Lab 5.3 Generated Art pt. 1

Instructor Guide

Overview

Students are going to be taught by a central instructor the basics of what a tuple is and how to access elements inside of a 2D list. Afterwards, they will complete a graphics activity that will involve their knowledge of indexing into lists, loops, and conditionals to create some cool art! If students complete the activity early, they can delve into creating unique art pieces by themselves!

Learning Goals

- Tuples are immutable lists
- Accessing a tuple is similar to accessing a list
- If you have a tuple inside of a list, you have a 2D list
- Bringing together lists and drawing in an extended example
- Accessing elements inside of a 2D list

Personal Growth Goals

- Consistency: Students will be using a wide mix of old skills with new skills in this lab, as they are asked to thoroughly remember how to create graphics, so the need to maintain the same level of growth instead of getting stuck on past learning experiences is key!

Skills Required

- A thorough understanding of list, and list indexing
- Understanding of how graphics work in Tkinter
- Understanding of random, loops, and conditionals

Resources Required

- Computers for either every student or every pair of students
- Python 3 and a text editor needs to be installed on all the computers
- One mentor per 2-3 students
- A projector to project the central instructor's computer

Instructor Preparation

1. Make sure all the computers students will use have Python and a text editor (right now, we use Pyzo) installed (check to see that students have a way to save/access files)
2. Load the following programming files onto each computer.
    a. 05_03_01_list_art_prep.py
    b. 05_03_02_generated_art.py

In Depth Description of Lab Activities

Phase 1: Setup

1. Before the students arrive, open the following files in a text editor on each computer:
    a. 05_03_01_list_art_prep.py
    b. 05_03_02_generated_art.py

Phase 2: Introduction | Review

1. Review the following topics verbally with students as they enter the class.
    a. Lists: Appending, popping, indexing
    b. Graphics: Tkinter syntax for drawing a rectangle or oval, what function do you create the images in?

Phase 3: General Lecture

1. This lecture will be taught by a central instructor, who will write up code while his/her computer is projecting for the whole class to see.
    a. Tuples
        i. What is a tuple?
            1. An immutable list, meaning, you cannot change any elements within the tuple.
        ii. Syntax for a tuple
            1. Just like a list except your using () (parenthesis)
            2. How do you create a tuple of one element?
            3. Why would you want to use a tuple?

iii. Accessing a tuple
1. The exact same as lists

b. 2D List Basics
i. Accessing elements in a 2D List
1. Go through an example using the code from the List Art Prep Activity
ii. Appending to a 2D List:
1. Appending elements to a 2d list
2. Appending a tuple or list to a 2d list

2. If students have any questions on the following topics, there is time to review over them again, especially for indexing into a 2D list.

Phase 4: List Art Prep Activity

1. Students will complete this activity with help from their mentors and the syntax guide if necessary.
2. If students are having trouble, the central instructor can complete Challenge 2.1 with the students.
3. If students complete this activity early, they can create more cool art or look at the next activity.

Phase 5: Start Generated Art Activity

1. Students will probably not have a lot of time to delve into this activity, so if they complete the List Art Prep Activity early, they can simply run this code and look it over (will continue next lesson).

Phase 6: Pack up | Review

1. Mentors should lead a discussion with their students based on the question: What do you think that you can do with these tools now?
2. This question may be useful to use this as a form of review, and can also be used to increase interest in the subject.

Lesson Plan

(:10) means that this part should be done by the tenth minute of the lesson

1. Setup (:0)
2. Introduction | Review (:10)
3. General Lecture (:20)
4. List Art Prep Activity (:50)
5. Start Generated Art Activity (:55)
6. Pack up | Review (:End)

Take Away

After completing this lab, students should be able to index into a 2D list, and use elements in a uniform fashion to complete problems. Students should also know the difference between a list and a tuple.