Make sure run SetGLFW.bat file before build Project solution, if you made change of directory or first download.

Image will be loaded on OpenGL window after using command.

**Commands**

* add -i <file name> <file name> -o <file name>
* sub -i <file name> <file name> -o <file name>
* mul -i <file name> <file name> -o <file name>
* inv -i <file name> -o <file name>
* log -c <float> -b <float> -i <file name> -o <file name>
  + default c is 1
  + default b is 10
* pow -c <float> -gamma <float> -i <file name> -o <file name>
  + default c is 1
  + default gamma is 1
* histeq -i <file name> -o <file name>
* histmatch -i <file name> -s <file name> -o <file name>
  + s is target image
* sobel -i <file name> -o <file name>
* gblur -i <file name> -o <file name> -N <int> -sigma <float>
  + default N is 2
  + default sigma is 1
* unshrpmask -i <file name> -o <file name> -N <int> -sigma <float>
  + default N is 2
  + default sigma is 1
* resize -w <int> -h <int> -i <file name> -o <file name>
  + default w is 255
  + default h is 255
* load <file name>
* save <file name>
* end

default output is output.ppm.

You can use “curr” to input filename which will use currently loaded file on OpenGL window.

ex)

* add –i curr curr -o output.ppm
* inv –i curr -o output.ppm

**Answers of questions**

Histogram matching heuristic

* I chose the nearest neighbor as the histogram matching heuristic because I think it's important to get the closest result to the intensity histogram of the spec image.

1. Compare and contrast the two approaches for resizing images (resizing to a common size, vs resizing to the larger image size) when performing an image operation that involves more than one image. Which approach is suitable for a medical imaging application like an MRI? Which approach is suitable for a simulation application like finite element modeling on the GPU?

* “Resizing to a common size” would have some loss of information but, would be faster. Since simulation application usually have finite memory or some processing resources and are speed-critical, this approach is suitable for a simulation application.
* “Resizing to the larger image size” would have no loss of information but, would have longer process time. Since medical imaging application like an MRI are information-critical, this approach is suitable for a medical imaging application.

2. We believe that the histogram equalization process always gives a better-contrast image than the original. We also believe that it is a non-destructive process i.e. it will not reduce the contrast in an already “good-enough” image. Show that the preceding statements are FALSE with a counter example. Use a 2x2 image to demonstrate your answer.

* For example,
  + [ [1,1], [1,7] ], 2x2 image -> [ [5,5], [5,7] ], 2x2 image
  + This kind of images, have too many specific intensities than others, will not provide better-contrast image by applying histogram equalization.

Q: How will you implement unsharp masking using the above commands?

* Gaussian blur
  + Generate filter with given parameter N, sigma
  + Operate input image and filter
  + Save blurred image
* Subtract input image and saved blurred image
* Display, store image

**Extra-credit**

Implemented Part F, functionality of the command-line.

Not implemented Part E.