



Discussion 3

Data Types & Table Manipulations

Materials: tinyurl.com/d8-disc03 or access through kevin-miao.com under teaching

Today

- Check-In
- Announcements
- Review: Data Types & Table Manipulations
- Worksheet
 - The worksheet is purposely made longer so you have more practice that you can do on your own
 - Challenge Question (last question on worksheet) is optional

Announcements

- Vitamin 3 will be due today
- Homework 2 is due tomorrow
 - For a bonus point, submit by tonight!
- Make sure you have the most recent version of lab 3
- Autograder issues
 - Grades for homework and lab will be delayed until further notice (likely 1-2 weeks)
 - This does not affect deadlines and normal workflow
- Tutoring Sections (~4-5 students) signups are filling up quickly.
 - If you couldn't sign up, check back weekly!

Data Types

- The most important types:
 - Numerical
 - Int: integers (1, 2)
 - Float: decimals (1.0, 1.100..)
 - If you divide ints, you will get floats
 - Text
 - Strings ('Hello' or "Hello")
 - Array
 - A sequence or list of items/objects of the same type
 e.g. array of ints, floats or strings
 - Tables
 - Check the type of an item with type (<name of object>)

Arrays

Ranges

- o np.arange(start, end [, step])
 - An array of increasing integers
 - np.arange $(0,3) \rightarrow [0,1,2]$

Array Methods

- array1 = make_array('Gamestop', 'AMC', 'BlackBerry')
- o array2 = make_array(1, 5, 10)
- O Finding the length of an array? Len Carragi)
- O Finding the first item of both arrays? מארים עַ עָּלָ נייּ
- O How do I sum all the items? np. 3 un carray)
- o array2 * 3 = √ {3,15,30}
- O How do I sum all the items? Many more min, max, cumsum ...

Table Manipulations

Table Methods

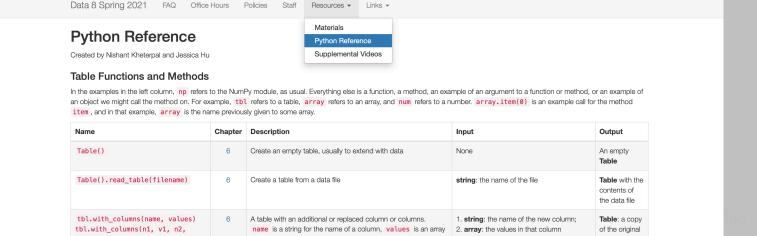
Changing a table

- Adding in a column: tbl.with column (...)
- Creating a new table with certain columns tbl.select(column)
 or tbl.drop(column)
- O Change column names tbl.relabeled(...)

Obtaining values

- Finding the size: tbl.num_rows, tbl.num_columns
- Obtaining a column as an array: tbl.column (<name> or <number>)
- Obtaining a row: tbl.row(<number(s)>)

Don't memorize. Your best friend is the Python Reference Sheet!



To the worksheet! 🚣

tinyurl.com/d8-disc03

1. What Would Python Do?

1. What Would Python Do?

For each of the following examples, presume that the code was run in an empty cell. Write down what Python would output. If the code results in an Error, explain why an error would occur.

```
[1, 2,3] [2,6,8]
c) np.arange(1, 4) + np.arange(2, 7, 2)
 array ([3, 6, 9])
d) make array (3, 4, 5) + np.arange(2, 7, 1)
ERRA!
                   [2,3,4,5,6]
  [3]
         Do not
```

Vitamin 2

What does Python output after running the code from 2C of the discussion worksheet?

The question is only one number. **Do not enter any spaces, words or sentences. These answers will be marked wrong; regrades won't be allowed.**

2. Fun with Arrays

Suppose we have executed the following lines of code. Answer each question with the appropriate output associated with each line of code.

3. eBay Auctions

Your friend Al is curious to see whether or not it's cheaper to buy his favorite items on eBay rather than through some other platform! Al stumbles upon some auction data from eBay, and decides to use his newly developed Table skills to do some data-crunching. However, Al is making a few mistakes and needs your help. For the following questions, identify why the code won't work as is.

The table below is called ebay and contains more than just the 3 rows displayed.

eborg	Auction_ID	Item	Opening_Bid	Closing_Price
	1	Jacket	50	75
	2	Smartwatch	100	150
	3	Tablet	350	600

3a. eBay Auctions

Auction_ID	Item	Opening_Bid	Closing_Price
1	Jacket	50	75
2	Smartwatch	100	150
3	Tablet	350	600

a) # Use comments to describe the code you write ebay.where('Opening_Bid', are.above(60))/ ebay.num_rows

e bay. where ('opening-bid', are. abore (60)) num-rows/ebay. num-rows

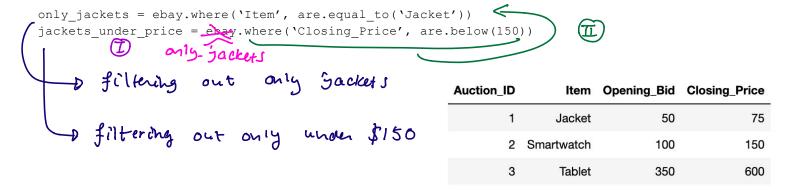
NUMBER

3b. eBay Auctions

Auction_ID	Item	Opening_Bid	Closing_Price
1	Jacket	50	75
2	Smartwatch	100	150
3	Tablet	350	600

3c. eBay Auctions

Al really wants a new jacket, but his budget is only \$150. To see whether eBay has had good deals on jackets historically, Al tries to filter the auction data such that it only contains jackets that were sold for a closing price less than \$150. He writes the following code to do so, but hasn't realized the mistake he's making. Help Al fix it so that your friend can hopefully get the jacket he deserves!



4. Violence in California

You are working on a project related to arrest-related violence in California. After a bit of searching, you finally find some relevant data and import it into your Jupyter Notebook. The table arrests is shown below. (Dataset source: https://www.kaggle.com/sohier/arrest-related-violence-in-california)





	Incident_Date_Str	City	Zip_Code	Num_Involved_Civilians	Num_Involved_Officers
0	7/3/2016	Hayward	94544	1	2
1	11/20/2016	San Leandro	94578	1	1
2	5/30/2016	Dublin	94568	1	2
3	6/30/2016	Dublin	94568	1	2
4	5/25/2016	Hayward	94545	1	1

4a. Violence in California

Before you start your exploration, you want to understand your data better. For each of the columns **City**, **Num_Involved_Civilians** and **Zip_Code**, identify if the data contained in that column is numerical or categorical.

	Incident_Date_Str	City	Zip_Code	Num_Involved_Civilians	Num_Involved_Officers
0	7/3/2016	Hayward	94544	1	2
1	11/20/2016	San Leandro	94578	1	1
2	5/30/2016	Dublin	94568	1	2
3	6/30/2016	Dublin	94568	1	2
4	5/25/2016	Hayward	94545	1	1

4b. Violence in California

Suppose you were only interested in arrests that involved two, three or four civilians. Assign range_civilians to a table that only contains rows from the arrests table that correspond to arrests involving two, three or four civilians.

	Incident_Date_Str	City	Zip_Code	Num_Involved_Civilians	Num_Involved_Officers
0	7/3/2016	Hayward	94544	1	2
1	11/20/2016	San Leandro	94578	1	1
2	5/30/2016	Dublin	94568	1	2
3	6/30/2016	Dublin	94568	1	2
4	5/25/2016	Hayward	94545	1	1

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4c. Violence in California

You're curious about finding out when the arrest involving the most officers occurred in Hayward. Assign <code>arrest_date</code> to a string that represents the date of the arrest that occurred in Hayward that involved the most officers. For this question, assume that the maximum number of officers involved in an arrest in Hayward is unique. It is okay for your code to wrap along the next line for <code>hay arrests sorted</code>.

```
hay_arrests_sorted = _____arrest_date = ____
```

		Incident_Date_Str	City	Zip_Code	Num_Involved_Civilians	Num_Involved_Officers
(0	7/3/2016	Hayward	94544	1	2
	1	11/20/2016	San Leandro	94578	1	1
2	2	5/30/2016	Dublin	94568	1	2
;	3	6/30/2016	Dublin	94568	1	2
4	4	5/25/2016	Hayward	94545	1	1

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5. End of an Error

For the following code snippet identify what errors are possible. The line of code pointed to in the output is the line that python will identify as having an error, and is not necessarily the only code that is in the cell. Why is the error possible or not possible? As an example, in the following screenshot, python is identifying the third line as the error, and the error message is "NameError: 'yanay' is not defined"

Letter	Error Message
Α	AttributeError: 'NoneType' object has no attribute 'sort'
В	ValueError: The column "y" is not in the table.
С	ValueError: Column length mismatch. New column does not have the same number of rows as table.
D	<pre>TypeError: with_column() missing 1 required positional argument: 'values'</pre>
E	SyntaxError: invalid syntax
F	<pre>TypeError: unsupported operand type(s) for +: 'int' and 'str'</pre>
G	ValueError: operands could not be broadcast together with shapes (3,) (2,)

5a. End of an Error

a) z = x + y

Letter	Possible?	Why?
Α		
В		
С		
D		
E		
F		
G		

Letter	Error Message
Α	AttributeError: 'NoneType' object has no attribute 'sort'
В	ValueError: The column "y" is not in the table.
С	ValueError: Column length mismatch. New column does not have the same number of rows as taken the same number of rows as taken the same number of rows as taken to be a same number of rows as taken
D	TypeError: with_column() missing 1 required positional argument: 'values'
E	SyntaxError: invalid syntax
F	<pre>TypeError: unsupported operand type(s) for +: 'int' and 'str'</pre>
G	ValueError: operands could not be broadcast together with shapes (3,) (2,)

5b. End of an Error

b) x.sort(1, descending=True)

Letter	Possible?	Why?
Α		
В		
С		
D		
E		
F		
G		

Letter	Error Message
Α	AttributeError: 'NoneType' object has no attribute 'sort'
В	ValueError: The column "y" is not in the table.
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D	TypeError: with_column() missing 1 required positional argument: 'values'
E	SyntaxError: invalid syntax
F	<pre>TypeError: unsupported operand type(s) for +: 'int' and 'str'</pre>
G	ValueError: operands could not be broadcast together with shapes (3,) (2,)

How did I do?

https://tinyurl.com/kevind8feedback