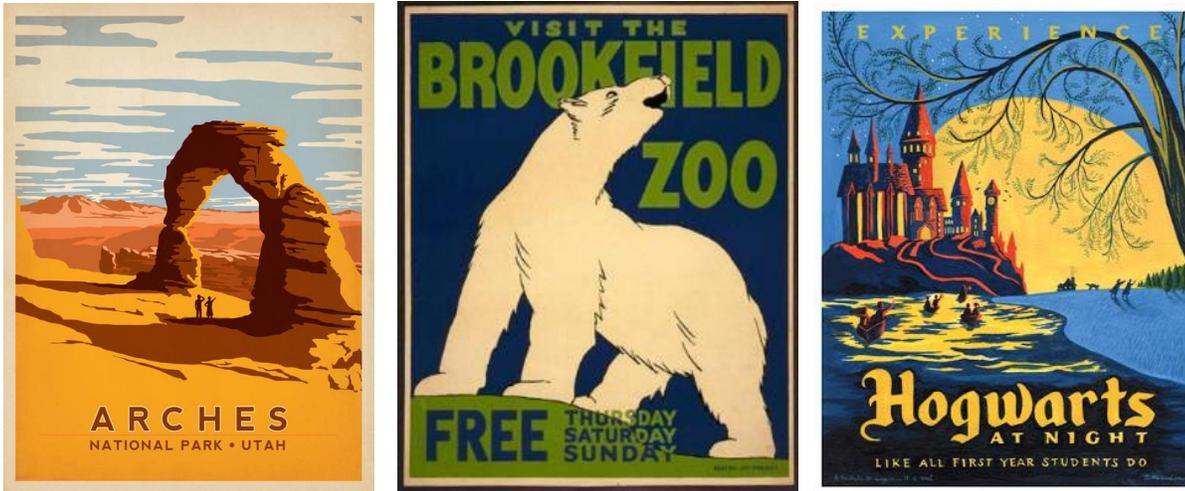# CS 111 – Program Design I, Fall 2015

Lab 7

Posterization

Posterization is a technique that reduces the number of colors used in a picture. The term comes from when travel and movie posters (ads) were made using just a few number of colors. Today, the same process is used with silk-screening t-shirts. Below are a few examples of these old time posters:

The code to posterize is often a modification of the black & white (grayScale) code. Once the "grayAmount" has been determined for a pixel, we use that value in if statement(s) to determine which of the posterized colors that pixel will be set. The following shows that code for posterizing into 2 colors: black and white (after the red, green and blue values have been accessed from a pixel). The idea of the code is:

- If the grayAmount is in the range from 0 to 127, the color of the pixel becomes black.
- If the grayAmount is in the range from 128 to 255, the color of the pixel becomes white.

```
// determine the grayAmount from the color at the pixel
int grayAmount = (int) (red * 0.299 + green * 0.587 + blue * 0.114);

// determine the final color value of the pixel
if ( grayAmount < 128 )
{
   // set the pixel to black
   red = 0;
   green = 0;
   blue = 0;
}
else
{
   // set the pixel to white
   red = 255;
   green = 255;
   blue = 255;
}
```

The above code would then need to store the updated red, green and blue values back into the pixel.

A 2-color posterization is OK; buhowever, when more colors are used, more details appear in the resulting picture.

To posterize to more colors we just need to use nested if statements (often called "else-if" clauses). The following posterizes to 4 colors (black, blue, green and white). In this one the ranges for the grayAmount are:

- 0 - 63 for black,
- 64 - 127 for blue,
- 128 - 191 for green, and
- 192 - 255 for white.

```
// determine the grayAmount from the color at the pixel
int grayAmount = (int) (red * 0.299 + green * 0.587 + blue * 0.114);

// determine the final color value of the pixel
if ( grayAmount < 64 )
{
   // set the pixel to black
   red = 0;
   green = 0;
   blue = 0;
}
else if ( grayAmount < 128 )
{
   // set the pixel to blue
   red = 0;
   green = 0;
   blue = 255;
}
else if ( grayAmount < 192 )
{
   // set the pixel to green
   red = 0;
   green = 255;
   blue = 0;
}
else
{
   // set the pixel to white
   red = 255;
   green = 255;
   blue = 255;
}
```

Lab Assignment

Due: Wednesday 10/21/2015 by 11:59 pm

For this lab assignment, you are to posterize a picture into 6 colors. We will use the "grayAmount" that was used when creating a black and white (grayscale) picture to determine which of the six color values will be used.

Since our range for the "grayAmount" can vary from 0 to 255, we need to divide that range into 6 parts to distribute the six colors evenly throughout the picture. Thus in each range will have about 42 values in it (255 / 6 => 42)

We will use the following shades of pink for our 6 colors. The names come from the web page at: http://www.tayloredmktg.com/rgb/.

grayAmount Range	0 - 42	43 - 84	85 - 127	128 - 170	171 - 212	213 - 255
Color Value	Medium Violet Pink r = 199 g = 21 b = 133	Deep Pink r = 255 g = 20 b = 147	Violet r = 238 g = 130 b = 238	Hot Pink r = 255 g = 105 b = 180	Light Pink r = 255 g = 182 b = 193	Pink r = 255 g = 192 b = 203

For this lab assignment, you are to write a java program that will complete the following:

1. Prompt the user for a picture and open that picture.
2. Call a method that will posterize the picture as described above. The picture opened in step 1 is to sent as a parameter to this method.
3. Display the posterized picture.
4. You must write your programs using good programming style which includes:
    o Good variable names
    o in-line commenting
    o header block commenting for the program and each method written
       Be sure to include the following with the header block comment for the program.
          ▪ your name
          ▪ day and time of your CS 111 lab section (i.e. Monday at 2:00)
          ▪ A description of the project.
    o proper indentation of program statements
    o use of blank lines to separate blocks of code.

Submission of the Lab

The lab must be submitted electronically to the Assignment Link for Lab 7 inside of Blackboard. You will only need to submit the java source code file (the ".java" file). Please only submit source code file (the **.java** file, not the **.class**).

Example of the Program

The original beach picture and the posterized version as required by this lab are as follows: