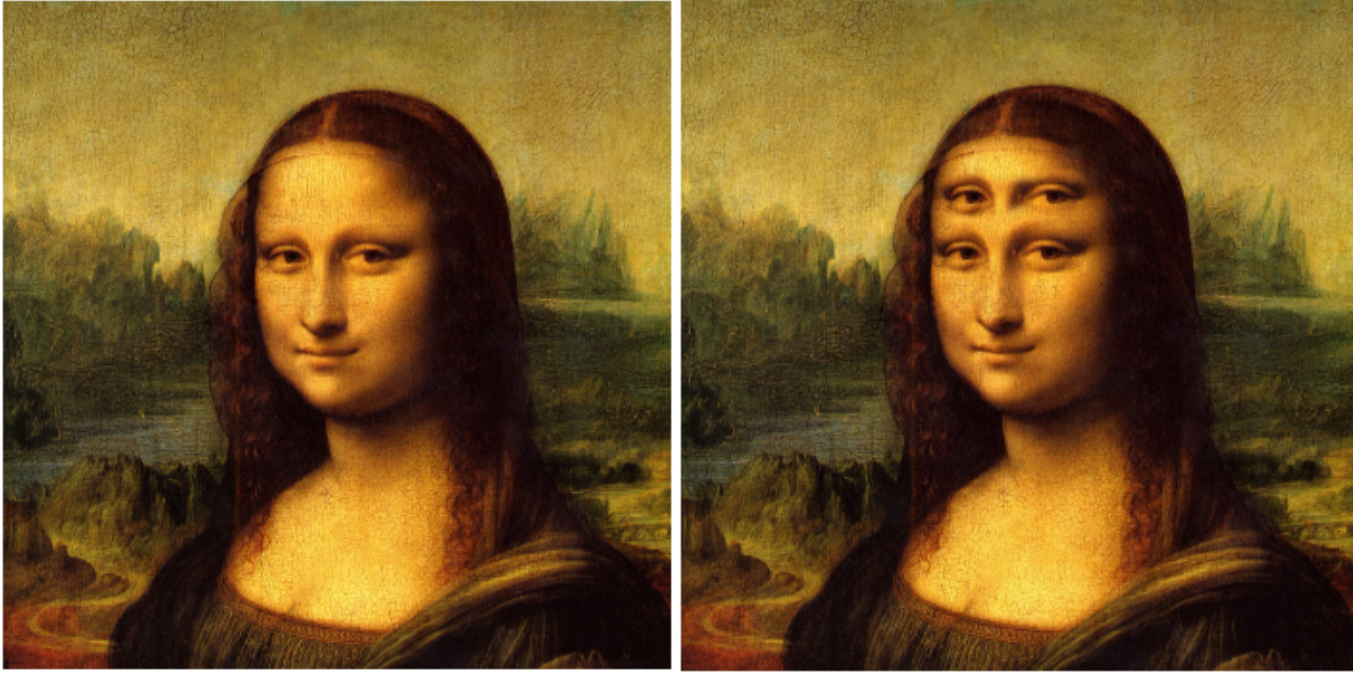**Due Date: 23:59 pm on Monday, December 12th, 2022**

Using Image Pyramid for Image Blending

(a) Input Image   (b) Result

Figure 1: Image Blending.

Background

In the image editing tools such as Adobe Photoshop, GIMP, image blending is the one of most fundamental task ans used for many purposes. For example you can prepare a poster for an advertisement or a film. The most important thing for image blending methods to blend images seamlessly. In other words for an successful image blending method, seams where images or image regions are stitched must be invisible. There are many ways to blend two or more images. One such approach proposed in [1] Laplacian Pyramid. Accordingly to this approach, images are first decomposed into their Laplacian pyramids, and then these images are blended in pyramid levels so that seamless

Overview

The goal of this assignment is to obtain a blended image like in Figure 1-b from the input images.

Details

Your program will take an image as input and a masked image region from another or same image and produce blended image. Specifically, you should carry out the following steps:

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.

   . You must show results of main steps in your report at least 5 different images with your comments.

   . You must analyze how number of Pyramid levels affect your results so you will obtain results for different number of Pyramid levels.

   . You will write your own Python code to select a region to create image mask.

The Report

Your report should contain a brief overview of the problem, the details of your approach, and the results of your algorithm with your comments. Show the results of all of the main steps . If your algorithm failed to give a satisfactory result on a particular image, provide a brief explanation of the reason(s).

What to Hand In

Your submission format will be:

- README.txt *(give a text file containing the details about your implementation, how to run your code, the organization of your code, functions etc.)*

- code/ *(directory containing all your code)*

- data/ *(directory containing all images - input, mask, blended)*

- report.pdf *(PDF report - LaTeX)*

Archieve this folder as **b\<studentNumber\>.zip** and submit to `https://submit.cs.hacettepe.edu.tr`.

Grading

The assignment will be graded out of 100:

- CODE: 0 (no implementation), 40 (a partial solution), 60 (a correct solution) and REPORT : 40

Academic Integrity

All work on assignments must be done individually unless stated otherwise. You are encouraged to discuss with your classmates about the given assignments, but these discussions should be carried out in an abstract way. That is, discussions related to a particular solution to a specific problem (either in actual code or in the pseudocode) will not be tolerated. In short, turning in someone else's work, in whole or in part, as your own will be considered as a violation of academic integrity. Please note that the former condition also holds for the material found on the web as everything on the web has been written by someone else.

References

[1] Pyramid methods in image processing,E. H. Adelson , C. H. Anderson , J. R. Bergen , P. J. Burt, J. M. Ogden,1984