

Introduction to Data Science

Data Science Essentials



Goals for today

- Review last session coding tasks
- Learn about some common data wrangling approaches
- Learn ways to find help (module API, Stack Overflow, etc)
- Intro to markdown



Review: Week 1 Coding Tasks



Get Data → **Process + Clean Data** → Exploratory Data Analysis

- Remove spaces from column names and convert to lower case
 - Able to use `df.column` to reference columns instead of `df['column']`
 - [PEP-8](#) compliant
- Convert objects to desired data types
 - datetime
 - numbers (integers and floats)
- Assess NaNs
 - Remove them?
 - Replace them with another value?
- Remove or separate any total/aggregate row in the initial data



pandas – <https://pandas.pydata.org/pandas-docs/stable/api.html>

- **df.describe()** and **series.describe()** – returns statistical info (count, mean, sd, quartiles)
- **df.isnull().sum()** – handy way to see total null values by column
- **series.replace()** – replace column values based on a set of replacement values; can use two arguments (**to_replace** and **value**) or pass a dict as a single argument to map these
- **df.groupby()** – group by a categorical variable to get summary statistics for that category
- **df.reset_index()** – resets the index to the default 0-based index; moves the current index to a column value unless **drop = True** is specified

*avoid using the **inplace = True** argument for pandas methods; instead assign the df back to itself
df = df.reset_index() instead of df.reset_index(inplace = True)





Resources for help when you get stuck

- Google
- Stack Overflow
- Doc Strings



- **Be as specific as you can: search for python + package + what you are trying to do.**
- **Copy the error from Jupyter and paste it right in the search box**
- **Pay attention to the dates of results - sometimes blog posts, etc. are outdated**
- **If you're not sure what text to use try asking your question exactly like you would ask another person!**





- **Many times your google search will lead you here**
- **The question is at the top. Remember this is someone's question and not the answer! Skim the question to ascertain that the issue is similar to yours.**
- **Scroll through the answers looking for:**
 - **A green check – this means the original poster accepted this as the best solution.**
 - **The largest number – this means the most people agreed this is the best solution. Sometimes the largest number is next to the question. This just means a lot of people had the same question!**



▲
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While the question has been answered, I'd like to add some useful tips when using [savefig](#). The file format can be specified by the extension:



```
savefig('foo.png')  
savefig('foo.pdf')
```



Will give a rasterized or vectorized output respectively, both which could be useful. In addition, you'll find that `pylab` leaves a generous, often undesirable, whitespace around the image. Remove it with:

```
savefig('foo.png', bbox_inches='tight')
```

Docstrings

- shift + tab after keyword in a Jupyter cell
- ? + keyword in a Jupyter cell

```
In [26]: pd.concat?
```

Signature: `pd.concat(objs, axis=0, join='outer', join_axes=None, ignore_index=False, keys=None, levels=None, names=None, verify_integrity=False, sort=None, copy=True)`

Docstring:

Concatenate pandas objects along a particular axis with optional set logic along the other axes.

Can also add a layer of hierarchical indexing on the concatenation axis, which may be useful if the labels are the same (or overlapping) on the passed axis number.

Parameters

`objs` : a sequence or mapping of Series, DataFrame, or Panel objects
If a dict is passed, the sorted keys will be used as the `keys` argument, unless it is passed, in which case the values will be selected (see below). Any None objects will be dropped silently unless they are all None in which case a ValueError will be raised

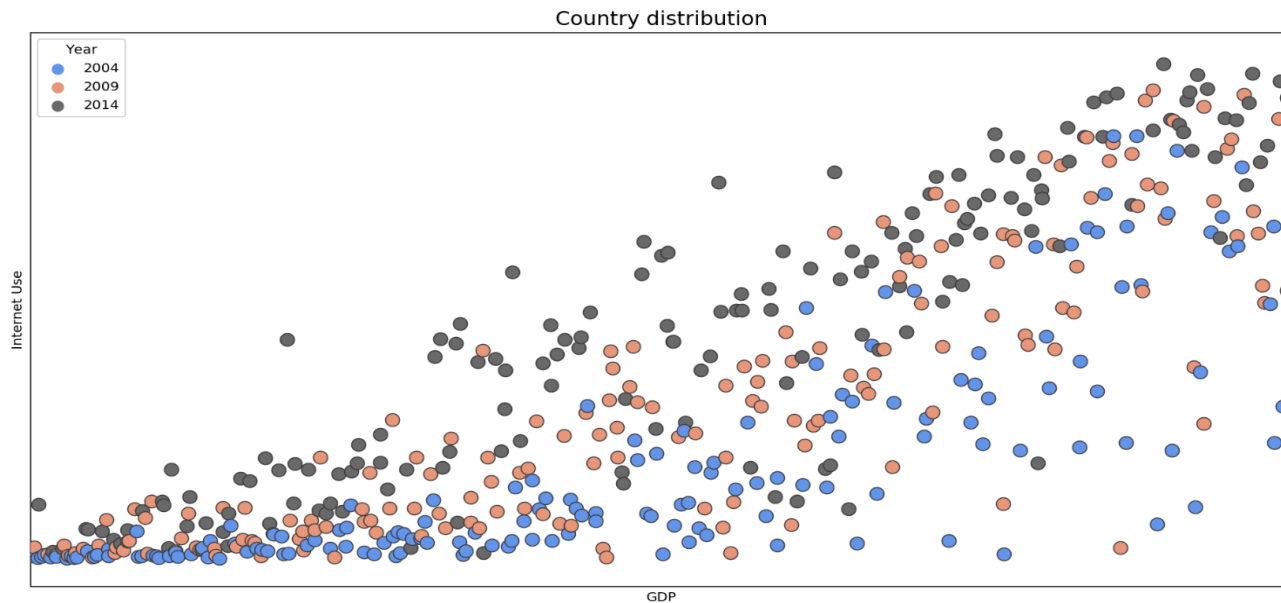


Markdown cells are a useful way to annotate your work:

Country GDP and internet usage distributions

Plotting of Year with x-axis as GDP_Per_Capita and y-axis as Internet_Users_Pct.

```
In [8]: plt.figure(figsize=(16,8), clear=True);  
  
ax1 = sns.stripplot(x="GDP_Per_Capita",  
                    y="Internet_Users_Pct",  
                    data=df_04_09_14,  
                    jitter=2,  
                    hue="Year",  
                    size=10,  
                    linewidth=.8,  
                    dodge=True);  
  
ax1.set_xlabel('GDP');  
ax1.set_ylabel('Internet Use');  
ax1.set_yticks([]);  
ax1.set_xticks([]);  
ax1.axes.set_title('Country distribution', fontsize=15);
```



Observing the plot ax1 above, we notice that in general, there looks to be a positive correlation between GDP and internet usage. This correlation seems strongest in years 2009 and 2014.

- Comment on choices made
- Comment on trends observed
- Note anomalies/surprises

<https://www.markdownguide.org/cheat-sheet/>



Questions?

