Python for Economics

Richard Lawrence
Morning Session, 9/17/2021
This course is divided into numbered Lessons

9. Lists
10. Dictionaries
11. Classes
12. Arrays
   ● Some reminders
   ● Lunch
   ● (more Lessons after Lunch)
Lesson 9
Lists

Your first data structure in Python
Lesson Learning Objectives

- Understand List properties (Length, Index, Slice)
- Use Membership test “in” as a condition
- Use Strings and Lists with Loops
- Practice some List and String manipulation methods
Lesson Primer

Data structure means applying a label scheme to a group of data elements.

(Imagine naming all these variables by hand!)

<table>
<thead>
<tr>
<th>label and index</th>
<th>story 0</th>
<th>story 1</th>
<th>story N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“Once”</td>
<td>“upon”</td>
<td>“End.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>value</td>
<td></td>
</tr>
</tbody>
</table>
Assignment “String Index”

Let us get some practice with this “index” concept using a familiar data type: *strings*.

Go to classroom assignment Lesson 9 “String Index”

Tasks:
- Read and Try the Examples
- Practice with the concepts *index* and *slice*
Assignment “List properties”

The first *data structure* you learn today is the **List**.

Go to classroom assignment Lesson 9 “List Properties”

Tasks:
- Read and Try the Examples
- Lecture: data structure with lists
- Exercise: practice length and index
- Exercise: practice creating and modifying lists
Break Time

10 minutes break. Lesson 9 continues at 10:00am
Lesson 9

Lists

(continued)
Assignment “List logic”

Go to classroom assignment Lesson 9 “List logic”

Tasks:
- Read and Try the Examples
- Exercise: practice using strings and lists with conditionals
Lesson Primer

We have previously seen the for loop used with fixed integer counting.

```
for x in range(99):
    print(x)
```

The for loop is powerful: we can replace the fixed integer counting with a list.

```
for x in list:
    print(x)
```
Assignment “List loops”

Go to classroom assignment Lesson 9 “List loops”

Tasks:
- Read and Try the Examples
- Exercise: use for loops with lists and strings
- Exercise: use for loops with multiple variables
- Exercise: using List comprehension to simplify loops
Homework “Lists and Strings”

Extra practice with Lists and Strings assigned as homework. Reminder: All homework assignments are mandatory.

- Assignment “Lists and Strings”
  - Lecture and Exercise
Lesson 10
Dictionaries

What if Lists had non-numeric indices?
Lesson Learning Objectives

- Understand keys and values
- Create dictionaries
- Retrieve data from dictionaries
Lesson Primer

Compare Lists and Dictionaries.

- Lists have an index (integer):
  
  ```python
  story[0] = "Once"
  ```

- Dictionaries have *keys* (any data type).
  
  ```python
  story["first"] = "Once"
  ```
Assignment “Dictionaries demo”

Go to classroom assignment Lesson 10 “Dictionaries demo”

Tasks:
- Read and Try the Examples
- Familiarize
Homework

Extra practice with Dictionaries assigned as homework.

● Assignment “National Economic Data”
  ○ Preparation for day 3 lessons (due by 9/23 11:59 PM)
Lesson 11
Classes

The general solution to complex data structuring
Lesson Learning Objectives

- Recognize classes vs object instances
- Define some simple classes
Lesson Primer

Our powers combined!

- Data structures
- Functions
- Class
Assignment “Classes demo”

Go to classroom assignment Lesson 11 “Classes demo”

Tasks:
- Read and Try the Examples
- Familiarize
Classes Homework

Extra practice with Classes assigned as homework.
Assignment “Talking Cats”
  ○ Fun Activity (due by 9/23 11:59 PM)
Break Time

10 minutes break. Lesson 9 continues at 11:00am
Lesson 12
Arrays

A more powerful data structure from the NumPy module
Lesson Learning Objectives

- Compare Numpy arrays to Lists: dimensions, indices, slicing
- Import data from files into arrays
- Perform array operations, such as arithmetic
- Filter arrays with conditionals
Assignment “Array basics”

Go to classroom assignment Lesson 12 “Array basics”

Tasks

- Read and try the examples
- Exercise: create and inspect arrays
- Exercise: read data from file into an array
Lesson Primer

Lists don’t have many built-in methods for interacting with data. Numpy Array supports common operations, such as arithmetic.

Example:

```
array C = array A + array B
```

means: add the elements of A and B pair-wise.
Assignment “Array Operations”

Go to classroom assignment Lesson 12 “Array Operations”

Tasks

● Read and try the examples
● Exercise: use array operations to process data efficiently
● Exercise: use mask to filter data
Homework on Arrays

Learning check with Numpy Arrays assigned as Homework.

- Assignment “Quiz” (due by 9/23 11:59 PM)
Some Reminders

Don’t forget to Turn in your assignments!

Morning session in-class assignments are due now
Summary of Homework Assignments

- Lesson 9: “Lists and Strings”
- Lesson 10: “National Economic Data”
- Lesson 11: “Talking Cats”
- Lesson 12: “Array Quiz”

Please complete your homework before class next Friday 9/24.
Office Hours

Please come to our office hours for assistance
● M 10 - 11 am Blocker 219B
● T 10 - 11 am (on Zoom only)
● W 2 - 4:30 pm Blocker 219B
● R 2 - 3 pm Blocker 219B

Please join our slack channel for discussion
● Workspace sweeterworkspace.slack.com
● Channel hprc-econ-fall-21 (private channel)
Lunch Time break reminder slide

Lunch time from 12 pm - 1 pm

We will return to continue with Lesson 13