Organize image information using list of lists

While loops

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CS151: Computational Thinking: Visual Media

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Review of canvas layout

Two Image objects. Each has solid color. Placed in Slot 1 or Slot 2 in larger Image canvas.
Goal

Organize the Image objects and their placement information to easily control:

• where each of the two images go (left or right)

• what color to make them (e.g. red, blue, yellow, etc.)

• Can use list of lists to store information about each image in the canvas. This information includes:

  • the x-coordinate of the top-left corner in the large canvas
  • the y-coordinate of the top-left corner in the large canvas
  • the solid color of the image.
  • the Image object
Example: placing two images on the canvas

Use one sublist per image in the canvas (i.e. two sublists total).

```python
imageList = [[0, 0, 'red', img], # Slot 1
             [<x offset>, <y offset>, 'blue', img], # Slot 2
           ]
```

with actual values:

```python
imageList = [[0, 0, 'red', img], # Slot 1
             [img.getWidth(), 0, 'blue', img], # Slot 2
           ]
```
Where we're going with this

In Project 6: The Warhol Project you will extend the same idea to make a 2x2 grid of images in the style of the artist Andy Warhol (the original image + 3 filtered versions of it).
Coloring and placing images on the larger canvas

Each sublist contains all the info needed to color and place an image in one of the canvas slots.

```python
imageList = [[0, 0, 'red', img],
             [img.getWidth(), 0, 'blue', img]]
```

- Loop thru list, deal with one sublist at a time.
- Clone the image object (*blank image initially*).
- "Paint" img the appropriate solid color, depending on the name in the sublist (*3rd item*).
- Place it on the canvas.
- Display the canvas.
Let's write code to place a pair of solid color images side-by-side using a list of lists (lecture_20_sidebysidelist.py)
Differences in Project 6

imageList = [[0, 0, 'red', img],
             [img.getWidth(), 0, 'blue', img]]

1. img should be an original PPM image loaded in from your project folder (e.g. miller.ppm), not a blank one.

2. 3rd item in each sublist is a string to indicate which filter to apply (e.g. swapBlueGreen).

3. You will have more sublists (Warhol is a 2x2 grid, 4 images total).
While loops
For loops are not the only kind of loops

For loops execute a sequence of computations for a **fixed number of iterations**. Not always what we want to do!

- If you’re hammering a nail, you can’t know for sure how many times to hit it to get it into a block of wood... You hammer the nail **while it’s sticking out**.

- A **while loop** executes code **while a condition is true**.
What is a while loop?

```
while <condition is True>:
    <body>
```

- In Python, the **while loop** runs commands in the body over-and-over-again until the condition evaluates to `False`.

- The `<condition is True>` is called the **loop sentinel**. It tells us whether we continue looping.
Example use: Entering car trip data by hand

Loop sentinel: Entering a negative number (invalid data)
Summary: Increment and decrement operators

• There is an **increment operator**: +=

  The line \( i += 10 \) is the same as \( i = i + 10 \).
  
  • Translation: *Assign to* \( i \) *its current value, plus 10*

• There’s also the **decrement operator** -=

  The line \( i -= 10 \) is the same as \( i = i - 10 \)
  
  • Translation: *Assign to* \( i \) *its current value, minus 10*
Can we make a while loop that mimics a for loop?

Convert this into a while loop:

```python
for i in range(10):
    print(i)
```
while loops can be dangerous!

What does the following loop do?

```python
i = 0
while i < 99:
    print(i)
```

• We forgot to increment i!

• It would run on forever, which leads to a dreaded infinite loop. This means you’d have to force-quit out of your Python program...it would otherwise only stop running if you shut off your computer!

• For loops are sometimes called definite loops. By contrast, while loops are sometimes called indefinite loops.