Introduction to Data Science

Metro Health Department

NASHVILLE SOFTWARE SCHOOL

Goals for today

- **Finish notebook from last week**
- **Practice notebook to review the topics covered so far.**
- **Learn ways to find help (module API, Stack Overflow, etc)**
- **Intro to markdown**
- **Learn some more *pandas*, including plotting with *matplotlib***

Resources for help when you get stuck

- Google
- Stack Overflow
- Doc Strings

Google

- 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 are outdated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!

stackoverflow

- 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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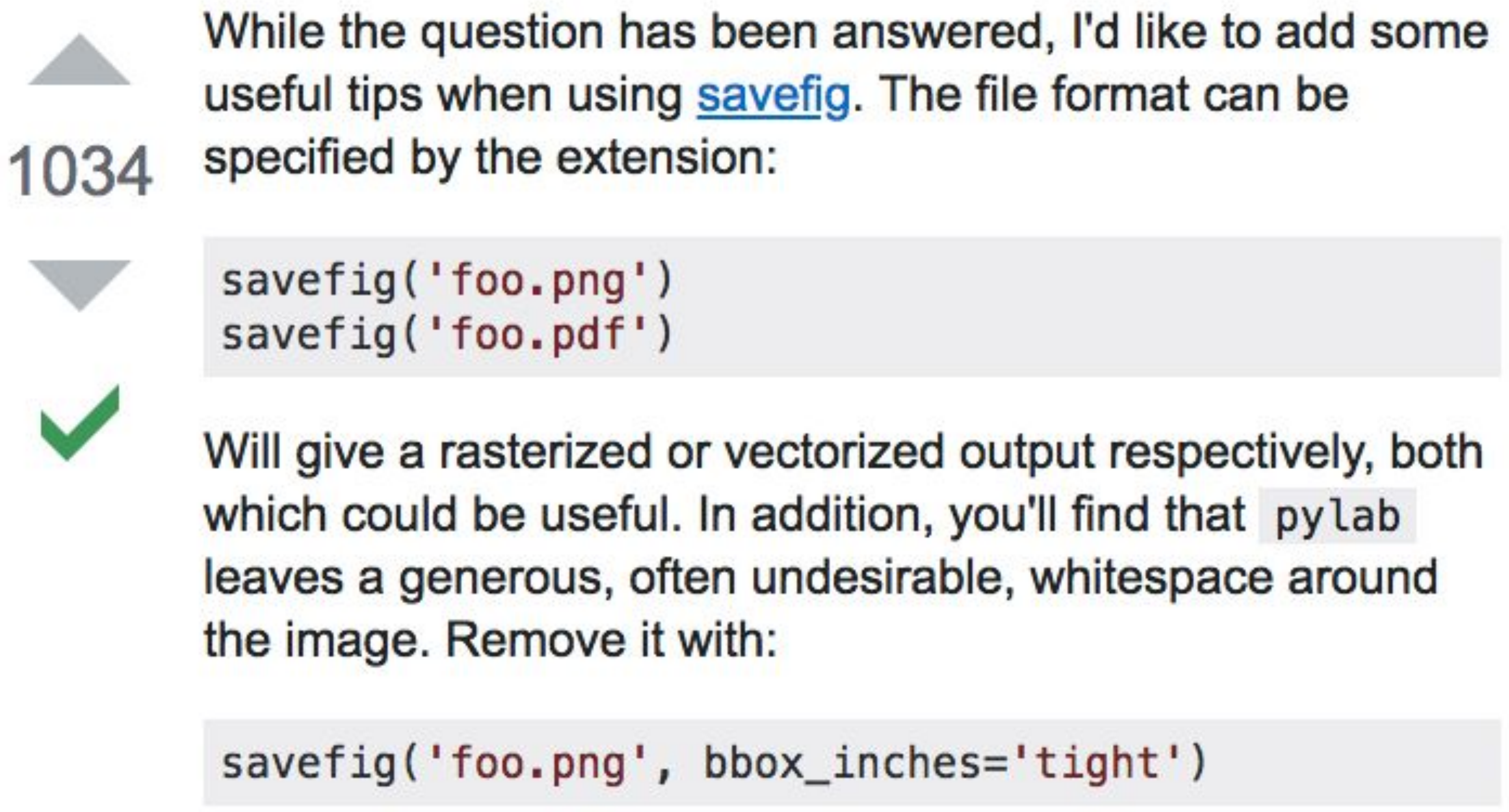


While the question has been answered, I'd like to add some useful tips when using savefig. The file format can be specified by the extension:

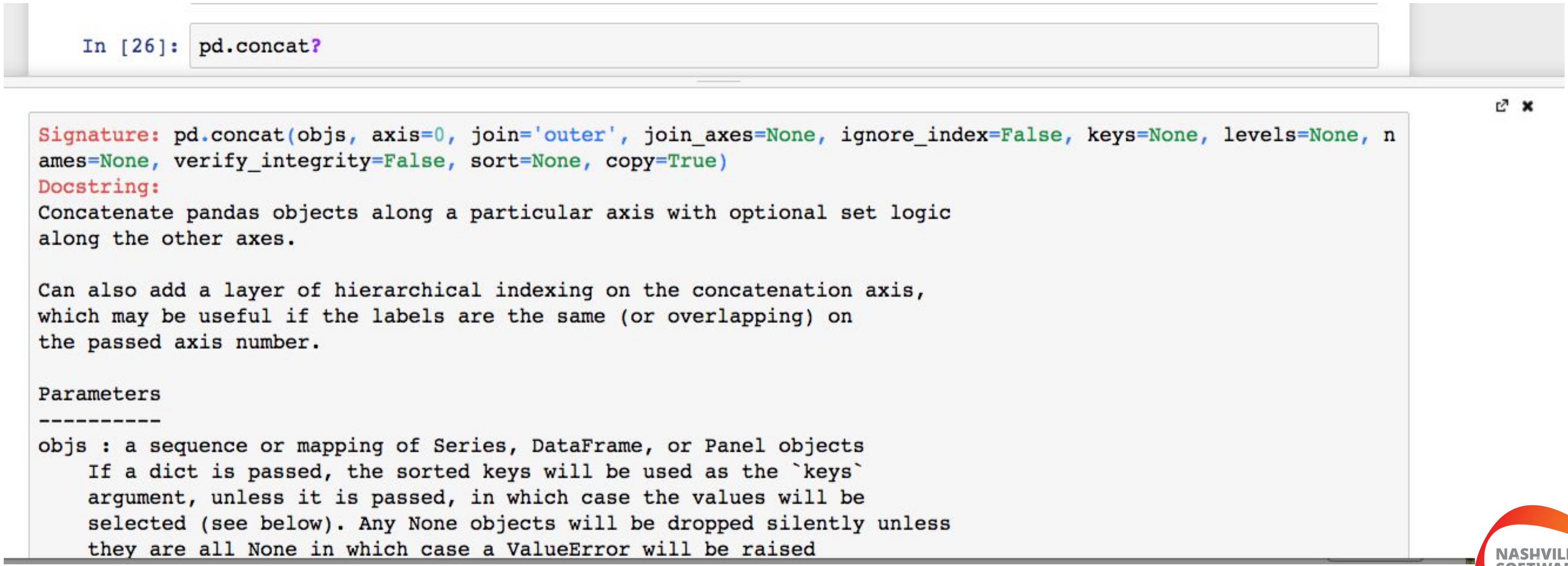
```
savefig('foo.png')
savefig('foo.pdf')
```

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')
```

Help within Jupyter

- shift + tab after keyword in a Jupyter cell (do it four times to pin the doc string to the bottom of the page)
- ? + keyword in a Jupyter cell



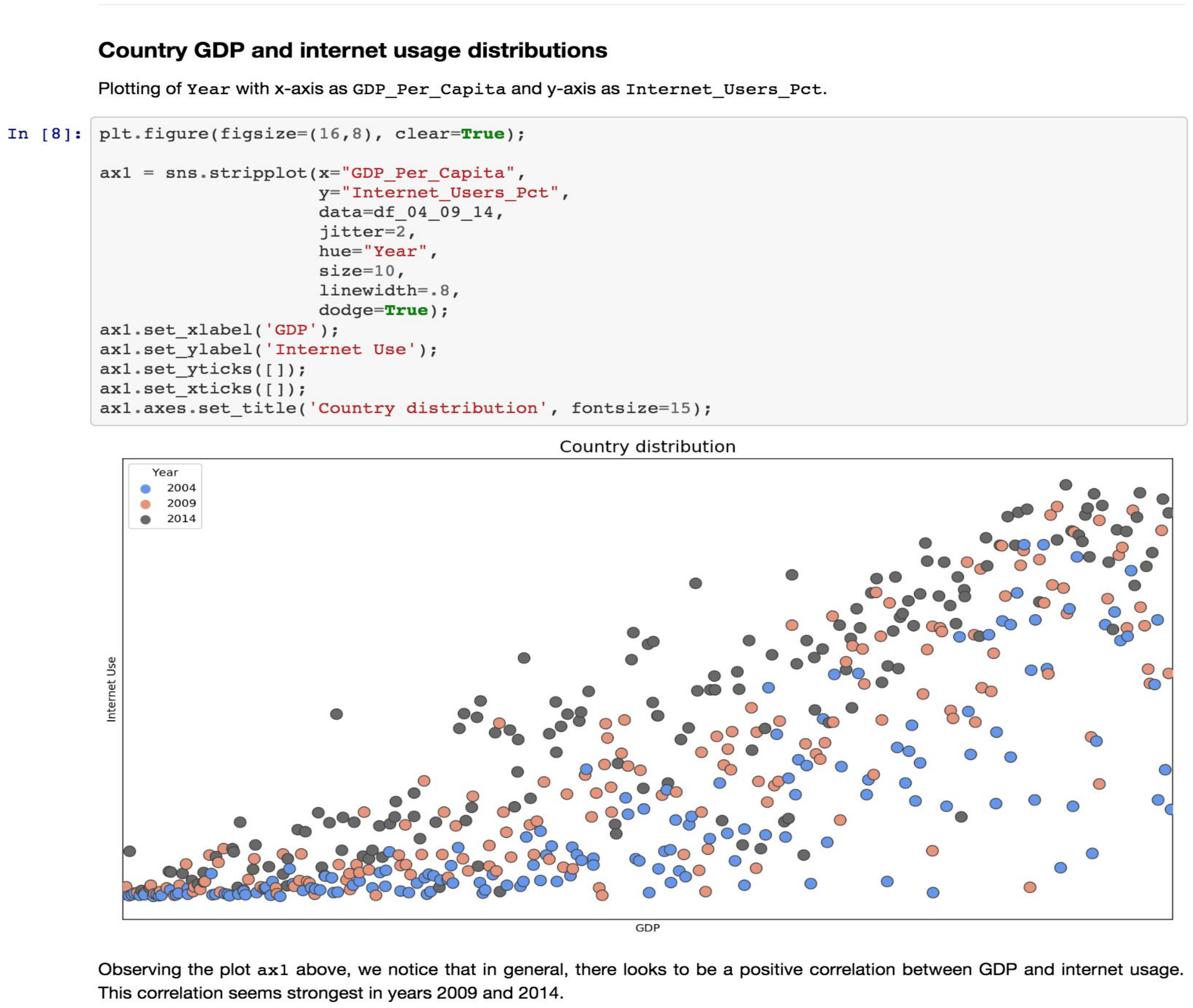
```
In [26]: pd.concat?
```

```
Signature: pd.concat(objs, axis=0, join='outer', join_axes=None, ignore_index=False, keys=None, levels=None, n
ames=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/

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

- **series.value_counts()** - gets counts for each unique value in a column (we saw this one last week)

- **df.groupby()** – group by a categorical variable to get summary statistics (count, sum, mean, etc.) by 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

- **Aggregate functions:**
  - **series.count(), series.nunique(), series.sum(), series.mean(), series.min(), series.max(), series.std()**

- **Functions to calculate values across rows:**
  - **series.shift(), series.diff(), series.cumsum()**

2_more_pandas_plus_plotting notebook

Questions?