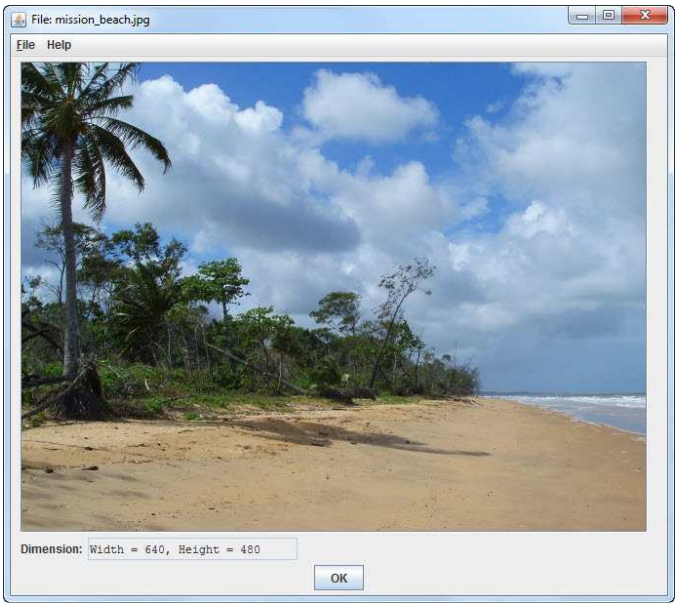
COSC 1P02 Assignment 3
Life on the Beach

Due: Nov. 12, 2012 @ 10:00am ***(late date Nov. 15)***

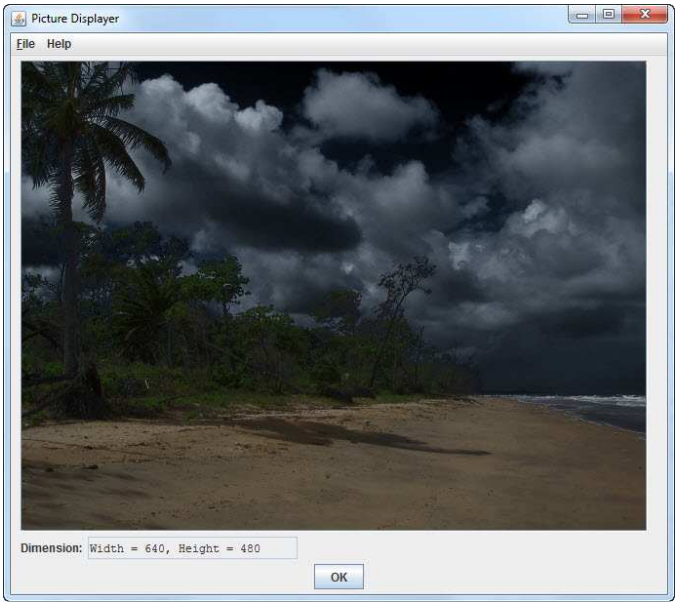
In preparation for this assignment, create a folder called `Assign3` and then, within this folder, three folders called `Assign_3_A`, `Assign_3_B` and `Assign_3_C` for the DrJava projects for the three parts of the assignment. The data files for submission are found at URL: `http://www.cosc.brocku.ca/Offerings/1P02/A3Files.zip`.

Part A

Write a program to convert an image into a night-time image. For example the beach image:



converted to night-time looks like:



The night-time effect is created by modifying each pixel's color based on how different (far) it is from "sky-blue" (`Color(58,117,197)`). For each pixel, the color distance between the pixel's color and "sky blue" is computed. Each color channel of the pixel is modified by the ratio of this distance value and `311` (the maximum distance) such that "sky-blue" becomes black (the ratio is 0) and the color most distance from "sky-blue" remains unchanged (ratio is 1).

For submission, run your program with the picture file: `mission_beach.jpg`. Save your new picture in the top level (`Assign3`) folder with name `night.jpg`.

Part B

An echo occurs when sound waves produced at one place reflect off a hard surface and return back to the original source. The time it takes for the sound to reach the surface and then return is the delay in the echo. Since sound attenuates (diminishes) as it travels, the reflected sound (echo) is quieter than the original.

Write a method:

```
private Sound echo ( Sound aSound, double delay,
                     double factor ) {…
```

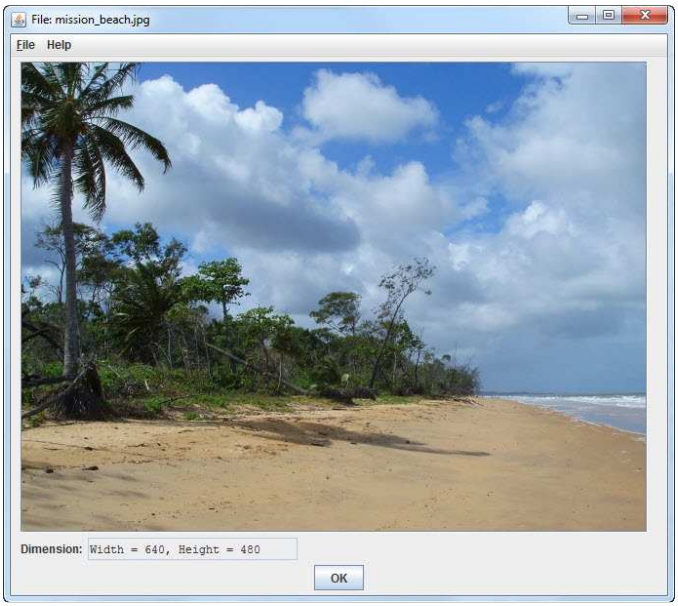
which produces a sound with an echo based on the original sound `aSound` with a delay of `delay` seconds and an attenuation of `factor`. The delay can be converted to a number of samples by multiplying by the sampling rate of the sound. The new sound will be longer than the original sound by the number of samples that make up the delay. The first samples in the echo will just be a copy of the samples from the original sound. Once the delay has elapsed, the next set of samples (until the end of the original sound) will be the sum of the samples in the original sound and the samples from the beginning of the original sound at the attenuated amplitude. Finally the last part of the result will simply be the remaining samples of the original sound at the attenuated amplitude.

Write a program that loads a sound, allows the user to play it and then produces a sound with an echo having a delay of `0.5` seconds and an attenuation of `0.25`. The new sound should then be presented for the user to play and, when done, the new sound should be saved.

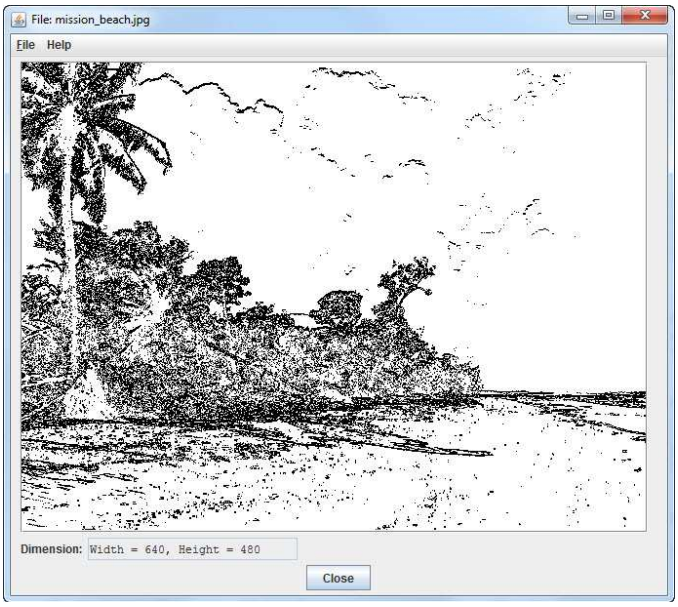
For submission, run your program with the sound file: `thisisatest.wav`. Save your new sound in the top level (`Assign3`) folder with name `echo.wav`.

Part C

Write a Java program to do simple edge detection on a picture. The resulting image will have black pixels wherever there is an edge in the original picture and white pixels elsewhere. For example, the picture:



after edge detection looks like:



To do edge detection: on each row we compare the intensity of the pixel with the pixel immediately below it (i.e. on the next row). If the absolute difference in the intensities is smaller than a value `TOLERANCE` (a constant with value `10.0`), we set the pixel to `white`, otherwise we set it to `black`. Since the last row has no row below it, we treat it as if the row below it is the same (i.e. all the intensities are the same).

Use a method:

```
private double intensity ( Color c ) {…
```

that returns the intensity of the `Color c`, defined as the average of the R, G and B components.

For submission, use the file `mission_beach.jpg` input and save the result in the top level folder (`Assign3`) as `edge.jpg`.

Submission:

Details regarding preparation and submission of assignments in COSC 1P02 are found on the COSC 1P02 website at URL: `http://www.cosc.brocku.ca/Offerings/1P02/AssignGuide.pdf`. This document includes a discussion of assignment preparation, programming standards, evaluation criteria and academic conduct (including styles for citation) in addition to the detailed assignment submission process copied below. **Part of the marks for the assignment will be awarded for programming standards.**

To prepare and submit the assignment electronically from the lab, follow the procedure below:

1. Ensure your folder (say `Assign3`) for the assignment is stored on your `Z:` drive.
2. Using DrJava, print (to `PDFCreator`) each of the `.java` files of your assignment using the name *`ClassName`*`.pdf` where *`ClassName`* is the class name (i.e. same name as the `.java` file) and save the `.pdf` file at the **top level** of the project folder (i.e. directly within `Assign2`).
3. Run the programs for the three parts. For Parts A & C, when the display is finished (i.e. `Close` button visible), select `Print Image of Window...` from the `File` menu on the `Picture Displayer` and direct the output to `PDFCreator` and saving the `.pdf` file at the **top level** of the project folder using an appropriate name (e.g. `PartA.pdf`). Also save the resulting picture file as directed in each part. For Part B, just save the resulting sound file as directed.
4. Run PuTTY by selecting `PuTTY` under `All Programs` in the `Start` menu.
5. Double-click `sandcastle` in the `Load, save ...` entry.
6. Enter your Brock userid and press the `Enter` key.
7. Once you have the `sandcastle%` prompt, navigate to your project directory for your assignment (say `Assign2`).
   Here are a few useful commands (press `Enter` after typing the command):

`ls –l`	- list files in current directory
`cd <directory name>`	- changes to the specified subdirectory (note, do not include the <>) e.g. `cd Assign3`
`cd ..`	- go up 1 directory level

   Note: If your file or folder names include spaces or special characters, you have to enclose the name in quotes, e.g. `cd "COSC 1P02"`.
8. Once you have confirmed you are in the correct project directory, type the command `submit1p02` and follow the instructions. It is important to note that the script will copy everything from the current directory and its subfolders to the 1P02 electronic drop box. It is important you are in the correct directory when you run the script. The script will confirm what you have submitted.
9. Log off sandcastle by typing `logout`.

For help in submitting an assignment from home see the COSC Help Center at URL: `http://www.cosc.brocku.ca/help/esubmit`.

DrJava

The folder from which you do the electronic submission should contain the project folder, including all files relevant to the project—the `.java` and `.class` files for the assignment and `.pdf` files for program listings and output.

Other platforms

If you are using an IDE other than DrJava to prepare your assignment at home, you must copy your code into DrJava to create new project(s) and then compile and run and prepare the submission as above. Your electronic submission must only include DrJava project folders and the `.pdf` files as described.