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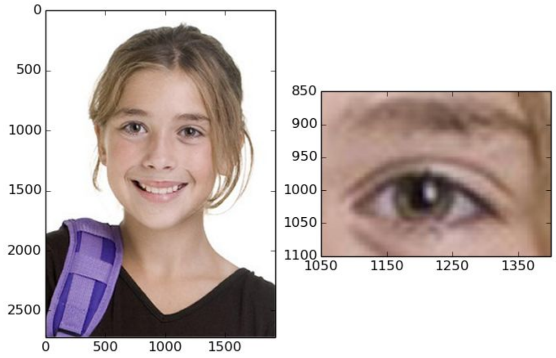
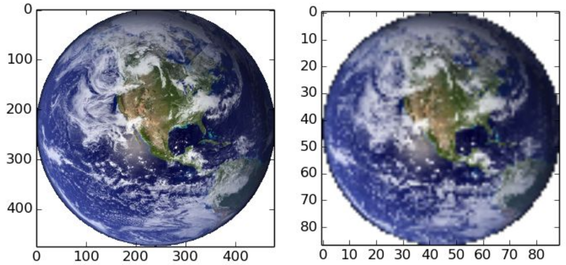
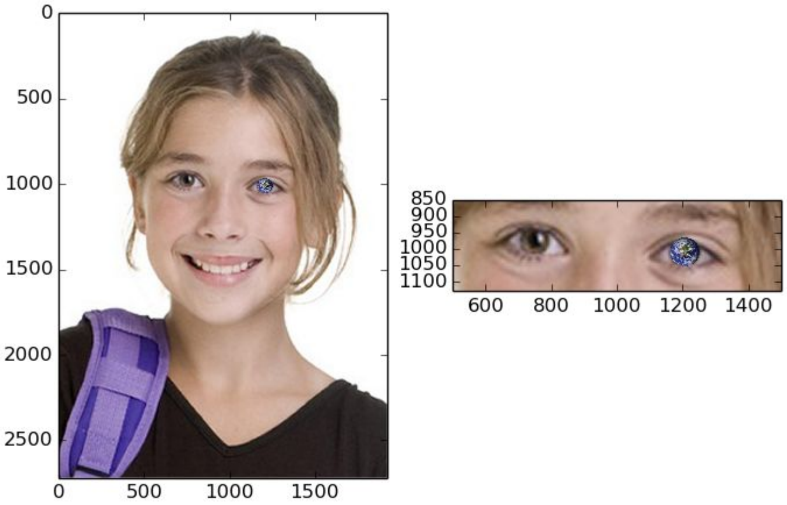
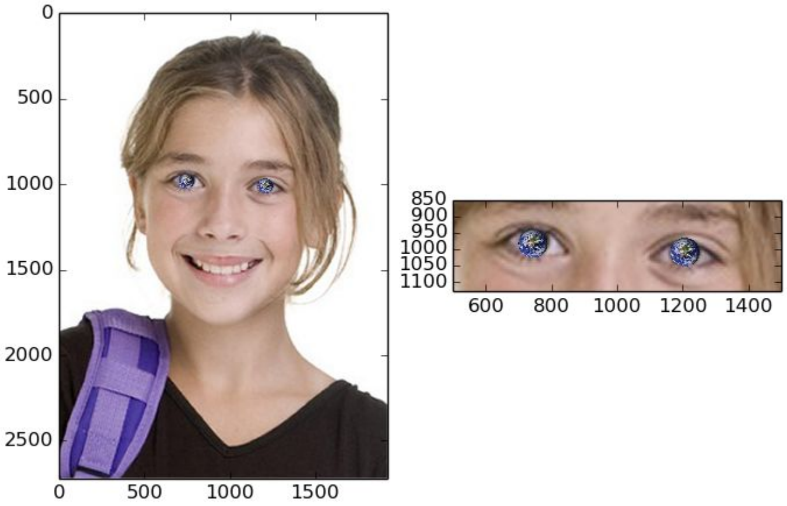
1.4.4 Part 2 Pictures

#14) girl.png	#14) resize_earth.png
 0 500 1000 1500 2000 2500 0 500 1000 1500 850 900 950 1000 1050 1100 1050 1150 1250 1350	 0 100 200 300 400 0 100 200 300 400 0 10 20 30 40 50 60 70 80 0 10 20 30 40 50 60 70 80
#14) earth_eye.png	#20) earths_as_eyes.png
 0 500 1000 1500 2000 2500 0 500 1000 1500 850 900 950 1000 1050 1100 600 800 1000 1200 1400	 0 500 1000 1500 2000 2500 0 500 1000 1500 850 900 950 1000 1050 1100 600 800 1000 1200 1400

1.4.4 Part 2 Only Answers & Conclusion Answers

13. Matplotlib.pyplot (plt) plots the image on a plot with an x and y axis. It has specific coordinates for each pixel, and manipulates the image based on pixel locations on the coordinate plane. numpy (np) manipulates images according to individual pixels of the image. PIL manipulates an image by performing a series of methods on it. Looks at image as a whole.

14. Opened and examined all three figures on our screen.

15a. Practice using this vocabulary by describing line 19: Line 19 calls the function subplots from the matplotlib library. The function is being called with 2 argument(s): one is the number of axes and the other is the number of plots. The function returns one object(s), which is/are being assigned to fig, ax.

15b. Line 20 calls __imshow()_ on ___ax[0]____
Line 23 calls imshow on ax[1]
Line 24 calls set_xticks on ax[1]
Line 25 calls set_xlim on ax[1]
Line 26 calls set_ylim on ax[1]
Line 27 calls savefig on fig'''

15c. The upper left coordinates of the bounding box containing the eyes is (1162 966).

16a.

```
#Open and show the student image in a new Figure window
student_img = PIL.Image.open(student_file)
fig, ax = plt.subplots(1, 2)
ax[0].imshow(student_img, interpolation='none')

# Display student in second axes and set window to the right eye
ax[1].imshow(student_img, interpolation='none')
ax[1].set_xticks(range(550, 910, 100))
ax[1].set_xlim(550, 900) # Measure in plt, experiment in iPython
ax[1].set_ylim(1100, 800)
fig.savefig('girl_left_eye_zoom')
```

17a. Line 30 uses the join() method from the os.path module. It is being passed 2 arguments. The value it returns is being assigned to the variable earth_file.

17b. In line 31 the open() function of the PIL.Image module returns a new PIL.Image object, which is being assigned to the variable earth_image.

17c. There are two parentheses because the argument is a tuple, which is formatted as having parenthesis around it (just like how a list is surrounded by two square brackets). The other set of parentheses shows that the tuple is an argument that the function uses.

17d. The 89 gives the width of the eye, while the 87 gives the height. The method resize is used with those as the arguments in order to resize the image and assign it to the variable earth_small.

17e. Line 33 calls the function subplots() from the matplotlib library with 2 argument(s): number of axes and number of plots. The function returns 1 object(s), which is/are being assigned to fig, ax. Line 34 calls the function imshow() from the matplotlib library with 1 argument(s): the image file it is showing.The function returns 1 object(s), which is/are being assigned to fig, ax. Line 35 calls the function imshow() from the matplotlib library with 1 argument(s): the image file it is showing. The function returns 1 object(s), which is/are being assigned to fig, ax.Line 36 calls the method savefig() on the object fig2 with 1 argument(s): 'resize_earth'. , aka the name of the file in which the image is saved.

17f.

i. An additional argument that can be passed to the resize() method is filter.
ii.The default value of the filter argument is NEAREST (which uses the nearest neighbor).
Iii ANTIALIAS should be used as the argument for filter unless speed is much more important than quality. Bilinear and Bicubic filters in the current PIL version is not recommended for downsampling.

17g. The size attribute of an image object is a 2-tuple (width, height). It is the image size in pixels. It gives the dimensions of the image.

17h. It returned the size of earth_img and earth_small, which were both 2-tuples (width, height). By taking the index of 1 of the size of earth_img, it returned the height value since that is the value in the first index of the tuple.

17i. The pixels are visible in the picture to the right and it is a lower quality image because it has less image pixels.

18. Image resizing method resize() takes a resample argument, which tells which filter should be used for resampling. Possible values are: PIL.Image.NEAREST, PIL.Image.BILINEAR, PIL.Image.BICUBIC and PIL.Image.ANTIALIAS. The algorithm for resizing a image, a value for either the height or the width would be chosen, and then the ratio of pixels of the original image would be scaled up or down factors depending on whether you want the resized image to be larger or smaller than before, to give the new height or length in pixels that would match the size given as an argument to the resize() method.

19a.
student_img size = (1920, 2720)
earth_small size = (89, 97)
student_img bytes = 15,667,200
earth_small bytes = 34,532

19b. Saved earth_small.png with the code in the iPython session

19c.
student.jpg bytes = 211,546
smallEarth.png bytes = 18,774

19d. The discrepancy between our answers in 19a and 19c was because when we downloaded the image by right-clicking it in the drop down bar on the left of our Cloud 9 workspace, it only downloaded the preview that Cloud 9 had assigned to it, and not the actual, full file itself.

19e. If a color is the first argument, it fills the box (area given through coordinates) with a single color.

19f. If the modes of the two images don't match, then the pasted image is converted to the mode of the original image.

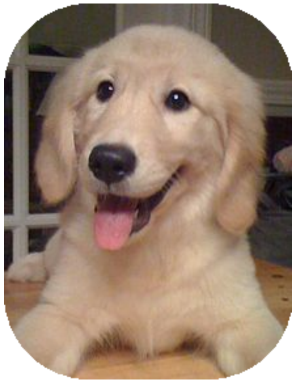
19g.The first arguments which is, earth_small, is the image that is pasted into the image object, which is student_image.The second argument is the box, which is a two tuple that gives the upper left corner. The third arguments which is the mask, makes it so that it updates only the region indicated by the mask.

20. Saved the full size student image with the close up of the eyes where the girl now has both eyes with earth images as earths_as_eyes.png.

Conclusion:
1. The methods used in this lesson were join(), resize(), paste(), save(), imshow() and savefig(). The attribute used in this lesson was the size attribute. The classes we used were PIL, matplot and numpy.'''

2. One complex task we performed in this assignment was pasting the images of the Earth's over the girl's eyes. This is abstraction because we used the methods, functions, and attributes of libraries in order to accomplish the task, instead of explicitly creating an algorithm that did the jobs of the functions and methods in the libraries. We did not need to understand the algorithm behind paste() and such functions, and were able to use them to manipulate the image. This is abstraction.'''

1.4.5 Pictures

#6) Choose an Original Image	#6) Choose the Modified image of the original one you chose
	
Extra Practice for Project (Not Extra Credit): Show the additional manipulation you and your partner did for the same image you chose above	

1.4.5 Answers & Conclusion Answers

5. We executed the code by entering %run Chekuri_Kang_1.4.5.py into the iPython terminal. The functions are round_corners(), get_images(), and round_corners_of_all_images().

6.The code created a new folder called modified within the 1.4.5_Images folder that had modified versions of all of the images that are in the 1.4.5_Images doler.

7a. Round_corners() takes 2 arguments. original_image, the first argument is a PIL Image object. percent_of_side, the second argument, is a float that is greater than 0 and less than 1. The return value is a PIL Image object.

7b. The new image is filled with the color purple.

7c. Object created in line 26: rounded_mask. Object created in line 27: drawing_layer.

7d. You would use the alpha value of 0 because in RGBA, the 0 is what makes it transparent (while 255 would be completely opaque).

7e. The code that corresponds with the image on the left are on lines 41-48. The code that corresponds with the image on the right are on lines 33-38.

7f. The modified image would be filled with white.

7g. The color values in the corners are (0, 0, 0, 0).

8a. Get_images can be passed with either 0 or 1 argument.

8b. Two objects are returned by the function. Both objects, image_list and file_list, are lists.

8c. os.getcwd(), os.listdir() , os.path.join()

8d. Os.listdir, Return a list containing the names of the entries in the directory given by path. The list is in arbitrary order. It does not include the special entries '.' and '..' even if they are present in the directory.

8e. This program has a try-except structure to open all images in the directory in the case of a file name not specifying that it's an image file. Adding a try-except structure ensures that the program does not halt if an IOE IOError occurs, which is what the open() function reports. In the case of an IOError, the except executes a pass, which is essentially telling the program to do nothing about the error. A try-except structure is a bad thing if the code accidentally catches other errors.

8f. Line 80 tells the error exception that the interpreter is expecting, which is an IOError that comes from when the filename does not specify an image file. Line 81 tells the program to do nothing if an IOError occurs, since pass is just used to fill in for Python syntax when nothing needs to be done. All of the try block lines will be executed one by one, and if any produce an IOError, then the except block will be executed. If no errors occur, then the program will continue on to the next block of code. If another error, not an IOError occurs, then the program will halt.

9a. The function call mkdir() is embedded in the try-except method because the person wanted to create a new directory but the file was already made, so that's why the output was pass, because the code was able to proceed since it already existed.

9b. The length of the image list is the number of image files that need to be modified.

9c. “n” is the index of the image file. In line 106, the n is created through a for loop that looks at the number of images, creates a range for it (which does not count the last image number), and then assigns this as the index n. Indexes start at 0, which ensures that there are enough indexes for every image even though range was not inclusive of the last number in the length of the image.

Conclusion:

1. You can see through the desktop behind the irregular edges of icons because the function round_corners and the alpha 0 can make the corners or edges transparent, so you can see through to the desktop screen.

2. The division of the code into 3 functions made the code easier to use because different functions could be interchangeably used as the purpose of the program changed. Also, errors were easier to fix and the program was less likely to halt completely since the functions were separate.

3. Alice is correct somewhat correct in saying that no image is unmanipulated. The science behind his claim is sound, but he ignores what an image truly is. An image is something that our eyes see, and our eyes only see through the process of our brains. This brain process includes the filling in of the blind spot and the limited number of rods in our eyes, so some images are true to the definition of an image. Barb is correct in saying that certain kinds of images are more true than others. Actual image manipulation is conscious, and requires an algorithm or code that purposely tweaks the image. The filling in of our brain and the reflection of photographs is accurate to an image since any errors or pixels are not on purpose and are simply the way our brains or cameras understand an image.

4. You can use an image if you receive consent from the owner, but that doesn't mean you can sell or download it because you could be taking the credit of someone else's work. If you take a picture on your own camera, it is ok because you are the person who took the original photo, however if you download another that you are not the owner of and put that into the public without credit, you could be charged with copyright fees. Because of the federal Copyright Act, photographs are protected by copyright from the moment it was created. Most of this depends on the context of the situation though.

5.The team dynamic was good in this project. We worked together to figure out answers to questions, and agreed on things before writing it down. Through our discussions, we found the answers to questions.