Programming and frameworks for ML

Pandas Additional Resources

About Me

Big Data Consultant at Indra / Big Data Lecturer

- More than 20 years of experience in different environments, technologies, customers, countries ...
- Passionate data and technology
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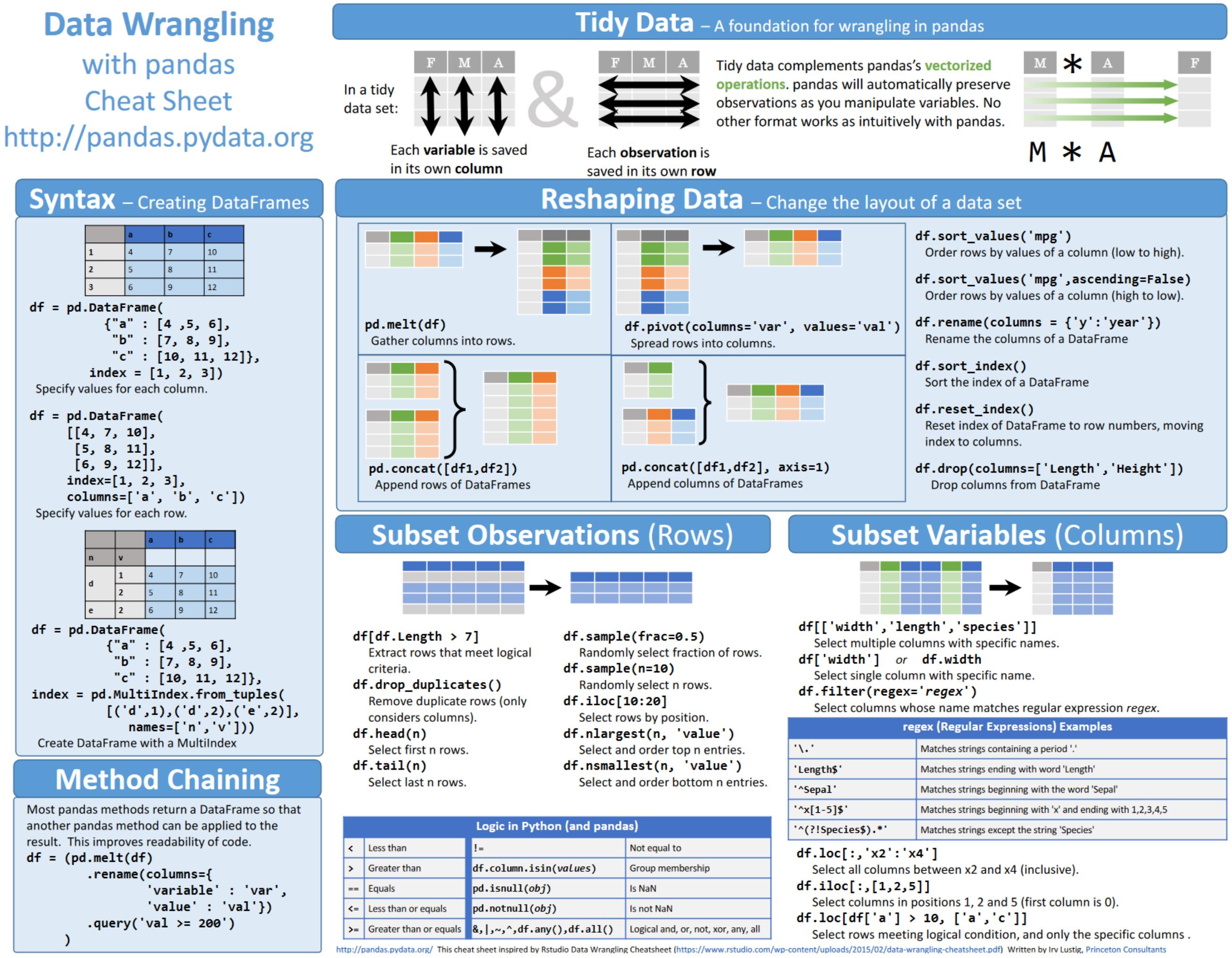
Pandas Cheat Sheet



Data Wrangling
with pandas
Cheat Sheet
http://pandas.pydata.org

Tidy Data – A foundation for wrangling in pandas

In a tidy data set:

F M A

Each **variable** is saved in its own **column**

&

F M A

Each **observation** is saved in its own **row**

Tidy data complements pandas's vectorized operations. pandas will automatically preserve observations as you manipulate variables. No other format works as intuitively with pandas.

M * A F

M * A

Syntax – Creating DataFrames

	a	b	c
1	4	7	10
2	5	8	11
3	6	9	12

```
df = pd.DataFrame(
          {"a" : [4 ,5, 6],
           "b" : [7, 8, 9],
           "c" : [10, 11, 12]},
        index = [1, 2, 3])
```
Specify values for each column.

```
df = pd.DataFrame(
     [[4, 7, 10],
      [5, 8, 11],
      [6, 9, 12]],
     index=[1, 2, 3],
     columns=['a', 'b', 'c'])
```
Specify values for each row.

		a	b	c
n	v			
d	1	4	7	10
	2	5	8	11
e	2	6	9	12

```
df = pd.DataFrame(
          {"a" : [4 ,5, 6],
           "b" : [7, 8, 9],
           "c" : [10, 11, 12]},
index = pd.MultiIndex.from_tuples(
          [('d',1),('d',2),('e',2)],
             names=['n','v']))
```
Create DataFrame with a MultiIndex

Method Chaining

Most pandas methods return a DataFrame so that another pandas method can be applied to the result. This improves readability of code.

```
df = (pd.melt(df)
        .rename(columns={
                'variable' : 'var',
                'value' : 'val'})
        .query('val >= 200')
     )
```

Reshaping Data – Change the layout of a data set

`pd.melt(df)`
Gather columns into rows.

`df.pivot(columns='var', values='val')`
Spread rows into columns.

`pd.concat([df1,df2])`
Append rows of DataFrames

`pd.concat([df1,df2], axis=1)`
Append columns of DataFrames

`df.sort_values('mpg')`
Order rows by values of a column (low to high).

`df.sort_values('mpg',ascending=False)`
Order rows by values of a column (high to low).

`df.rename(columns = {'y':'year'})`
Rename the columns of a DataFrame

`df.sort_index()`
Sort the index of a DataFrame

`df.reset_index()`
Reset index of DataFrame to row numbers, moving index to columns.

`df.drop(columns=['Length','Height'])`
Drop columns from DataFrame

Subset Observations (Rows)

`df[df.Length > 7]`
Extract rows that meet logical criteria.

`df.drop_duplicates()`
Remove duplicate rows (only considers columns).

`df.head(n)`
Select first n rows.

`df.tail(n)`
Select last n rows.

`df.sample(frac=0.5)`
Randomly select fraction of rows.

`df.sample(n=10)`
Randomly select n rows.

`df.iloc[10:20]`
Select rows by position.

`df.nlargest(n, 'value')`
Select and order top n entries.

`df.nsmallest(n, 'value')`
Select and order bottom n entries.

Logic in Python (and pandas)			
<	Less than	!=	Not equal to
>	Greater than	`df.column.isin(values)`	Group membership
==	Equals	`pd.isnull(obj)`	Is NaN
<=	Less than or equals	`pd.notnull(obj)`	Is not NaN
>=	Greater than or equals	`&,|,~,^,df.any(),df.all()`	Logical and, or, not, xor, any, all

Subset Variables (Columns)

`df[['width','length','species']]`
Select multiple columns with specific names.

`df['width']` *or* `df.width`
Select single column with specific name.

`df.filter(regex='regex')`
Select columns whose name matches regular expression *regex*.

regex (Regular Expressions) Examples	
`'\.'`	Matches strings containing a period '.'
`'Length$'`	Matches strings ending with word 'Length'
`'^Sepal'`	Matches strings beginning with the word 'Sepal'
`'^x[1-5]$'`	Matches strings beginning with 'x' and ending with 1,2,3,4,5
`'^(?!Species$).*'`	Matches strings except the string 'Species'

`df.loc[:,'x2':'x4']`
Select all columns between x2 and x4 (inclusive).

`df.iloc[:,[1,2,5]]`
Select columns in positions 1, 2 and 5 (first column is 0).

`df.loc[df['a'] > 10, ['a','c']]`
Select rows meeting logical condition, and only the specific columns .

http://pandas.pydata.org/ This cheat sheet inspired by Rstudio Data Wrangling Cheatsheet (https://www.rstudio.com/wp-content/uploads/2015/02/data-wrangling-cheatsheet.pdf) Written by Irv Lustig, Princeton Consultants

https://pandas.pydata.org/Pandas_Cheat_Sheet.pdf

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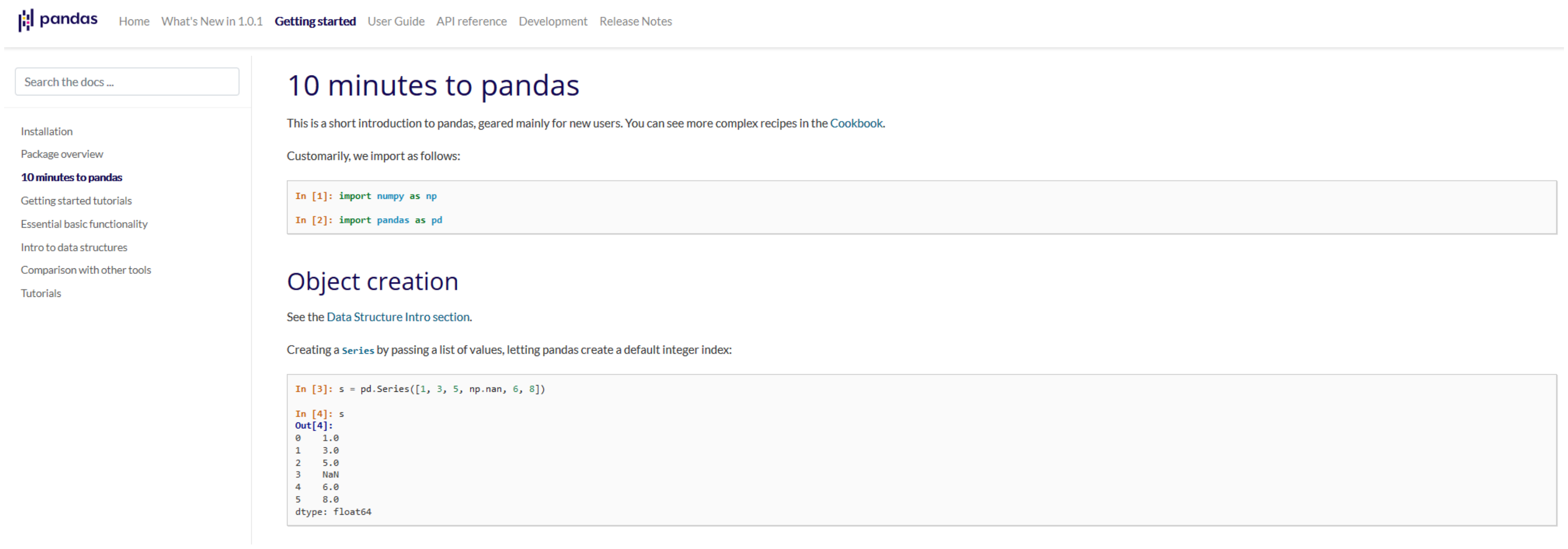
10 minutes to pandas



10 minutes to pandas

This is a short introduction to pandas, geared mainly for new users. You can see more complex recipes in the Cookbook.

Customarily, we import as follows:

```
In [1]: import numpy as np

In [2]: import pandas as pd
```

Object creation

See the Data Structure Intro section.

Creating a `Series` by passing a list of values, letting pandas create a default integer index:

```
In [3]: s = pd.Series([1, 3, 5, np.nan, 6, 8])

In [4]: s
Out[4]:
0    1.0
1    3.0
2    5.0
3    NaN
4    6.0
5    8.0
dtype: float64
```

https://pandas.pydata.org/pandas-docs/stable/getting_started/10min.html

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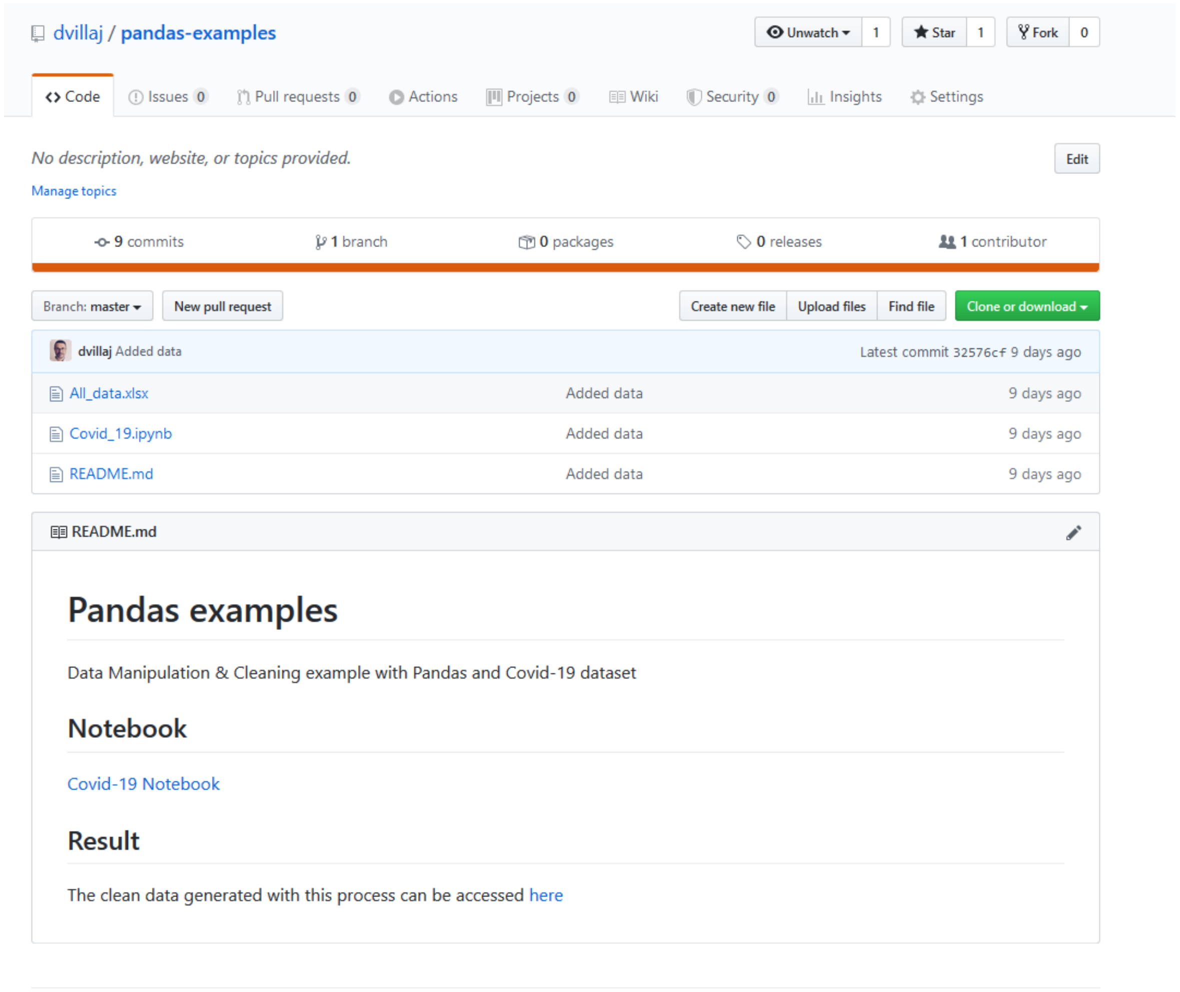
Examples


dvillaj / pandas-examples

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9 commits | 1 branch | 0 packages | 0 releases | 1 contributor

dvillaj Added data — Latest commit 32576cf 9 days ago

All_data.xlsx	Added data	9 days ago
Covid_19.ipynb	Added data	9 days ago
README.md	Added data	9 days ago

README.md

Pandas examples

Data Manipulation & Cleaning example with Pandas and Covid-19 dataset

Notebook

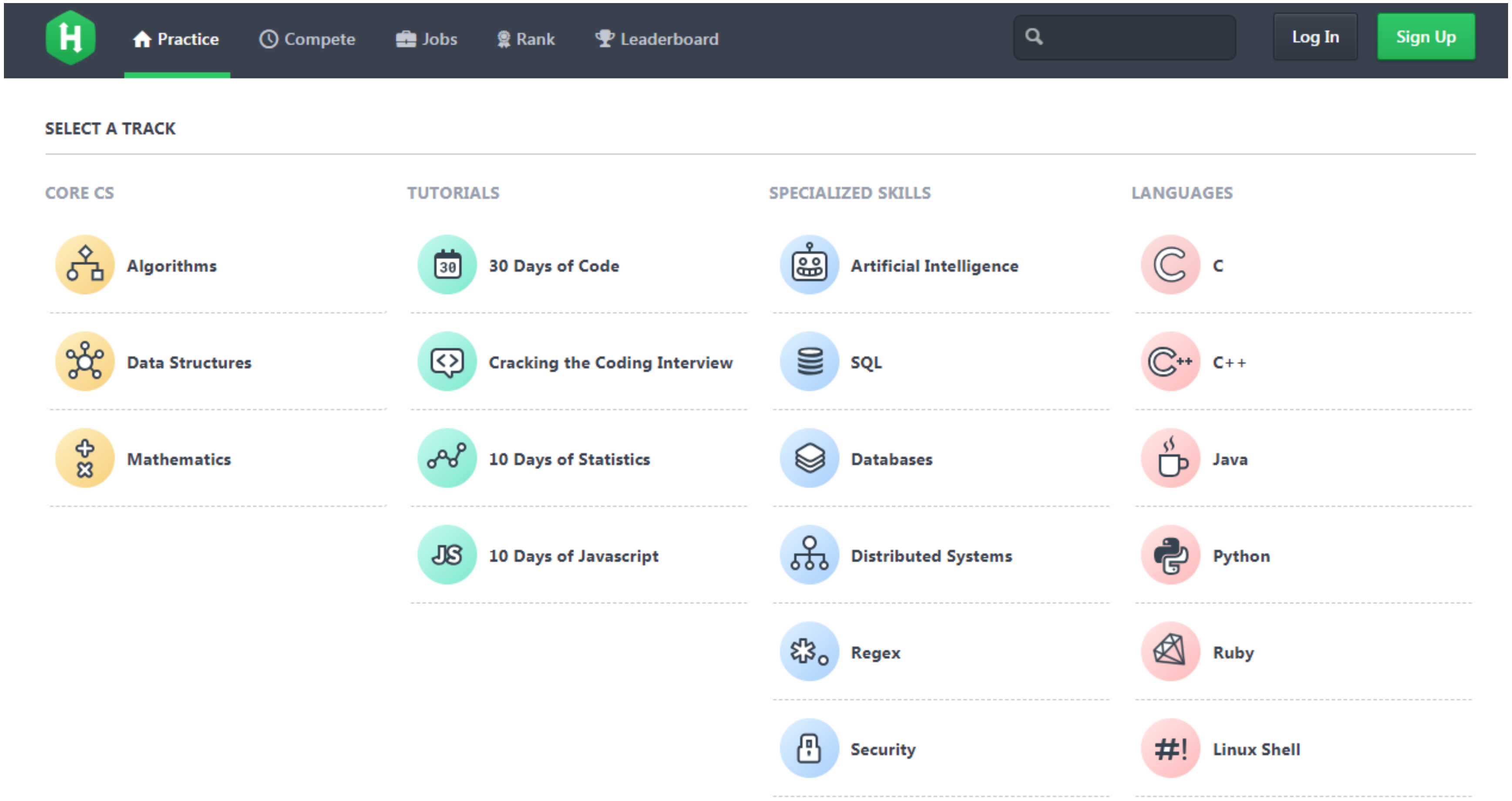
Covid-19 Notebook

Result

The clean data generated with this process can be accessed here

https://github.com/dvillaj/pandas-examples

Practice



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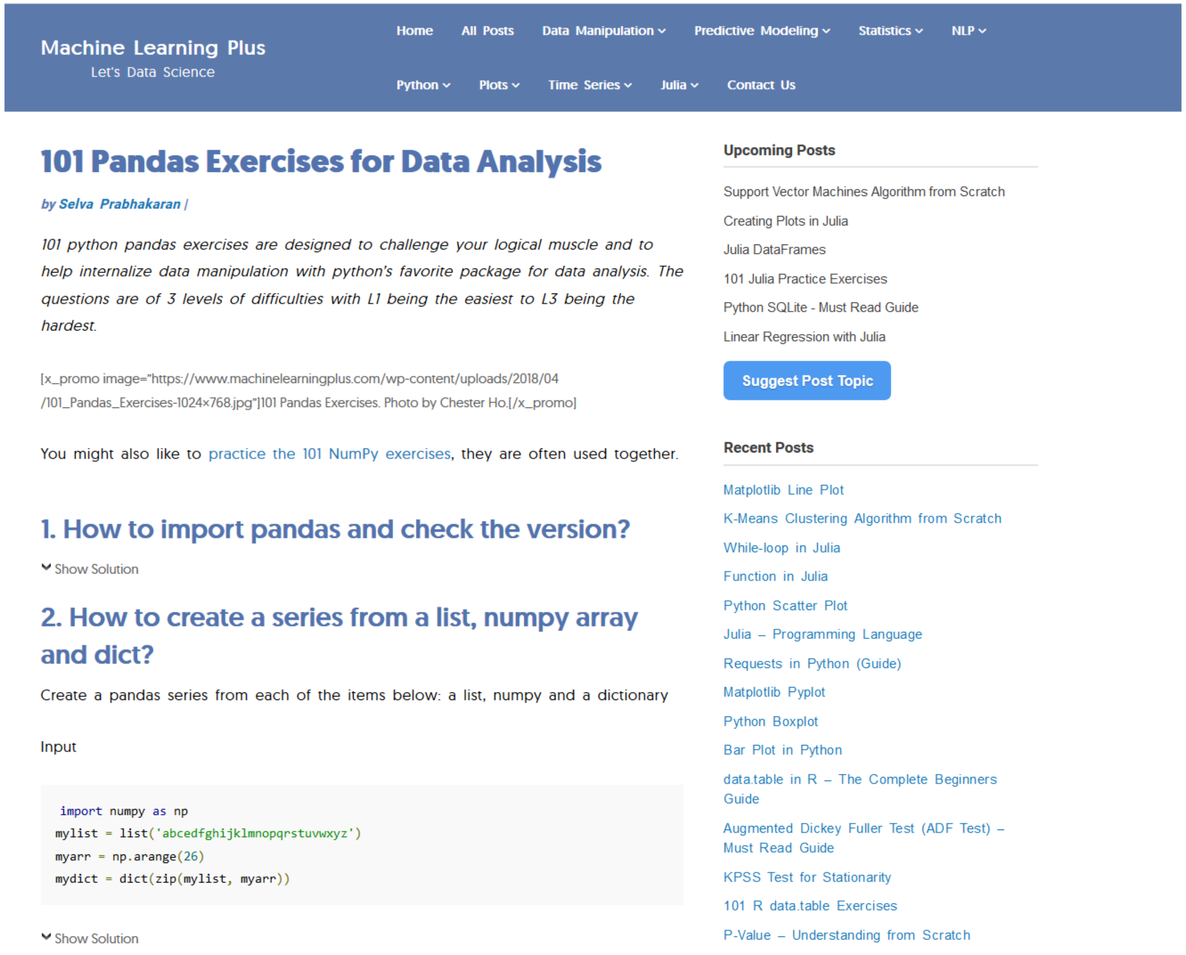
		Security	Linux Shell

https://www.hackerrank.com

Practice



101 Pandas Exercises for Data Analysis

by Selva Prabhakaran |

101 python pandas exercises are designed to challenge your logical muscle and to help internalize data manipulation with python's favorite package for data analysis. The questions are of 3 levels of difficulties with L1 being the easiest to L3 being the hardest.

[x_promo image="https://www.machinelearningplus.com/wp-content/uploads/2018/04/101_Pandas_Exercises-1024×768.jpg"]101 Pandas Exercises. Photo by Chester Ho.[/x_promo]

You might also like to practice the 101 NumPy exercises, they are often used together.

1. How to import pandas and check the version?

Show Solution

2. How to create a series from a list, numpy array and dict?

Create a pandas series from each of the items below: a list, numpy and a dictionary

Input

```
 import numpy as np
mylist = list('abcedfghijklmnopqrstuvwxyz')
myarr = np.arange(26)
mydict = dict(zip(mylist, myarr))
```

Show Solution

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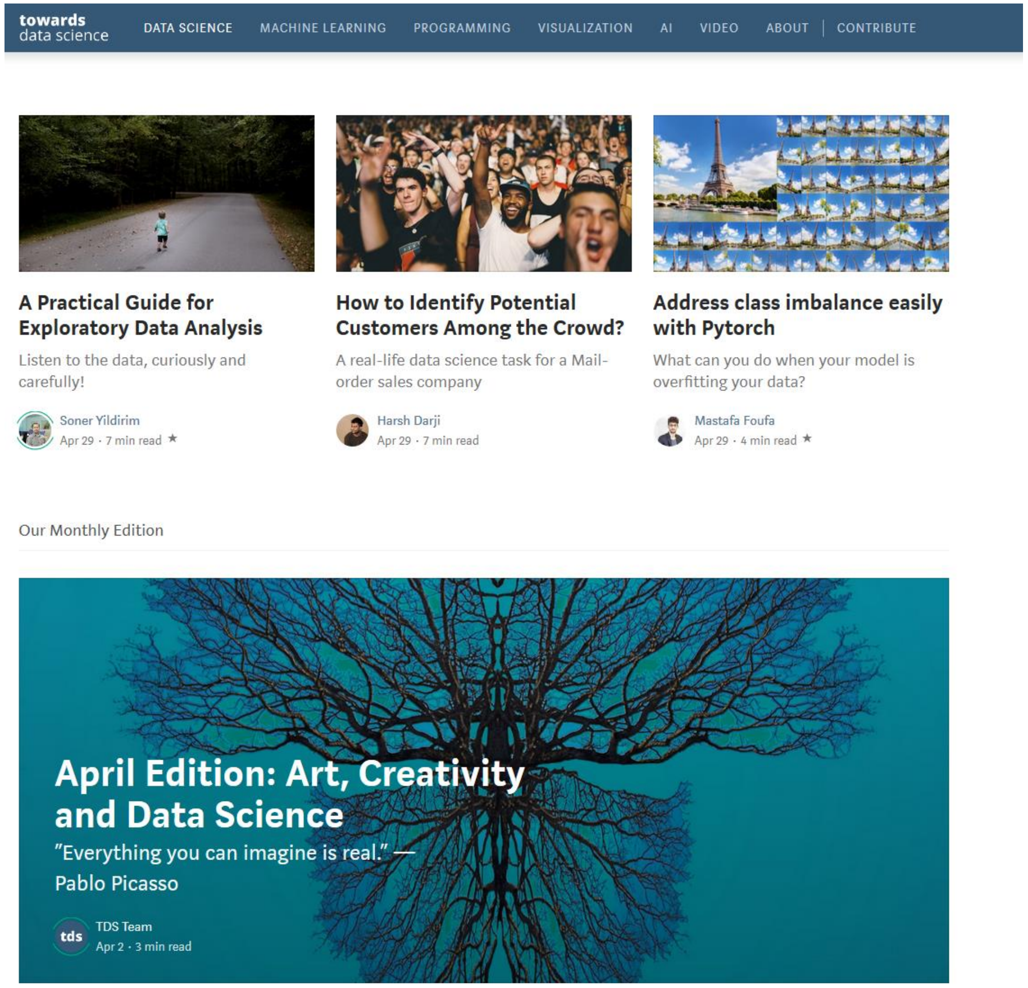
P-Value – Understanding from Scratch

https://www.machinelearningplus.com/python/101-pandas-exercises-python/

Articles



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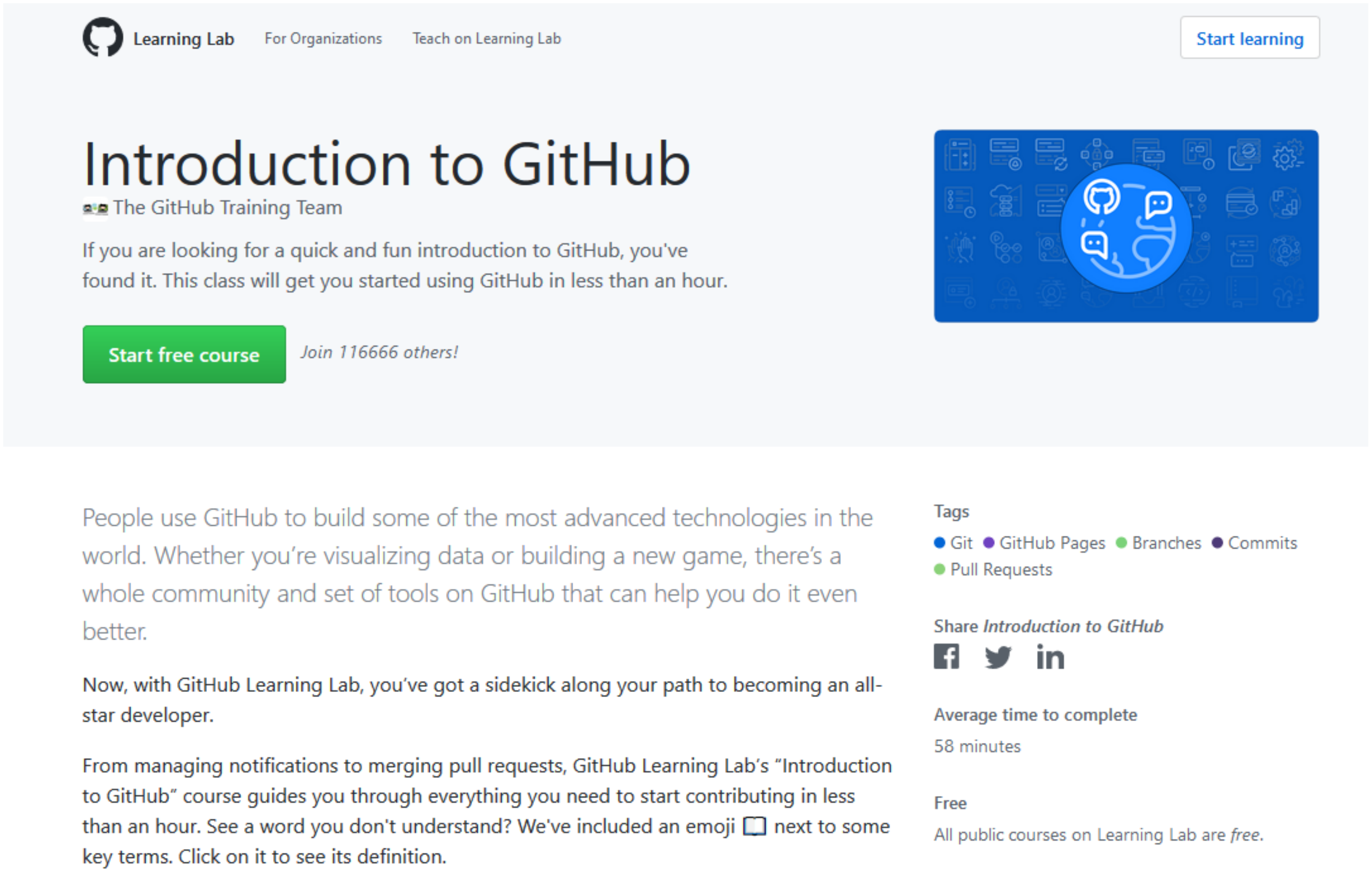

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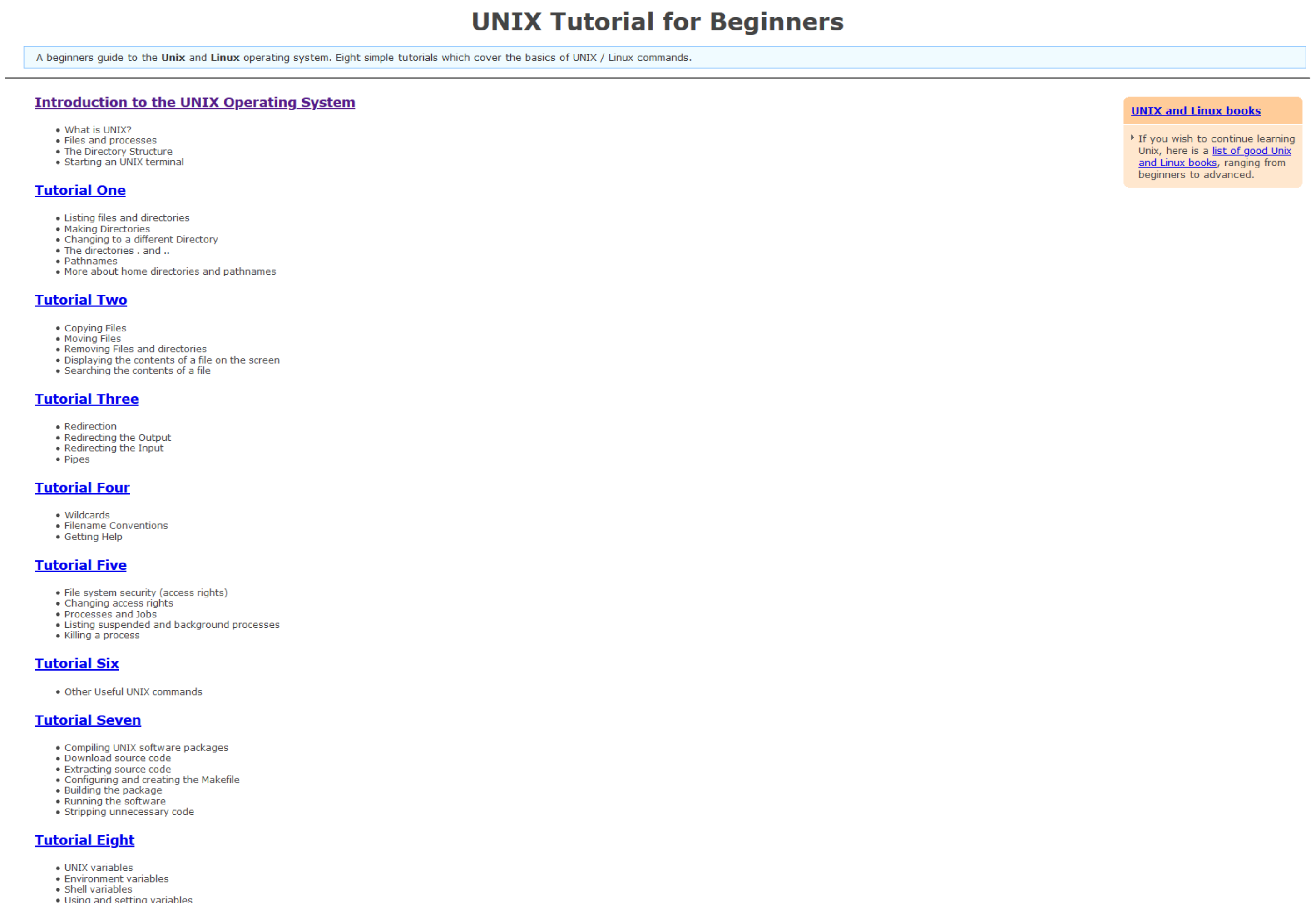
Git Client

https://www.gitkraken.com/

Unix Tutorial



UNIX Tutorial for Beginners

A beginners guide to the **Unix** and **Linux** operating system. Eight simple tutorials which cover the basics of UNIX / Linux commands.

Introduction to the UNIX Operating System

- What is UNIX?
- Files and processes
- The Directory Structure
- Starting an UNIX terminal

Tutorial One

- Listing files and directories
- Making Directories
- Changing to a different Directory
- The directories . and ..
- Pathnames
- More about home directories and pathnames

Tutorial Two

- Copying Files
- Moving Files
- Removing Files and directories
- Displaying the contents of a file on the screen
- Searching the contents of a file

Tutorial Three

- Redirection
- Redirecting the Output
- Redirecting the Input
- Pipes

Tutorial Four

- Wildcards
- Filename Conventions
- Getting Help

Tutorial Five

- File system security (access rights)
- Changing access rights
- Processes and Jobs
- Listing suspended and background processes
- Killing a process

Tutorial Six

- Other Useful UNIX commands

Tutorial Seven

- Compiling UNIX software packages
- Download source code
- Extracting source code
- Configuring and creating the Makefile
- Building the package
- Running the software
- Stripping unnecessary code

Tutorial Eight

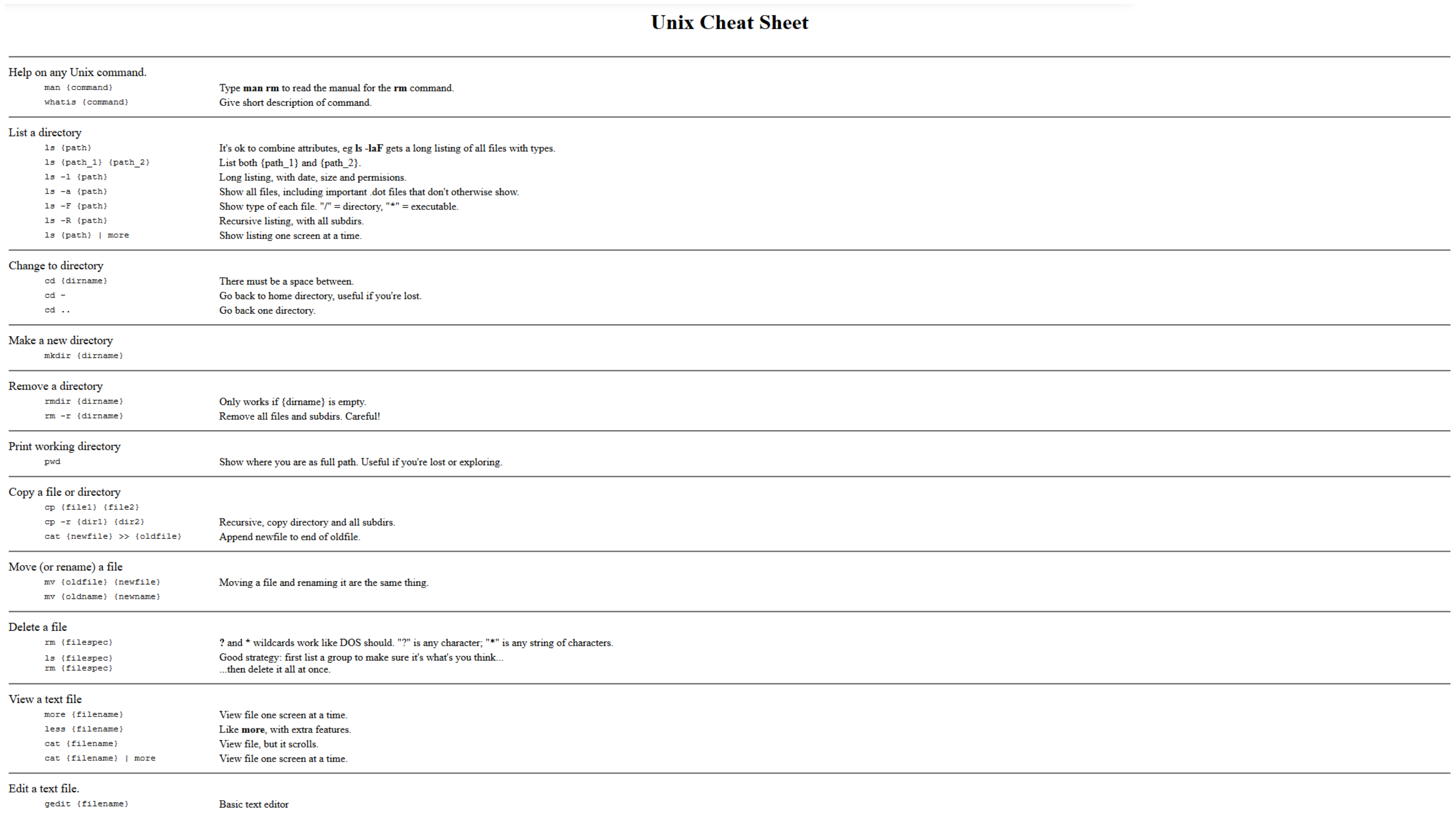
- UNIX variables
- Environment variables
- Shell variables
- Using and setting variables

UNIX and Linux books

If you wish to continue learning Unix, here is a list of good Unix and Linux books, ranging from beginners to advanced.

http://www.ee.surrey.ac.uk/Teaching/Unix/

Unix Cheat Sheet



Unix Cheat Sheet

Help on any Unix command.

`man {command}`	Type **man rm** to read the manual for the **rm** command.
`whatis {command}`	Give short description of command.

List a directory

`ls {path}`	It's ok to combine attributes, eg **ls -laF** gets a long listing of all files with types.
`ls {path_1} {path_2}`	List both {path_1} and {path_2}.
`ls -l {path}`	Long listing, with date, size and permisions.
`ls -a {path}`	Show all files, including important .dot files that don't otherwise show.
`ls -F {path}`	Show type of each file. "/" = directory, "*" = executable.
`ls -R {path}`	Recursive listing, with all subdirs.
`ls {path} | more`	Show listing one screen at a time.

Change to directory

`cd {dirname}`	There must be a space between.
`cd ~`	Go back to home directory, useful if you're lost.
`cd ..`	Go back one directory.

Make a new directory

`mkdir {dirname}`	

Remove a directory

`rmdir {dirname}`	Only works if {dirname} is empty.
`rm -r {dirname}`	Remove all files and subdirs. Careful!

Print working directory

`pwd`	Show where you are as full path. Useful if you're lost or exploring.

Copy a file or directory

`cp {file1} {file2}`	
`cp -r {dir1} {dir2}`	Recursive, copy directory and all subdirs.
`cat {newfile} >> {oldfile}`	Append newfile to end of oldfile.

Move (or rename) a file

`mv {oldfile} {newfile}`	Moving a file and renaming it are the same thing.
`mv {oldname} {newname}`	

Delete a file

`rm {filespec}`	? and * wildcards work like DOS should. "?" is any character; "*" is any string of characters.
`ls {filespec}` `rm {filespec}`	Good strategy: first list a group to make sure it's what's you think... ...then delete it all at once.

View a text file

`more {filename}`	View file one screen at a time.
`less {filename}`	Like **more**, with extra features.
`cat {filename}`	View file, but it scrolls.
`cat {filename} | more`	View file one screen at a time.

Edit a text file.

`gedit {filename}`	Basic text editor

http://www.mathcs.emory.edu/~valerie/courses/fall10/155/resources/unix_cheatsheet.html

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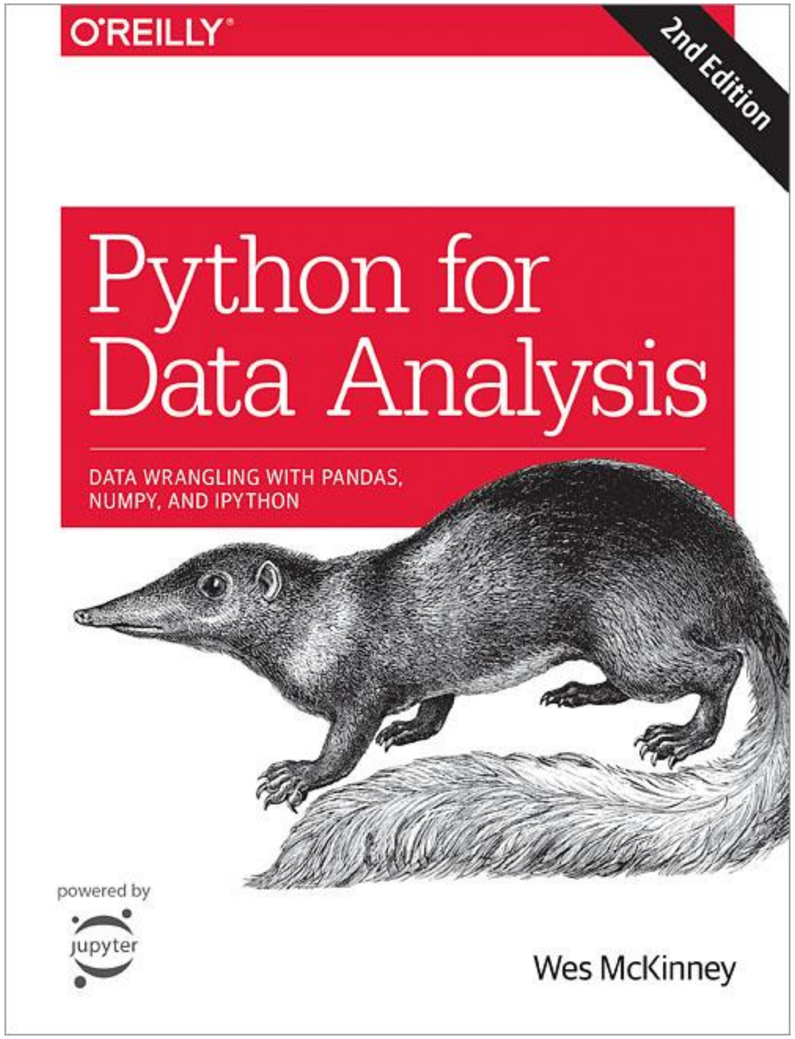
Bibliography



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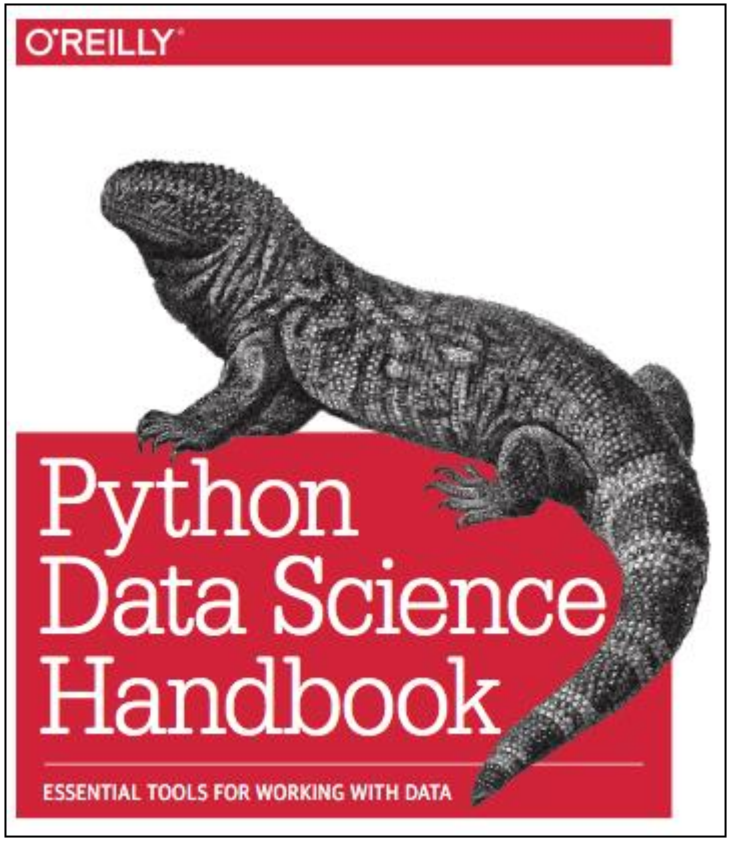

- https://github.com/jakevdp/PythonDataScienc eHandbook

THANKS FOR YOUR ATTENTION

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