

**CS116 – Lab 2B**  
**Due Date: September 14**

**Purpose:** A function can use multiple pictures and combine them in interesting ways.

**Knowledge:** This lab will help you become familiar with the following content knowledge:

- How to use multiple pictures in a function

**Task:** Now that you have some experience with modifying all the pixels in a picture, we are going to bump it up a notch by writing a function that uses multiple pictures.

We want to generate a sequence of pictures which makes it appear that the starting picture is morphing in the final picture. In other words each subsequent picture will systematically appear more and more like the final picture.

Suppose that you want to generate  $n$  intermediate pictures. Consider the  $k^{th}$  picture in the sequence. We can compute the pixel color of each pixel by computing a weighted average of each of the red, green, and blue values. Suppose that *startRed* and *endRed* are the red values at corresponding pixels in the starting and ending pictures. We would compute the red value of the corresponding pixel in the  $k^{th}$  picture as follows:

$$newRed = startRed + ((endRed - startRed)/n) * k$$

We would need to do the same for the green and blue values as well.

**Assignment 1:**

Write a function `kthMorphPicture(start,end,n,k)` that returns the  $k^{th}$  picture in a sequence of  $n$  pictures.

The steps that are needed are:

1. Create a new empty picture which is the same size as your given pictures.
2. Get the pixels of all three of your pictures.
3. For each of the set of three corresponding pixels, compute the weighted values of the red, green, and blue components.
4. Set the new color of your resulting picture.
5. Return your resulting picture after all the pixel colors have been set.

You will need to test this with start and end pictures which are exactly the same size. In the mediasources folder the `whiteFlower.jpg`, `yellowFlowers.jpg`, and `rose.jpg` pictures are all the same size.

**Criteria for Success:** If you show the picture returned by this function, you will see that it contains aspects of both the starting and ending pictures. Your function should work for any positive integer  $n$  and a  $k$  that is between 1 and  $n$

**Assignment 2:**

Write a function `morph(start,end,n)` which displays the  $n$  pictures which morph from the starting to ending pictures. You will, of course, want to use `kthMorphPicture` to accomplish this.

**Criteria for Success:** Your function should display  $n$  pictures using `kthMorphPicture` where each successive picture morphs the starting picture more and more into the ending picture.

Submit your file containing your functions. Please indicate both partner names in your submission.