Section 1

MANE 3351

Subsection 1

Lecture 3, August 30

Classroom Management

Agenda

- Attendance
- Textbook

Subsection 2

Resources

Handouts

- Lecture 3 Slides
- Lecture 3 Marked Slides

Calendar

Lecture	Date	Content
1	August 23	Welcome to Class, Syllabus
2	August 25	Error Analysis
3	August 30	Introduction to Jupyter Notebook

Assignments

- Set up PC to run Jupyter Notebook

Git

git --fast-version-control

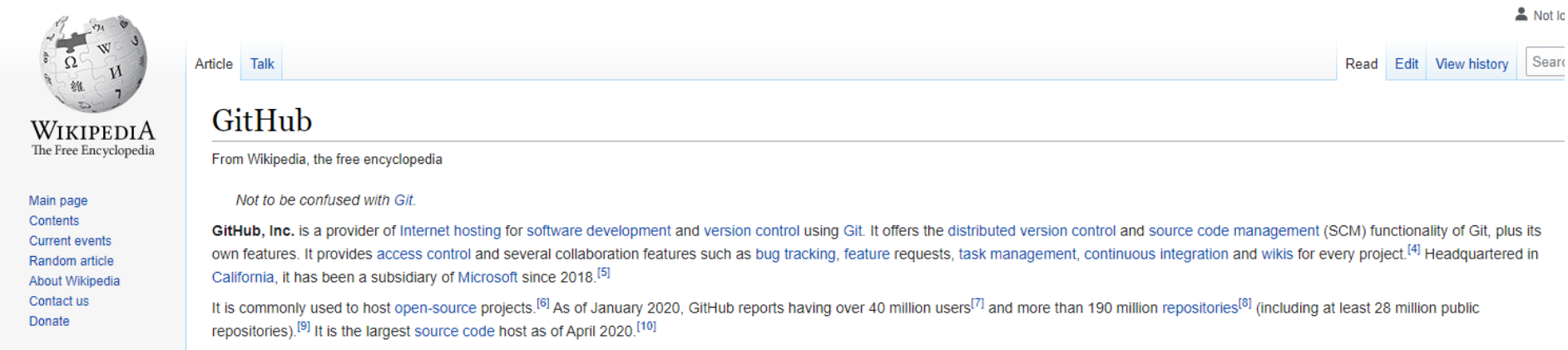
Search entire site...

Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency.

Git is easy to learn and has a tiny footprint with lightning fast performance. It outclasses SCM tools like Subversion, CVS, Perforce, and ClearCase with features like cheap local branching, convenient staging areas, and multiple workflows.

Source

GitHub



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GitHub

From Wikipedia, the free encyclopedia

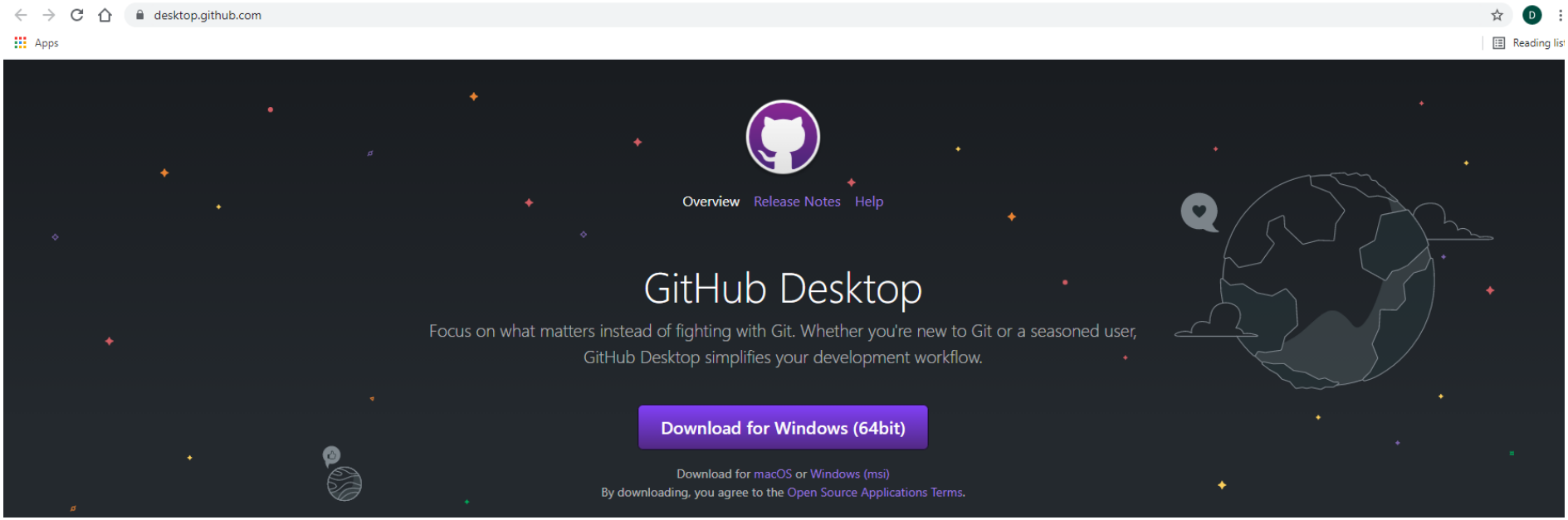
Not to be confused with Git.

GitHub, Inc. is a provider of Internet hosting for software development and version control using Git. It offers the distributed version control and source code management (SCM) functionality of Git, plus its own features. It provides access control and several collaboration features such as bug tracking, feature requests, task management, continuous integration and wikis for every project.[4] Headquartered in California, it has been a subsidiary of Microsoft since 2018.[5]

It is commonly used to host open-source projects.[6] As of January 2020, GitHub reports having over 40 million users[7] and more than 190 million repositories[8] (including at least 28 million public repositories).[9] It is the largest source code host as of April 2020.[10]

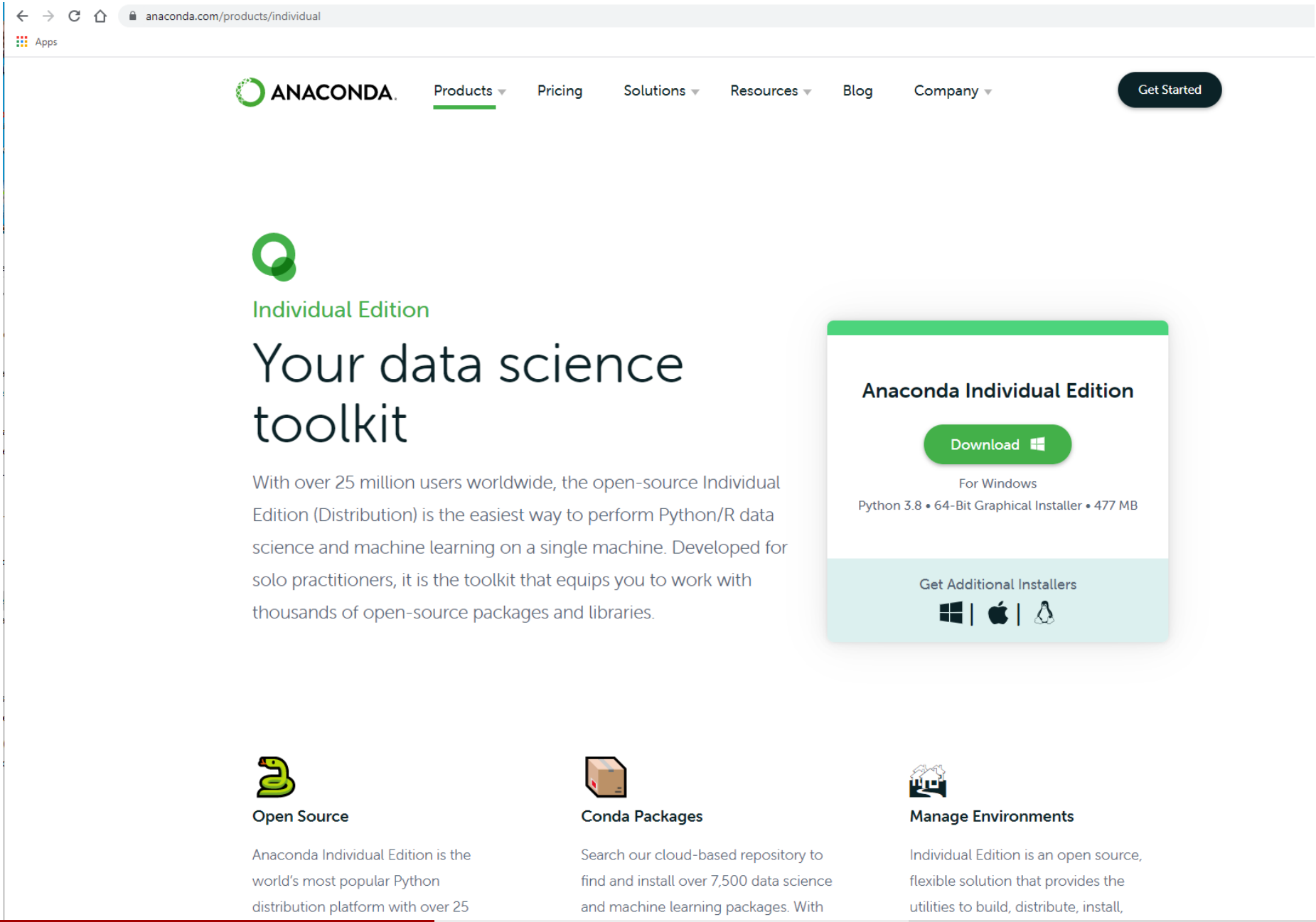
- Source
- Classroom lecture materials will be available at http://github.com/douglastimmer/MANE3351_Fall2021
- Easiest approach is download on PC or Mac using gitHub Desktop
- For Raspberry Pi, git must be used (command line)
- Laboratories will be handled slightly differently (more later)

GitHub Desktop



- Source
- Graphical interface that makes using GitHub very easy to use
- Downloading lecture materials
  - First use: clone repository
  - Subsequent uses: pull repository (will update local material)
- Please do not push

Python with Jupyter Notebook



GitHub Demonstration

Standard Normal, Case 1

```
import matplotlib.pyplot as plt
import numpy as np
import scipy.stats as sct
import math

a=0.5

x=np.linspace(-4,4,500)
y=sct.norm.pdf(x,0,1)
y2=0.0*x
maske =(x<a)

plt.plot(x,y,'b')
plt.fill_between(x,y,color='#666666',where=maske)
plt.plot(x,y2,'b')
plt.show()

answer=sct.norm.cdf(a,0,1)
```

First 4 Lines

- Imports allow external packages to be used
- Most standard packages are included in the Anaconda installation
  - **Matplotlib** “is a Python 2D plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environments across platforms. Matplotlib can be used in Python scripts, the Python and IPython shells, the Jupyter notebook, web application servers, and four graphical user interface toolkits”[^1]
  - **NumPy** “is the fundamental package for scientific computering with Python. It contains amont other things: 1). a powerfull N-dimensional array object, 2). sophisticated (broadcasting) functions, 3. tools for integrating C/C++ and Fortran code, and 4). usefull linear algebra, Fourier transform, and random number capabilities.”[^2]
  - **SciPy** “is a Python-based ecosystem of open-source software for mathematics, science, and engineering. In particular, these are some of the core packages: NumPy, SciPy library, Matplotlib, IPython, Sympy, and pandas.”[^3]
  - **Math** "provides access to the mathematical functions defined by the C standard.

Python Libraries

Numpy Linspace

numpy.linspace

numpy.linspace(*start, stop, num=50, endpoint=True, retstep=False, dtype=None, axis=0*)

Return evenly spaced numbers over a specified interval. [source]

Returns *num* evenly spaced samples, calculated over the interval [*start*, *stop*].

The endpoint of the interval can optionally be excluded.

Changed in version 1.16.0: Non-scalar *start* and *stop* are now supported.

Changed in version 1.20.0: Values are rounded towards `-inf` instead of `0` when an integer `dtype` is specified. The old behavior can still be obtained with `np.linspace(start, stop, num).astype(int)`

- Source
- Experiment with endpoint

scipy.stats.norm

scipy.stats.norm

`scipy.stats.norm = <scipy.stats._continuous_distns.norm_gen object>` [source]

A normal continuous random variable.

The location (`loc`) keyword specifies the mean. The scale (`scale`) keyword specifies the standard deviation.

As an instance of the **`rv_continuous`** class, **`norm`** object inherits from it a collection of generic methods (see below for the full list), and completes them with details specific for this particular distribution.

Notes

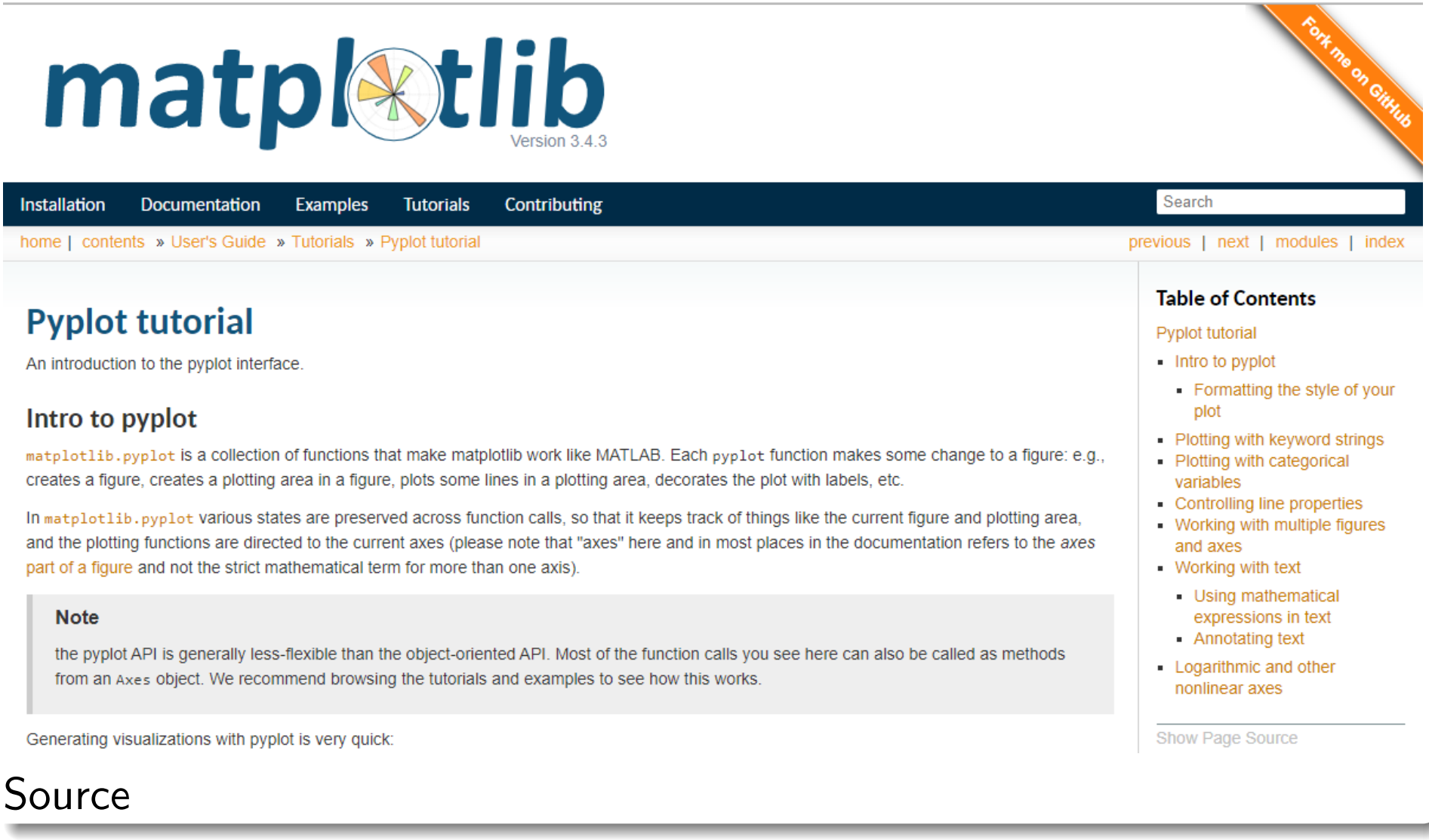
The probability density function for **`norm`** is:

$$f(x) = \frac{\exp(-x^2/2)}{\sqrt{2\pi}}$$

for a real number x.

The probability density above is defined in the "standardized" form. To shift and/or scale the distribution use the `loc` and `scale` parameters. Specifically, `norm.pdf(x, loc, scale)` is identically equivalent to `norm.pdf(y) / scale` with `y = (x - loc) / scale`. Note that shifting the location of a distribution does not make it a "noncentral" distribution; noncentral generalizations of some

Matplotlib



Source