CS111 S17 Take Home Exam #2

This problem will be worth 15 points, or 1/3 of your overall exam grade (15 for this + 30 for in-class = 45 points total for exam). You must complete it on your own, though you may use your book, notes and Python documentation. **You may not ask the prefect, the lab-techs, or any other person for help in any way, nor search online.** You may ask me questions to clarify the assignment or for help debugging, but not how to actually solve the assignment. If in doubt feel free to ask (me) and worst case I will tell you if I can't answer a question.

Part of your grade will be the quality of your solution, including comments, organization into functions, efficiency of your solution, etc.

Deliverables: Upload your solution file named **username.py**

Interleaving 2 images

Write a program that will take two images and interleave them so it appears that the two images are superimposed. There are 3 levels at which to complete this task, with partial credit for completing one of the lower levels. You should only submit one final program, and most important is that what you submit WORKS. Much better to submit a working program that only performs the level 1 task than a broken program where you attempt to perform a higher level. You may include code where you attempted the higher level task but if it doesn't work comment it out and TEST that the program at least runs and displays an image that is some attempt at one of the levels.

Please include a comment at the very top of your Python file stating which level you achieved, so I know how to test appropriately!

Level 1: 10 points – interleave every other row of 2 equal-sized images

You will receive 10 of the 15 points if you only get this first part working, so I recommend starting with this! Read 2 image files as command line arguments, so that I can run your program with a command like

```
python3 sgoings.py image1.gif image2.gif
```

Your program should display 3 images in one window - the original 2 images and the final interleaved image (as described below). The window should be large enough that all 3 images can be displayed such that they do not overlap (even if that means it doesn't fit on the screen).

For this first level you can assume that the 2 original images are the exact same height & width. I have provided you with 2 sample gifs (flowers 1&2) that are the same size to practice on, but your program should work for any size images as long as the 2 are the same. You should then create a 3rd image that is made up of alternating rows from the 2 original images. So the first row of the new image should be the first row of image1, the second row of the new image should be the second row of image2, the 3rd new image row should be the 3rd row of image1, and so on. In other words, all the even numbered rows of pixels (if I start counting with 0) come from the first image, and all the odd numbered rows of pixels come from the second image.

Here is what my solution looks like (the edges of the window are cut off as it was too wide to fit on my screen):

Level 2: 3 points – interleave 2 equal-sized images with user-input num rows from each

You will receive up to 13 of the 15 points if you get this additional feature working. Add 2 more command line arguments nRows1 and nRows2 that are the number of rows to take at a time from each image as you interleave them. I should be able to run your program with a command like

```
python3 sgoings.py image1.gif image2.gif 3 2
```

Your program should do everything from level 1, but instead of interleaving by alternating every other row, take the first nRows1 rows from image 1 to copy into the new image, then the next nRows2 rows from image2, then the next nRows1 from image 1, etc. So for the example command above, you would take rows 0-2 from image1, then rows 3-4 from image2, then rows 5-7 from image1, and so on. Note that if the user enters 1 for both nRows1 and nRows2 your interleaved image should look exactly like it did in level 1!

Below is my solution with nRows1=30 and nRows2=20 (again the edge is cut off on the left as the window did not entirely fit on my screen. Be careful at the bottom of the new image, if there aren't enough rows left to copy a full nRows, just copy as many as you can (note the final slice in my example doesn't have 20 rows from image2, as there were only 10 left).

Level 3: 2 points – interleave 2 differently-sized images with user-input num rows from each

You will receive the last 2 points if you get this additional feature working. Your program should do everything from level 2, and can be run using the same command with the 4 command line arguments, but it should work even if the 2 images are different sizes. It should create the interleaved new image to be the size of the smaller of the 2 loaded images, and then interleave the smaller image with a same-sized chunk of the larger image. The trick is the chunk should come from the **middle** of the larger image! So if one image is 100x100 pixels, and the other is 120x160 pixels, your final image should be 100x100 interleaving the entire smaller image and the 100x100 chunk from the larger image consisting of pixels from rows 30-130 and columns 10-110. You can assume that the larger image will be larger in both dimensions (e.g. I won't try anything like a 100x100 image with a 50x150 image). Below is my solution for AA.gif interleaved with flowers1.gif and nRow arguments of 5, 5.