

KEY_Lesson11_Pandas-Reading

July 18, 2019

1 Reading Data with Pandas

In the last lesson, we learned how pandas stores data as rows and columns in DataFrames. We previously used a small dataset that was hard-coded right in the notebook. But in the real world, we want to be able to use large datasets that can't be easily hard-coded or typed out by hand. We store large datasets as files in the CSV format, which allows different programs like Excel, Google Sheets, or our Python programs to share data easily.

We have some data stored in Google Drive, so first we need to access it:

```
[0]: # mount Google Drive
from google.colab import drive
drive.mount('/content/gdrive')
path = '/content/gdrive/My Drive/SummerExperience-master/'
```

Drive already mounted at /content/gdrive; to attempt to forcibly remount, call drive.mount("/content/gdrive", force_remount=True).

When you run the above cell, it will prompt you to follow a link. Click it, then copy the code it gives you into the prompt and press the enter key.

Once you do that, Google 'mounts' the Google Drive folder to this notebook so we can access the files in it directly from Python.

Now we need to import pandas. Let's use the pd nickname like before:

```
[0]: # import the pandas package
import pandas as pd
```

Now we're ready to read our dataset into Python with pandas! We'll use a function called read_csv. Our dataset is in Google Drive and we need to tell read_csv exactly where to find it. read_csv will create a DataFrame for us. Let's call it tips:

```
[0]: # load the tips csv
tips = pd.read_csv(path + 'SampleData/tips.csv')
```

Since we saved the data to a variable, pandas didn't show us what it looks like. How would you view the beginning of the tips DataFrame without seeing every row? Try it below:

```
[0]: # View just the beginning of the tips DataFrame
tips.head()
```

```
[0]:
```

| | total_bill | tip | sex | smoker | day | time | size |
|---|------------|------|--------|--------|-----|--------|------|
| 0 | 16.99 | 1.01 | Female | No | Sun | Dinner | 2 |

| | | | | | | | |
|---|-------|------|--------|----|-----|--------|---|
| 1 | 10.34 | 1.66 | Male | No | Sun | Dinner | 3 |
| 2 | 21.01 | 3.50 | Male | No | Sun | Dinner | 3 |
| 3 | 23.68 | 3.31 | Male | No | Sun | Dinner | 2 |
| 4 | 24.59 | 3.61 | Female | No | Sun | Dinner | 4 |

Look at the column names of the `tips` DataFrame. We have `total_bill`, `tip`, `sex`, `smoker`, `day`, `time`, and `size`. Based on the column names and some of the values in the DataFrame, what do you think the rows each represent?

The rows represent: waiters and waitresses in a restaurant

Now let's take a look at the end of the DataFrame:

```
[0]: # View the end of the tips DataFrame
tips.tail()
```

```
[0]:   total_bill  tip  sex smoker  day  time  size
239    29.03  5.92  Male    No  Sat  Dinner    3
240    27.18  2.00 Female   Yes  Sat  Dinner    2
241    22.67  2.00  Male   Yes  Sat  Dinner    2
242    17.82  1.75  Male    No  Sat  Dinner    2
243    18.78  3.00 Female    No  Thur Dinner    2
```

Notice the numbers on the far left side of the DataFrame. pandas assigned a number to every row. What number did pandas assign to the very first row of the DataFrame? (Scroll up if you need to.) So how many rows do we have in this DataFrame?

Number of rows: 244

The column of numbers that label the rows is called the index of the DataFrame. The index is an attribute, a special variable which belongs to variables of the DataFrame type. An example of an attribute would be if you had a variable `dog` with an attribute `dog.owner` to store the name of the person who owns the dog.

We can view the DataFrame's index like this:

```
[0]: tips.index
```

```
[0]: RangeIndex(start=0, stop=244, step=1)
```

So our index starts at 0, ends at 244, and increases by 1 for each row. Another way to count the number of rows is to take the length of the index using the `len` function:

```
[0]: len(tips.index)
```

```
[0]: 244
```

Like the index labels the rows of the DataFrame, there is an attribute called `columns` that refers to the columns of the DataFrame. Let's take a look:

```
[0]: tips.columns
```

```
[0]: Index(['total_bill', 'tip', 'sex', 'smoker', 'day', 'time', 'size'],
dtype='object')
```

We could count the number of columns -- there aren't too many -- but what's the fun in that? Let's write a line of code to tell us the number of columns:

```
[0]: # length of the DataFrame's columns
len(tips.columns)
```

```
[0]: 7
```

Conveniently, we can also call `len` on the DataFrame itself. Try it here! Is the result equal to the number of rows or the number of columns?

```
[0]: # use len on tips
len(tips)
```

[0]: 244

Based on the number of rows and columns, how many data points are in the `tips` DataFrame?

```
[0]: # calculate the number of data points in tips
7 * 244
```

[0]: 1708

That's a lot more data than we've handled before. But that's nothing for pandas -- it can handle DataFrames with *millions* of rows! Data scientists use pandas to handle very large datasets from the real world.

Instead of typing the number of rows and columns in the DataFrame, we could put both commands with `len` on the same line. Try it here:

```
[0]: # Multiply the length of rows & columns without typing numbers
len(tips) * len(tips.columns)
```

[0]: 1708

This way, if the `tips` data changes, we can simply re-run the above cell to find the number of values in it, without having to manually type out the number of rows and columns.

You just learned:

- How to read datasets into pandas DataFrames.
- The `index` and `columns` attributes of DataFrames.
- How to find the number of rows, columns, and number of data points in a DataFrame.