Assignment 04 - Seam Carving

- Create an **A04** folder.
  - Inside this folder create an **input** and **output** folder.
- In the A04 folder put your code in a file named **program.py**.
- Create a presentation/document that shows all your output images along with answers to all the questions. Label all images with their filename. Be sure to explain what the task was for each part and how you accomplished it. Include code snippets for each task. Call this **presentation.pdf**. (There are other implicit requirements that every assignment ever has such as put your name on it.)
- Zip everything into **A04_[username].zip**. Example: A04_sewardn99.zip

0. Input Image (Show this section in the presentation.)
   a. Get/Take one high resolution color image that is suitable for vertical and horizontal seam removal. This image will be referred to as image1 and save it in the input folder as **image1.png**.
1. Vertical Seaming
   a. Decide on a method to produce an energy map. Describe your method and why you picked it. Normalize the values for the energy map and save as **pic_1_a.png**.
   b. Use Dynamic Programming on your energy map. Save the result to **pic_1_b.png**.
   c. Find a seam and highlight it on each of the following images: image1, pic_1_a, and pic_1_b. Save the results as **pic_1_c_0.png**, **pic_1_c_1.png**, and **pic_1_c_2.png** respectively.
   d. Remove the seam from image1. Save the result as **pic_1_d.png**.
   e. Remove 40+ vertical seams. Save the result as **pic_1_d.png**.
   f. *Add a manual attractor or repulsor to the energy map. Demonstrate the removal of a targeted object or the preservation of an object. Save as **pic_1_f.png**.
   g. *For part e and f highlight all removed pixels from image1. Save as **pic_1_g_0.png** and **pic_1_g_1.png**.
2. Horizontal Seaming
   a. Find a seam and highlight it on image1. Save it as **pic_2_a.png**.
   b. Remove 40+ horizontal seams from image1. Save the result as **pic_2_a.png**.
   c. *Highlight all removed pixels in part b on image1. Save as **pic_2_c.png**.
3. Both
   a. Create a function that can remove horizontal and vertical seams until the image hits a target width and height. **retarget(img,(w,h))**
   b. Retarget image1 to the following sizes (flip dimensions if you have a portrait image): 320x240, 320x320, 640x480, and 640x640. Save them as

pic_3_b_0.png, **pic_3_b_1.png**, **pic_3_b_2.png**, and **pic_3_b_3.png**. (Feel free to scale image1 before you do this section to make your results more sane. Use the same scaled image1 for each one.)

c. *Modify retarget for expanding an image. Expand image1 by 40+ in both the x and y directions and save the result as **pic_3_c.png**. (The min path will be the same every time which will cause a bad stretching artifact. Instead, act like you need to remove 40+ seam and keep track of them to know where to add in without the stretching artifact.)

4. Content Removal

a. **Make a binary image that shows a map of what is targeted for removal. Save it as **pic_4_a.png.**

b. **Remove seams until the targeted content is gone and then add back in seams until you get back to the original size. Save it as **pic_4_b.png**. For best results you actually need to remember all the removal seams.

*Not required for the 90%.
**I am offering 10% in true bonus. (If you do all the * and ** parts then you can get a 110%.)