Python for Data Science

Assignment 1, problem 3 by Glenn Svanberg

List vs Tuple in Python

A Listin python is an ordered sequence of objects accessible by index. The List can contain mixed types but normally most of the time a list only contains one type of object. (Naili 2020). The same is true for Tuples, the main difference between them is that a List is mutable whereas a tuple is immutable . This means that once a tuple is initialized it can not be modified any more. New values can not be appended, inserted or deleted. Neither can values be changed (Horstmann 2016). Both the List and the Tuple can be iterated over in loops and both of them can have any size. There is no strict limit for how many values can be stored in either of them. However since a List can be changed, the number of objects it contains can vary over time while the Tuple will never change in size (Naili 2020).

A List can for example be useful for keeping track of the number of visitors on a website during a day. The number of visitors can be stored on an hourly basis with the first hour of the day being the first position in the List. The List will then have 24 objects containing information on the amount of visitors throughout the day. Let's assume that a new List is initialized in the morning and for each hour the program will append a new object with the amount of visits for the previous hour to the end of the List. This would be very impractical to do without a List since we would need 24 different variables to store the values in and if we would like to combine all the hours to get the total amount of visitors in the day it would be a very difficult task. Since the List is iterable it would be a simple task to get the sum of all the values. In this particular case a Tuple would not be useful since it can not grow over time. Once it is initialized it can not change making it useless for this application.

A Tuple is used if it needs to be certain that it will not be modified. For instance if the Tuple stores transactions that another part of the program need to be able to see but not modify. Then a tuple would be very useful since it is immutable and even if code that we can not be sure what it does have access to the data it will not be able to modify it in any way.

The list and the tuple have very similar notation. while the List is based around square brackets the tuple is based on parentheses.

A List can be implemented like this:

    my_list = [3, 5, 6, 3]

and a tuple like this:

    my_tuple= (,3, 5, 6, 3)

to access one specific value from either a list or a tuple the same notation is used:
        my_list[0]
        my_tuple[0]

Since the list is mutable the List it is possible to change the value on any given position this is done by just assigning a value to the given index of the list: my_list[0] = 54

Distinction between data types and their naming in Python

I find the naming of python data types in general very similar to other programming languages. However there are some distinct differences. For instance Python has two different types of numbers, the integer and the float. This is very similar to other languages but with small differences. JavaScript has for example only one number type called number. Java has a total of six different number types, four for different sizes of integers and two for different types of floating point numbers. However the most commonly used numbers in java are called the int and float just as in Python.

Another thing that differs Python from Java is that Python does not have a separate type for a single char. Instead a string with length of 1 is used. C#, C and Java are using the same approach of letting a string consist of the primitive type char. JavaScript on the other hand is using the same technique as Python with a char not being a separate data type but rather a string with the size of 1.

When it comes to booleans Python differs from other languages by having True and False being represented by a capitalized first letter. This is not something used by either C#, C, Java or JavaScript. PHP on the other hand takes it one step further by using All capitalized letters for the boolean values.

In Python a List and a Tuple are ordered collections of objects that can include different data types with the difference that the Tuple is immutable and the List is mutable. However In Java a List it is similar both a Tuple and a List is ordered collections of objects and the tuple is immutable. What differs is that in Java the Tuple can contain different data types while the List can only contain one data type. Another small difference is that dictionaries in Java and C# is called maps rather than dictionaries even though they all represent a collection of objects stored as key value pairs rather than an ordered list accessible by it's index.

These are examples of many smaller differences between programming languages but it doesn't seem to be any major differences that makes Python stick out as an outlier in how the data types are named or what they represent.

References

Horstmann, C. (2016) *Python for everyone.* 2nd ed. Hoboken., NJ: Wiley, 2016. ISBN: 978-1-119-05655-3.

Naili, M. (2020) *Data types and data structure in Python*. Gothenburg University [Lecture]