

# CMPT 361 Assignment 1

Due time: June 17<sup>th</sup>, 23:59:59. Total marks: 20.

## Part 1: Green screen matting for Virtual Tourism

(12 marks in total)

1. Prepare Data: (2 marks in total)
  - 1.1. Take three photos of yourself against a background of uniform color. They can be just a portrait or your full body. You can use any color for the background but we recommend green or blue. The three photos should span a range of difficulty levels from easy to hard for the matting task. (1 mark)
  - 1.2. Download three photos of a scene or tourist attraction. It should be the same place but with different angles or field of view. (1 mark)
2. Develop Algorithms: (6 marks in total)
  - 2.1. Develop a basic algorithm that separates the foreground (i.e., you) from the uniform-colored background, and generates a binary alpha map. Compose yourself with the scene photos. (2 marks)
  - 2.2. Identify problems with the first basic algorithm, and try to come up with an improved algorithm to generate a true alpha map (non-binary). If you don't have your own ideas, please read relevant sections in the textbook, or the original Siggraph paper on blue screen matting. Test image composition with the improved algorithm. (4 marks)
3. Report Your Results: (4 marks in total)
  - 3.1. Describe your basic and improved algorithms. Reference the source of ideas in case you borrowed other people's ideas. Write out the matlab commands the TA needs to use to check if he can extract the same alpha maps and generate the same output images as you reported. (2 marks)
  - 3.2. Insert tuples of different (input1, extracted alpha map, input2, output) pictures into your report. Identify factors that affect the output quality, such as how tidy your hair is. In addition, analyse the strengths and weaknesses of the two algorithms.. (2 marks)

Note: no matter how hard your try, your output quality will not match what is shown in the textbook, unless you reimplement a full Siggraph/CVPR paper published in recent years, which is neither necessary nor recommended. **Do not use any external software such as Photoshop.**

## Part 2: Image Blending

(8 marks in total)

1. Prepare Data: (1 mark in total)
  - 1.1. Find/prepare three pairs of images to be blended. The three sets should span a range of difficulty levels from easy to hard for the blending task. For example, the easy pair could be some patterns or textures, the medium pair could be some animals or fruits, and the hard pair should be two photos of yourself, one

- better looking than the other, or a picture of yourself and a picture of a movie star/character whom you dream to be. (1 mark)
2. Implement the Laplacian pyramid based image blending: (5 marks in total)
    - 2.1. Build the Laplacian pyramids for your input images. (2 marks)
    - 2.2. Build a Gaussian pyramid for the mask, and blend the Laplacian pyramids. You are allowed to use external software to register the two input images and define the binary mask. (2 marks)
    - 2.3. Reconstruct the final blended image. (1 mark)
  3. Report Your Results: (2 marks in total)
    - 3.1. Write out the matlab commands the TA needs to use to check if he can generate the same blended images as you reported. (1 mark)
    - 3.2. Insert tuples of different (input1, mask, input2, output) pictures into your report. Identify factors that affect the output quality, such as the type of objects to be blended. (1 mark)

Note: parameterizing your algorithm is recommended, so that you can experiment with different parameter settings to achieve good results.

## Submission

Please submit a zip file with student number and your name (i.e., **300000001\_TerryFox.zip**). The zip file will contain all your matlab code, images, and a report in pdf format. **Do not reuse code from other sources.** You can reuse ideas from others, with proper references in your report.