# 24780 Engineering Computation: Problem Set 8

(*) In the following instructions (and in all course materials), substitute your Andrew ID wherever you see *yourAndrewId*.

You need to create a ZIP file (which may appear as a compressed folder in Windows) and submit the ZIP file via the 24-780 Canvas. The filename of the ZIP file must be:

```
PS08-YourAndrewID.zip
```

For example, if your Andrew account is hummingbird@andrew.cmu.edu, the filename must be:

```
PS08-hummingbird.zip
```

Failure to comply with this naming rule will result in an automatic 5% deduction from this assignment's credit. If we cannot identify the submitter of the file, an additional 5% credit will be lost. If we are ultimately unable to connect you with the submitted ZIP file, you will receive 0 points for this assignment. Therefore, ensure strict adherence to this naming rule before submitting a file.

The ZIP file must be submitted to the 24-780 Canvas. If you find a mistake in a previous submission, you can re-submit the ZIP file with no penalty as long as it's before the submission deadline.

Your Zip file should contain only ps8.cpp. Do not include project files and intermediate files generated by the compiler. But, do not worry about some files or directories that are automatically added by the archiver (__MACOSX__ file for example).

Notice: The grade will be assigned to the final submission only. In the case of multiple file submissions, earlier versions will be discarded. Therefore, when resubmitting a ZIP file, it MUST include all the required files. Also, if your final version is submitted after the submission deadline, the late-submission policy will be applied, regardless of how early your earlier version was submitted.

**Ensure that your program can be compiled without errors on one of the compiler servers. Do not wait until the last minute, as the compiler servers may become very busy just minutes before the submission deadline!**

Submission Due: Please refer to Canvas.

# START EARLY!

Unless you are a good programmer, there is no way to finish the assignment overnight.

## Rendering Histogram [ps8.cpp] (100 pts)

Starting from the png viewer we did in class,

- Modify the code so that it takes PNG file name from the terminal.
- Add a class called Histogram.
- Histogram class has a protected member variable called hist, which is an array of integer with 256 elements.
- Add a constructor that clears all elements of hist.
- Add a function called Make, which takes a reference to YsRawPngDecoder, and calculate histogram, and store it in the member variable. Replace MakeHistogram function with this function.
- Add a function called Print, which prints a bar graph on the console window. Replace Print-Histogram function with this function.
- Add a function called Draw, which draws a histogram on the graphics window. Draw vertical lines from x=0 to x=255, which extends from the bottom of the window upward. The length of the line must be proportional to the occurence, hist[x]. Scale the occurrences so that maximum occurrence will be 80 pixels high. Use it so that histogram is rendered over the image. (See screenshot.)

The sample code crashes if Print or Draw function is called before Make function. Make it so that it does not crash.

Use all essential const qualifiers. You will lose 1 point for each missing const qualifier. Having non-essential const qualifiers will not affect your score.

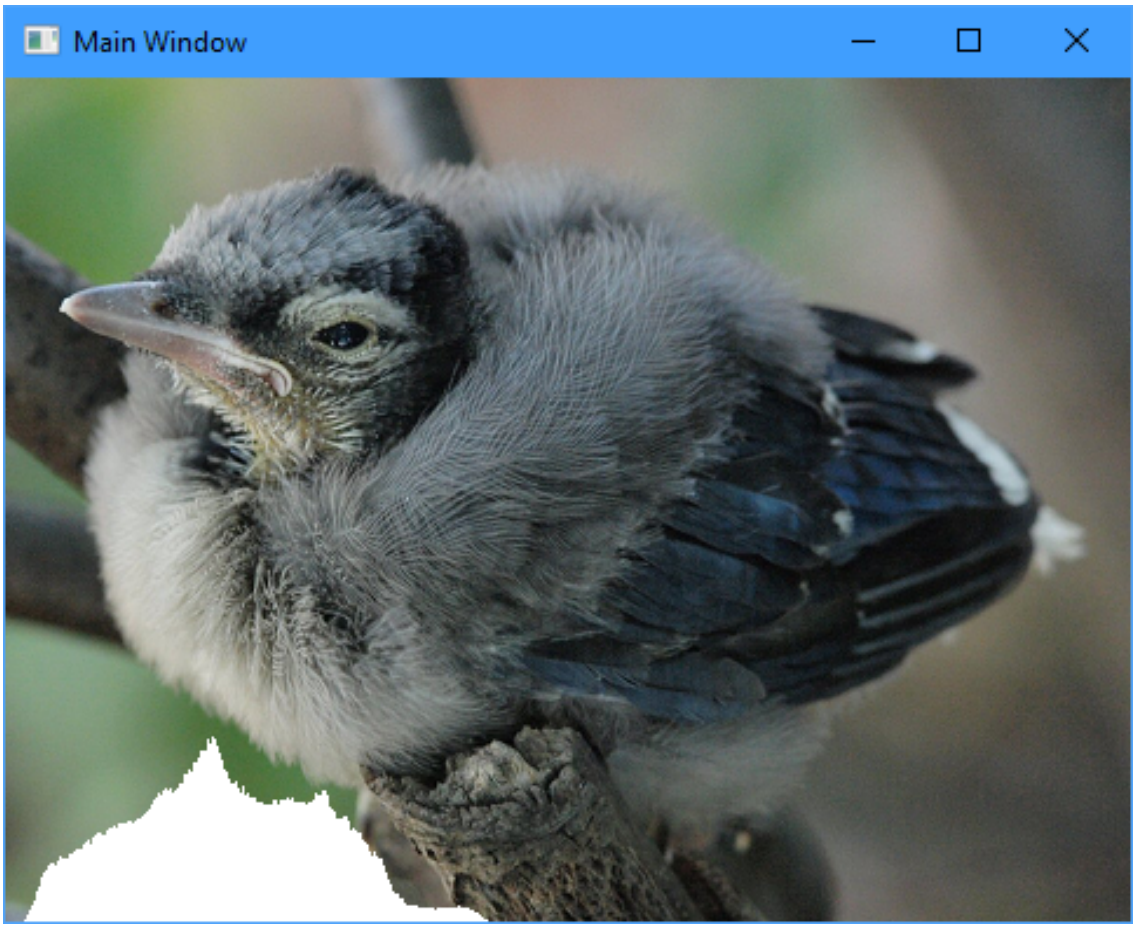


Fig. 1: Problem Set 8-1 Screenshot


Fig. 2: Problem Set 8-1 Screenshot

## Test Your Program with One of the Compiler Servers

Test your program with one of the following compiler servers:

```
http://freefood1.lan.local.cmu.edu
http://freefood2.lan.local.cmu.edu
http://freefood3.lan.local.cmu.edu
http://freefood4.lan.local.cmu.edu
```

You need to make sure you are not getting any errors (red lines) from the compiler server.

It is a good practice to remove warnings as well. However, we will not take points off for warnings as long as your program satisfies requirements of the assignment.

You can only access these servers from CMU network. If you need to access from your home, use CMU VPN. Please visit the CMU computing services web site how to install the VPN.