Lab Goals

- Practice working with image manipulation code and algorithms
- Understand the workings of convolution filters well enough to create your own

Assignment Details

Andy Warhol (1928-1987) was an American artist who was one of the leaders in the “pop art” movement in the 1960s. One of his famous techniques was to experiment with color, duplicating the same image but altering the color scheme each time. For example, this image of John Lennon using 9 different color schemes:
In this lab, you will create something similar, both by manipulating pixels and by applying a convolution filter. You are welcome to select any image that you like for this lab; however, it should be small enough to be shown on the screen four times in a 2x2 grid. You can use GIMP on the department machines to resize your image if necessary.

Here are the requirements for your final output:

- You should show the image that you have selected at least four times in a 2x2 grid. If you want to experiment more with pixel manipulation and color filters, you can expand to a 2x3 or 3x3 grid. Going beyond 3x3 is possible, but may start to cause screen fit issues. Regardless of your overall layout, you should include both rows and columns: no 4x1 or 1x4 layouts.

- Assuming a 2x2 grid, you should have:
  
  - The original unaltered image in the top-left corner
  - An image with simple pixel color manipulation in the top-right corner (something similar to what we did during the lecture on 9/25 when we first introduced image processing).
  - An image with a provided convolution filter applied in the bottom-left corner (something from the notes or code from the lecture on 10/05, such as sharpening, edge detection, blur, etc.).
  - An image with your own convolution filter applied in the bottom-right corner.

- If you extend beyond a 2x2 grid, you should include each of the four above, but can also extend with additional filters and pixel manipulation.

- In designing your own convolution filter for the bottom-right image, you should first conceive of an idea for how you want to manipulate the image, then design a convolution filter that you think will achieve that design goal. If it works, great! If it doesn’t, try to figure out why, and then update your filter to reflect the changes. Keep track of what you try – it’s a submission requirement.

- The convolution filters that you use don’t have to be 3x3, as they are in the provided code. You can easily extend to 5x5, 7x7, 9x9, etc. and experiment in that fashion.

When deciding which filter to apply to each individual pixel, remember the code hint in the demo from 10/05: \( i = \text{rowNum} \times \text{width} + \text{colNum} \). By determining which quadrant (or sextant, or octant, etc.) a pixel is in by row and column by using values like \( \text{height}/2 \) and \( \text{width}/3 \), we can then determine which filter to apply to each pixel is located in the pixel array.
Submission Details

For this assignment, please submit the following items which you have followed while completing this lab to your cs382f2015-<your user name> repository. Your submission should include the following:


2. Upload: All of your commented source code for the scene that you implemented.

3. Upload: The base image that you are manipulating.

4. Upload: A screenshot of the image that you created.

5. Print and Upload: An Assignment Information Sheet

Additional Group Requirements

You are welcome to submit this assignment on your own, or in a group with one other person. In cases of groups, I would prefer one experienced programmer and one inexperienced programmer in the group, but this is not an absolute requirement. Additionally, each group need only submit one paper copy of their work, but each member of the group should push all items to their own repositories.

Finally, each group must create a short document (0.5-1 pages) detailing the work breakdown of the group members: who worked on which components, which lines of code belong to each group member, etc. Comments in the code will help here too.