Image Processing – 67829 – Exercise 3

Due Date: 15.02 at 23:59

Version 1.0 - Last Update 05.02.2024

1 Task

In this exercise, you will need to perform image blending using different images which you choose. We encourage you to experiment with the capabilities of these blending techniques and see if you can come up with new types of blends and ideas.

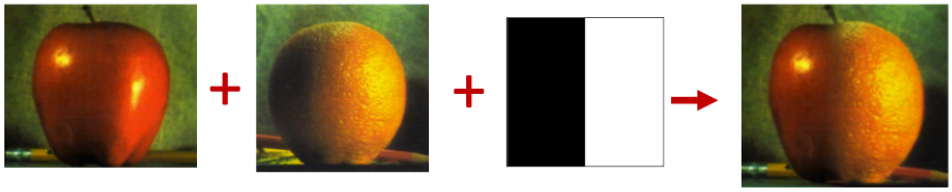
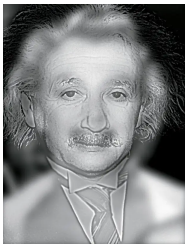


Image Blending



Hybrid Images

1.1 Image Blending

Given two images and a mask, blend the images seamlessly.

1.2 Hybrid Images

Given two images, create a third image such that, when viewed up close, the first image appears, and when viewed from afar, the second image appears.

Note 1: This exercise is meant to be fun and allow you to explore the possibilities of image processing and manipulation even with simple algorithms such as the ones you will use here. Be creative, try to test the limitations of the methods and see if you can bend them to your will.
Note 2: This exercise is easy by design; however, you will need to use your solution for exercise 4, so make sure you have a good implementation that you understand.
Note 3: Your solution needs to be based on the material you've learned in class.

2 Submission

- ❖ Submission instructions are given in the "Submissions Guidelines" document published on the course web page (here). Please read and follow them carefully. Any updates to those guidelines will be posted in the news forum, so be sure you follow the forum.
- ❖ You are required to submit code that can run on the CS computers and a "requirements.txt" file with all the pip dependencies you've used in your solution that can run on the CS computers.

3 Report Guidelines

In addition to the code, you should submit a report describing your solution. The report must follow the following structure and address the topics below and should be no longer than 4 pages:

1. Introduction
   - ➤ In your own words, state the goal of the exercise and what was the main technique (i.e. an idea or concept you've learned in class, not a technical tool like numpy) you've used to solve it.
2. Algorithm
   - ❖ For each blending algorithm:
     i. Description
     - ➤ Clearly describe the steps involved in your algorithm.
     - ➤ Elaborate on each concept you used learned in class and use the blending images with the proper visualization.

     ii. Implementation Details
     - ➤ Describe your implementation of the algorithm
     - ➤ Specify the parts that you implemented from scratch and those that you've used functionality from an existing library. What libraries did you use and why did you choose these?

- ➤ Describe any necessary hyper-parameters, thresholds, or other choices used in your algorithm.
- ➤ Discuss any challenges faced during implementation and how they were addressed.

❖ Explain the difference between the two algorithms

3. Results
   (a) Present your blending results.
   (b) Present two intermediate results - unsuccessful blendings. Explain what you think are the reasons for the failed blending.
      ☞ Avoid presenting technical failures (e.g., blending with a single-value mask, etc.).
4. Pyramids
   (a) Present visualization of **Gaussian** pyramid (include multiple levels) using one of the images you used for blending. Briefly, what we can observe from this pyramid?
   (b) Present visualization of **Laplacian** pyramid (include multiple levels) using one of the images you used for blending. Briefly, what we can observe from this pyramid?
5. Conclusion
   - ➤ Summarize your key findings and insights.

Your final submission should be a tar file containing a PDF named "ex3.pdf", a python file named "ex3.py", and a requirements.txt file with your dependencies. To create a tar file you can run the following command:

```
tar -cvf ex3.tar ex3.py ex3.pdf requirements.txt
```

4 Grading

Your exercise will be graded based on a manual inspection of your report (and code).

Good luck and enjoy!