Program #1 - Nice Picture

Let's make a NicePicture interface that's a little easier to use.

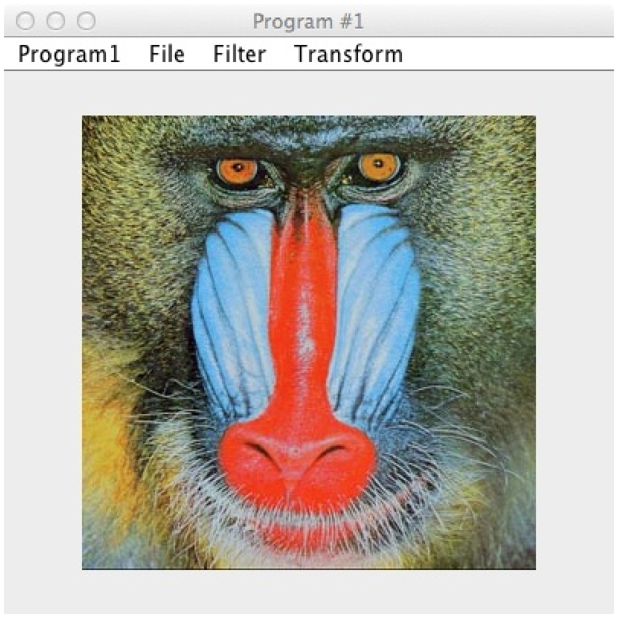
Logistics:

- Due: **Fri Apr 18, 2014**
- Worth: 10 points

1. Description

The Java GUI packages are awesome: AWT and Swing. They are pretty complicated, however. In Program #1, we'll create a simpler, nicer interface to images. One that allows a CSC 161 student (and professor) to have some fun.

With our nice interface, we'll build an image editor with some cool image filters and transforms. It'll look something like this:



This program emphasizes the concepts from Chapter 11 Inheritance and Chapters 13, 14 GUI.

In Program #1, we'll learn about:

- Inheritance, classes and interfaces
- Java GUI programming: JFrame, BufferedImage, Color, JLabel, JFileChooser
- Menus in Java: JMenuBar, JMenu, JMenuItem
- Java GUI event-handling: ActionEvent, ActionListener
- Program parameters to main()
- The static factory method
- Image filtering and changing algorithms
- There's probably an ArrayList in there too

2. Implementation

We'll define three interfaces:

- `NicePicture` - a very simple image interface to view and change the pixels in an image
- `NiceFilter` - an interface to apply a pixel-changing filter to an image
- `NiceTransform` - an interface for moving pixels around in an image

I'll put this code on the k: drive. I might throw a `NiceEditor` interface in there. Or maybe we'll just talk about it.

There is a ton of code to help you in our text. For example:

- Page 821 - Section 13.7 File Choosers
- Page 824 - Section 13.8 Menus

You'll succeed if you slice and dice this program into parts, coding one at a time.

1. Create a JFrame with just a JLabel and some text in it
2. Create a JFrame with some menus (with stubs doing little/nothing)
3. Implement the NicePicture interface and then show it in a JFrame
4. Implement your editor
5. Implement a bunch of picture filters and transforms

3. Grading

Please place the following in your `program1/` k: drive folder:

- A `README` file describing the state of your program
- Your beautiful Java code that follows our Java Coding Guidelines
- Include any images you would like me to look at. Explain them in your README.

Your editor should include:

- At least 10 filters
- At least 5 transforms
- Include a filter from one of your CSC 161 peers and get one of your peers to include one of your filters in their program.
- Your menus should include:
  - Program1 menu: About, Exit
  - File menu: Open, Save
  - Format menu: includes all registered `NiceFilter` objects
  - Transform menu: includes all registered `NiceTransform` objects
- Something should happen when the user clicks on your image. Show the pixel color at that location?
- Something should happen when the user right-clicks on your image. You decide.
- And please add <u>at least</u> one cool thing to your editor that I haven't specified.

I'm sure I'm forgetting some things here. We'll chat in class.

Now, about your image filters and transforms. There's tons of sources for interesting image algorithms. You are invited to use whatever you find. You must indicate the source of your algorithm, and there's a `source()` method in both `NiceFilter` and `NiceTransform` for you to acknowledge where you got your algorithm.

Here are some basic filters:

- Lighter - increase all pixel colors by N%
- Darker - decrease all pixel colors by N%
- Grayscale - make your picture gray by making each pixel the average of R+G+B
- Negative - switch each RGB value to 255-value

Once your infrastructure is in place, then you're golden because all these filters will have a similar structure:

```
for( x = 0 to picture width) {
   for( y = 0 to picture height) {
      get the RGB color at location (x, y) in picture
      change the RGB values according to your filter's spec
      set the new RGB value at (x, y)
   }
}
```

Transforms move pixels around or more fundamentally change a picture. Some basic transforms include:

- Draw grid - draw a grid over your pic
- Mirror - create a mirror reflection of your pic
- Upside down - flip it upside down