



JupyterLab: The Evolution of the Jupyter Notebook

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The Jupyter Notebook



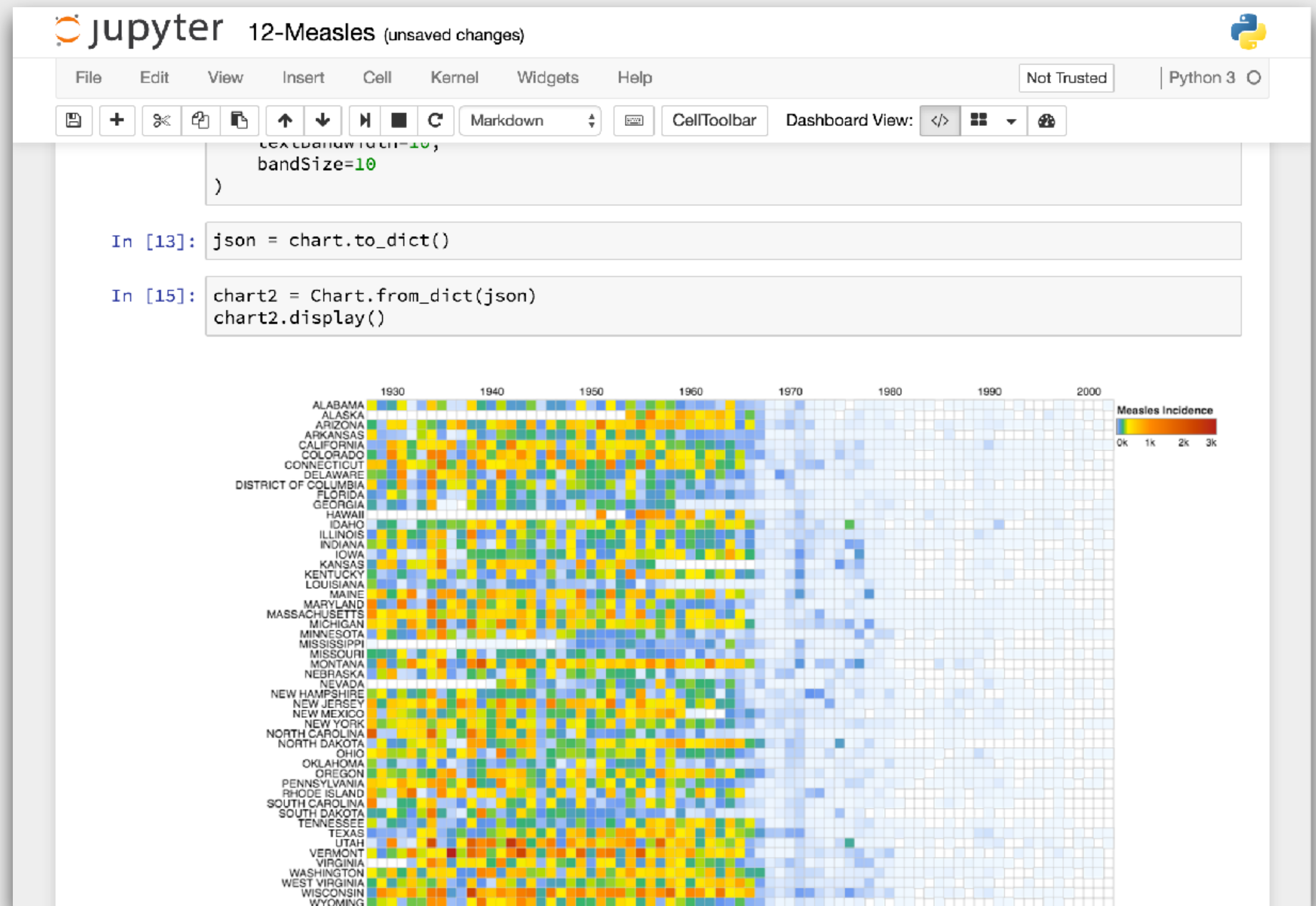
Jupyter Notebook



Interactive, Exploratory, Reproducible

- **Interactive**, browser-based computing environment
- **Exploratory** data science, ML, visualization, analysis, stats
- **Reproducible** document format:
 - Code
 - Narrative text (markdown)
 - Equations (LaTeX)
 - Images, visualizations
- Over 50 programming languages
- Everything open-source (BSD license)

Jupyter Notebook



A Jupyter Notebook document with a visualization of measles data.

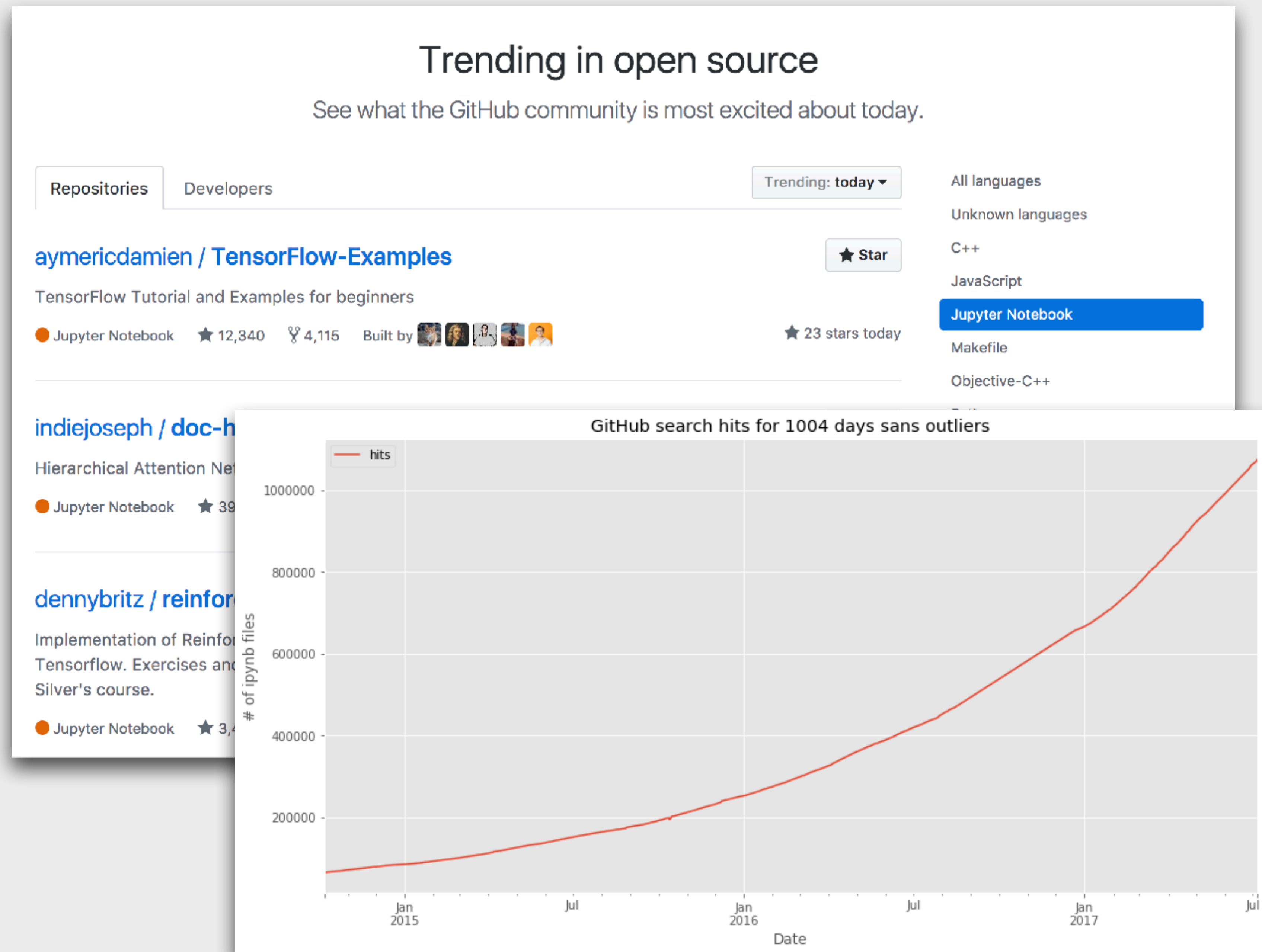
Project Jupyter: Where are we today?



Millions of Users



Millions of Notebooks



<https://github.com/trending/jupyter-notebook>

Enabling Reproducible Science





LIGO Open Science Center

LIGO is operated by California Institute of Technology and Massachusetts Institute of Technology and supported by the U.S. National Science Foundation.

Getting Started

Tutorials

Data

Events

Bulk Data

Timelines

My Sources

Software

GPS ↔ UTC

About LIGO

Data Analysis Projects

Acknowledgement

Welcome to the LIGO Open Science Center

About LIGO

Get Started with LIGO data

Join the E-mail list for updates

For general information on LIGO, please visit ligo.org

If you have LSC credentials, you may go to the [development site](#)

More discoveries from LIGO!

Data Releases from two events and a candidate event

released 2016 June 15:
[Event of December 26, GW151226: Chirp mass 9](#)

released 2016 June 15:
[Candidate event of October 12, LVT151012: Chirp mass 15](#)

released 2016 Feb 11:
[Event of September 14, GW150914: Chirp mass 30](#)

The [LIGO Laboratory's Data Management Plan](#) describes the scope and timing of LIGO data releases.

Jupyter notebook

See the new tutorial on signal processing with LIGO data, as a Jupyter (iPython) notebook.

[Tutorial on Binary Black Hole Signals in LIGO Open Data](#)

<https://losc.ligo.org/about/>

Live Code on Binder



LIGO Binder



Turn a GitHub repo into a collection of interactive notebooks

Have a repository full of Jupyter notebooks? With Binder, open those notebooks in an executable environment, making your code immediately reproducible by anyone, anywhere.

Build and Launch a Repository

GitHub repo or URL

Git branch, tag, or commit

Path to a notebook file (Optional)

Launch

Waiting

Already built!

Launching

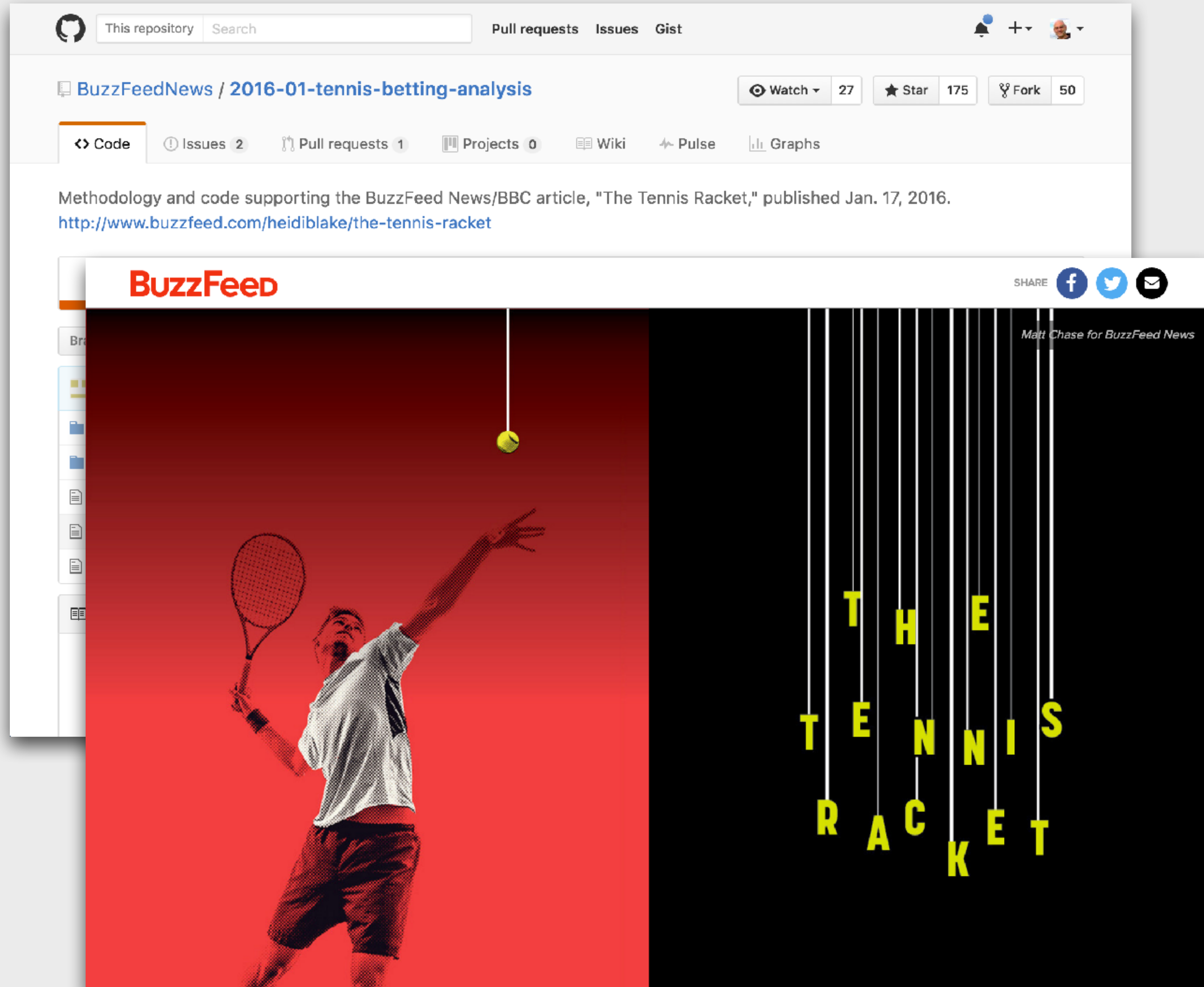
Build logs

show

<https://losc.ligo.org/tutorials/>

<https://beta.mybinder.org/v2/gh/minrk/ligo-binder/master?filepath=index.ipynb>

Enabling Open Data Journalism



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Data visualization with Seaborn

Seaborn provides an API on top of matplotlib, which uses sane plot and color defaults and simple functions for common statistical plot types.

By Jake VanderPlas, May 7, 2015

Embracing Jupyter Notebooks at O'Reilly

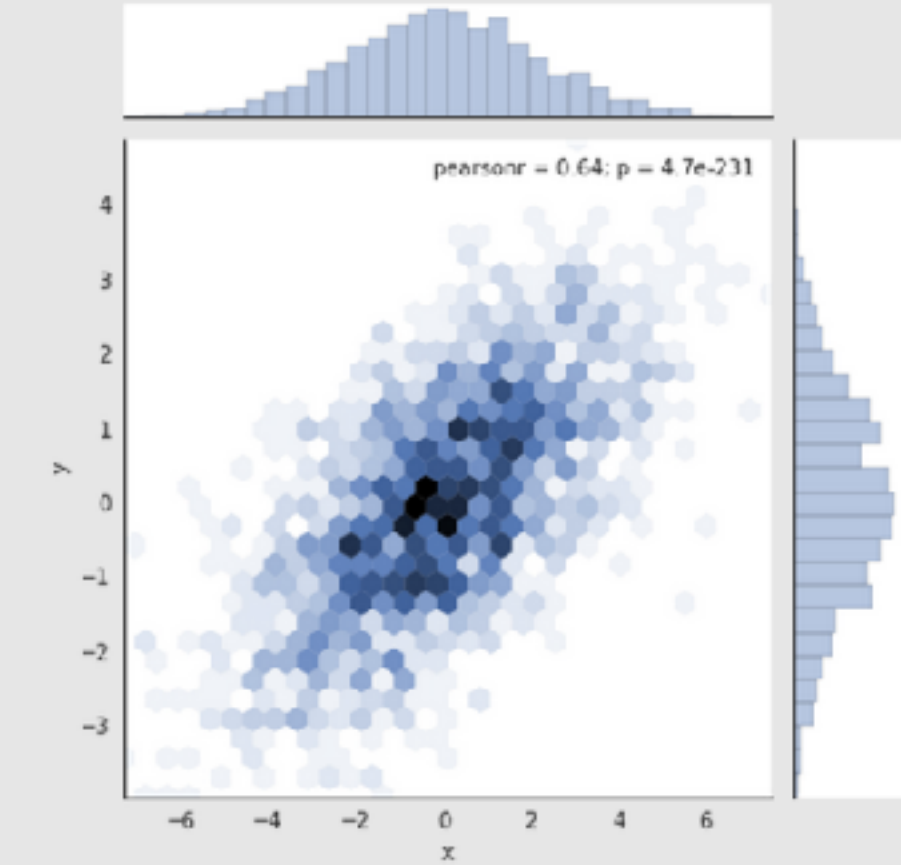
O'Reilly Media is using our Atlas platform to make Jupyter Notebooks a first class authoring environment for our publishing program.

By Andrew Odehahn, May 7, 2015

Embracing Jupyter Notebooks at O'Reilly

O'Reilly Media is thrilled to announce that we're making IPython Notebooks a first-class authoring environment for our publishing program, on par with Word or our Atlas platform. As part of our move to embrace the platform, we're also experimenting on beta.oreilly.com with new ways for readers to experience this content, like these examples:

- Data visualization with Seaborn
- Introduction to Support Vector Machines
- Simple Line Plots with Matplotlib
- Three-dimensional Plotting in Matplotlib
- An illustrated introduction to the t-SNE algorithm



```
with sns.axes_style('white'):
    sns.jointplot("x", "y", data, kind='hex')
```

There are other parameters which can be passed to `jointplot` for example, we can use a hexagonally-based histogram instead:

done

O'Reilly Atlas authoring platform incorporating live code

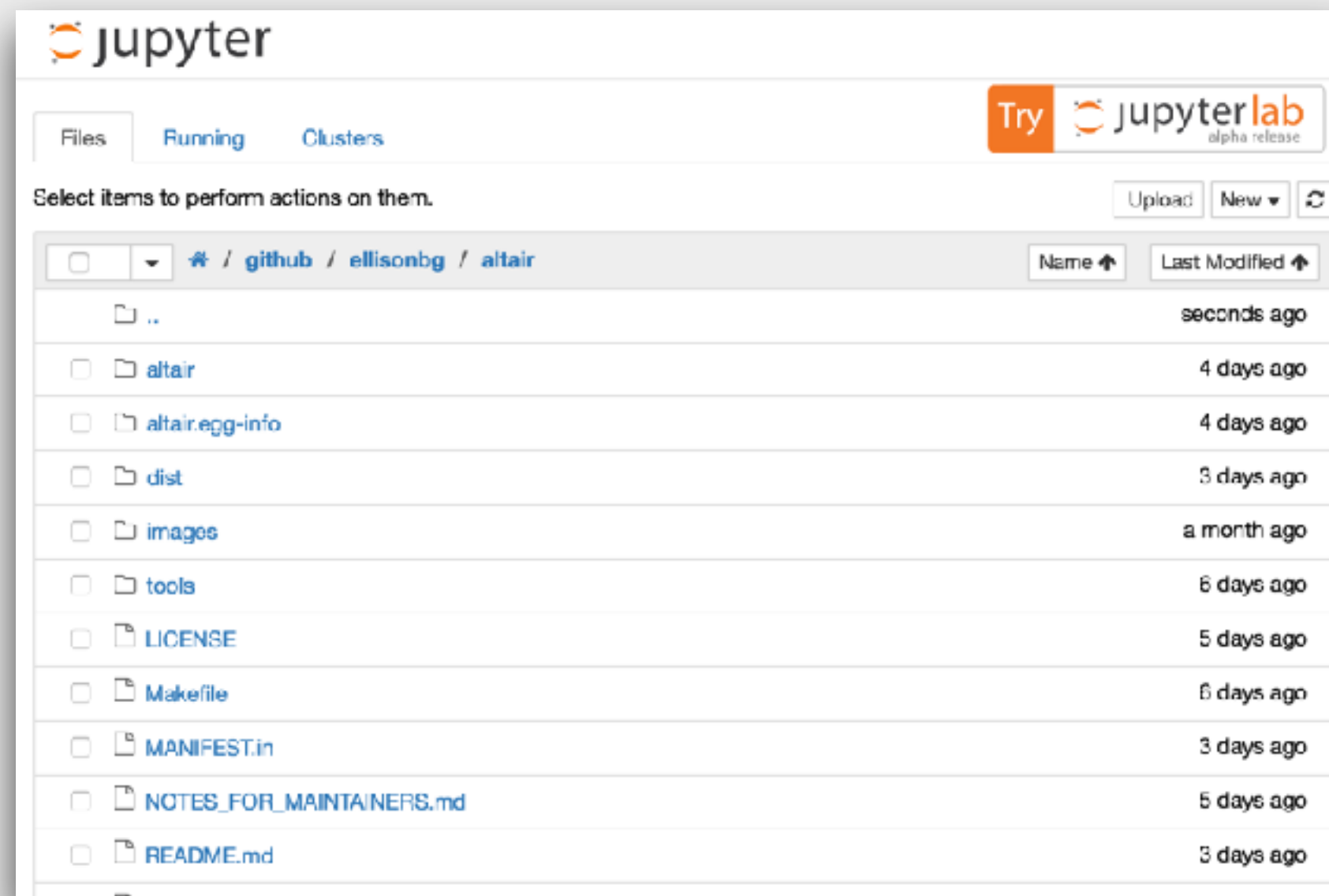
<https://www.oreilly.com/ideas/jupyter-at-oreilly>



Building Blocks for Interactive Computing

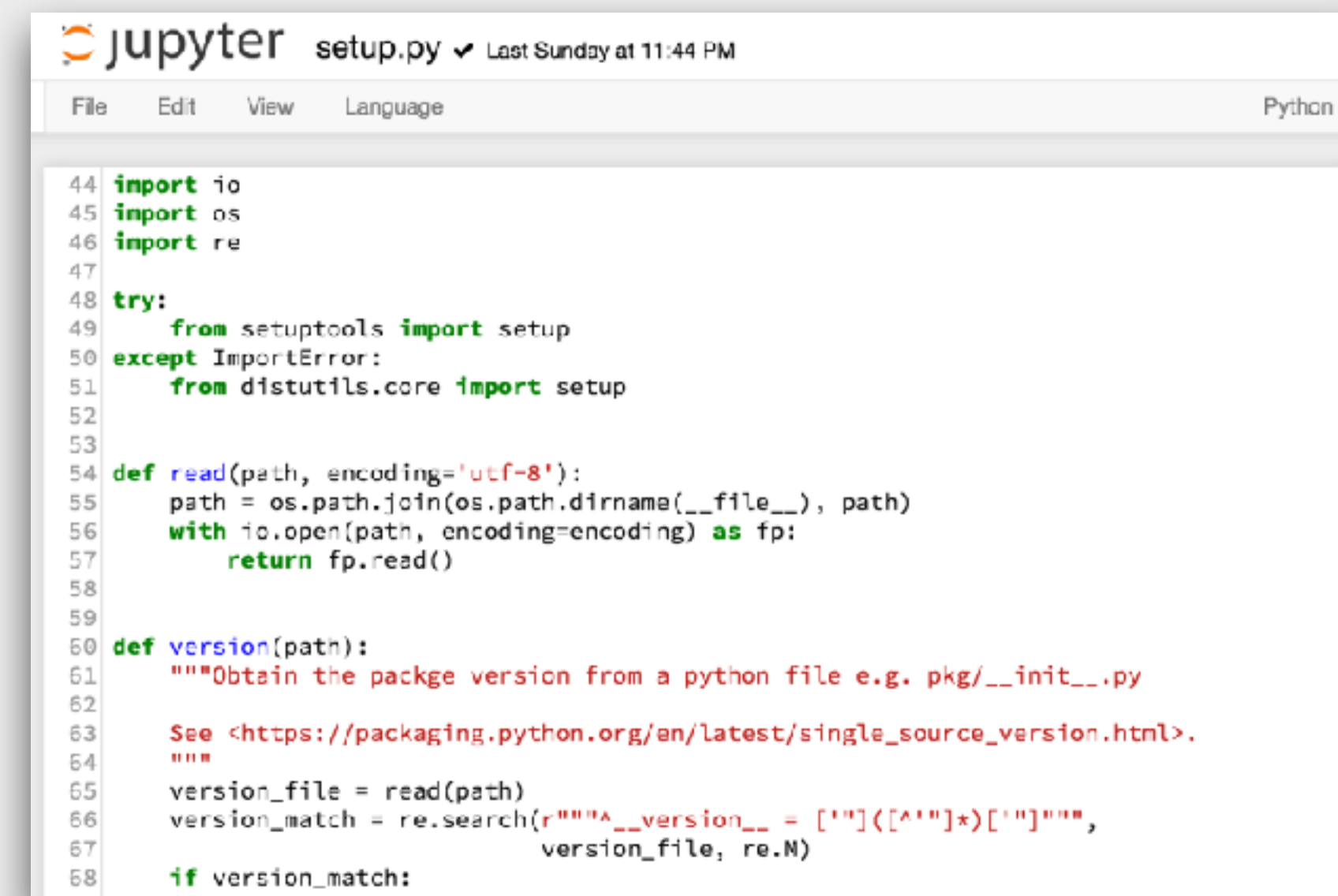


Classic Jupyter: More Than Just Notebooks



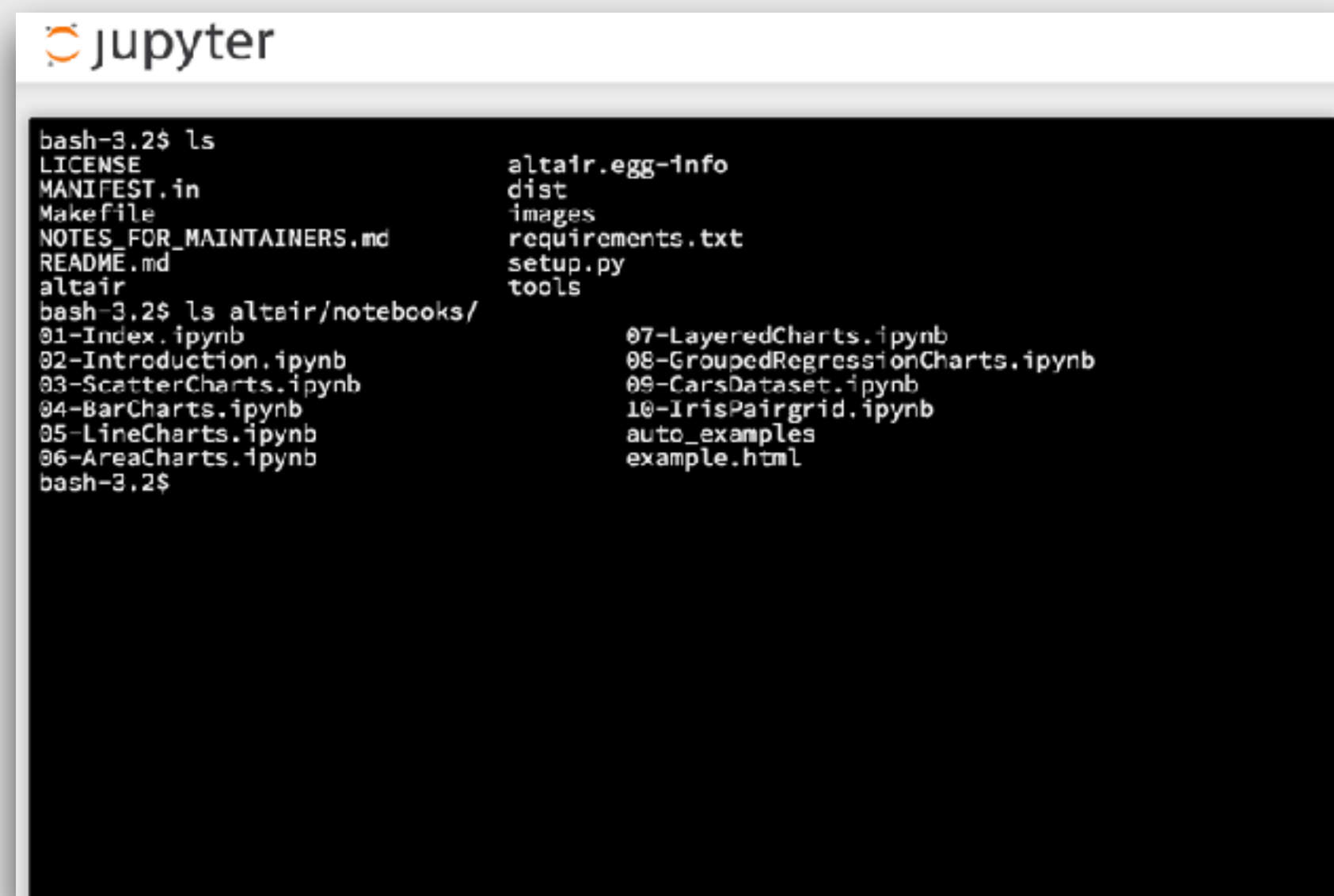
The Jupyter file browser interface shows a directory listing for the path `github / ellisonbg / altair`. The interface includes tabs for Files, Running, and Clusters. A table lists files and folders with their last modified times:

Name	Last Modified
..	seconds ago
altair	4 days ago
altair.egg-info	4 days ago
dist	5 days ago
images	a month ago
tools	6 days ago
LICENSE	5 days ago
Makefile	6 days ago
MANIFEST.in	3 days ago
NOTES_FOR_MAINTAINERS.md	5 days ago
README.md	3 days ago



The Jupyter code editor interface shows a Python file named `setup.py`. The code defines a `read` function to read a file and a `version` function to extract the package version from a Python file.

```
44 import io
45 import os
46 import re
47
48 try:
49     from setuptools import setup
50 except ImportError:
51     from distutils.core import setup
52
53
54 def read(path, encoding='utf-8'):
55     path = os.path.join(os.path.dirname(__file__), path)
56     with io.open(path, encoding=encoding) as fp:
57         return fp.read()
58
59
60 def version(path):
61     """Obtain the package version from a python file e.g. pkg/__init__.py
62
63     See <https://packaging.python.org/en/latest/single_source_version.html>.
64     """
65     version_file = read(path)
66     version_match = re.search(r'__version__ = ["\']([^\"]*)["\']',
67                               version_file, re.M)
68     if version_match:
```



The Jupyter terminal interface shows a shell prompt `bash-3.2$` and a directory listing of files in the `altair` directory:

```
bash-3.2$ ls
LICENSE
MANIFEST.in
Makefile
NOTES_FOR_MAINTAINERS.md
README.md
altair
altair.egg-info
dist
images
requirements.txt
setup.py
tools
07-LayeredCharts.ipynb
08-GroupedRegressionCharts.ipynb
09-CarsDataset.ipynb
10-IrisPairgrid.ipynb
auto_examples
example.html
```



Building Blocks

File Browser

Notebooks

Terminal

Text Editor

Kernels

Output



Introducing JupyterLab



JupyterLab: Integrated Experience

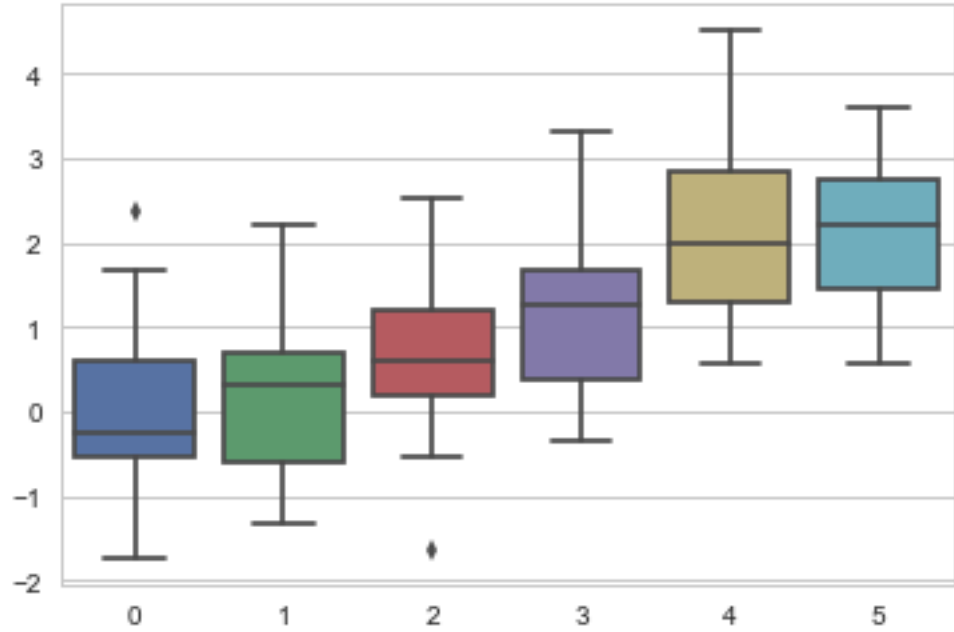
File Notebook Editor Terminal Console Help

Launcher aesthetics.ipyn x

Code jlabdemo

In [6]:

```
sns.set_style("whitegrid")
data = np.random.normal(size=(20, 6)) + np.arange(6) / 2
sns.boxplot(data=data);
```



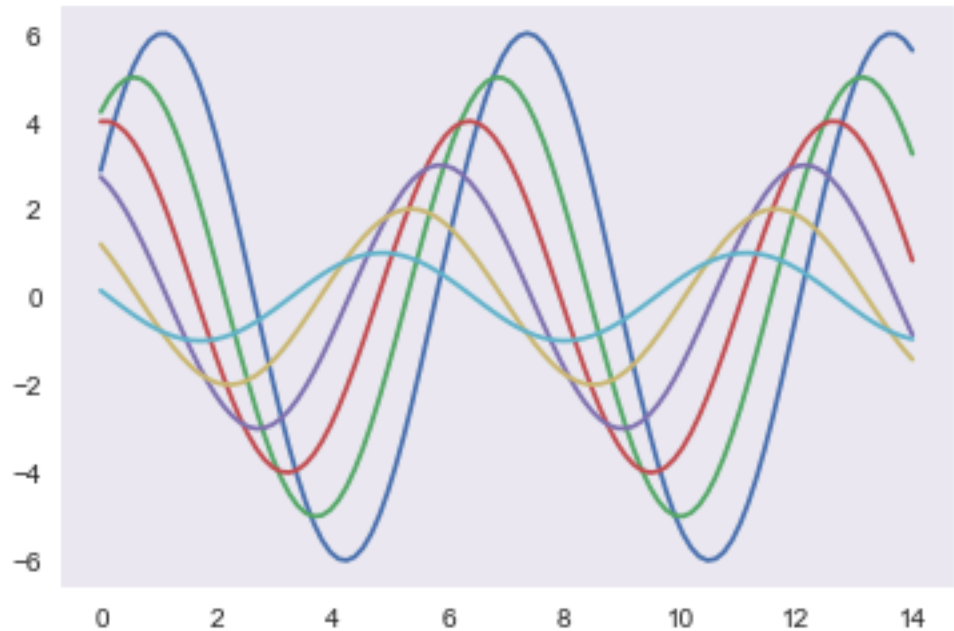
For many plots, (especially for settings like talks, where you primarily want to use figures to provide impressions of patterns in the data), the grid is less necessary.

In [7]:

```
sns.set_style("dark")
```

In [8]:

```
sinplot()
```



In [9]:

```
sns.set_style("white")
```

categorical.py x

```
434
435 class _BoxPlotter(_CategoricalPlotter):
436
437     def __init__(self, x, y, hue, data, order, hue_order,
438                  orient, color, palette, saturation,
439                  width, dodge, fliersize, linewidth):
440
441         self.establish_variables(x, y, hue, data, orient, order, hue_order)
442         self.establish_colors(color, palette, saturation)
443
444         self.dodge = dodge
445         self.width = width
446         self.fliersize = fliersize
447
448         if linewidth is None:
449             linewidth = mpl.rcParams["lines.linewidth"]
450         self.linewidth = linewidth
451
452     def draw_boxplot(self, ax, kws):
453         """Use matplotlib to draw a boxplot on an Axes."""
454         vert = self.orient == "v"
455
456         props = {}
457         for obj in ["box", "whisker", "cap", "median", "flier"]:
458             props[obj] = kws.pop(obj + "props", {})
459
460         for i, group_data in enumerate(self.plot_data):
461
462             if self.plot_hues is None:
463
464                 # Handle case where there is data at this level
465                 if group_data.size == 0:
466                     continue
467
468                 # Draw a single box or a set of boxes
469                 # with a single level of grouping
470                 box_data = remove_na(group_data)
471
472                 # Handle case where there is no non-null data
473                 if box_data.size == 0:
474                     continue
475
476                 artist_dict = ax.boxplot(box_data,
477                                         vert=vert,
478                                         patch_artist=True,
479                                         positions=[i],
480                                         widths=self.width,
481                                         **kws)
```



JupyterLab

Building Blocks

- Work with the building blocks in a flexible and integrated manner
- Modern JavaScript development: npm-based packaging, Typescript, phosphor.js
- Clean model/view separation
- Well separated public/private APIs
- Fully extensible by third parties
- High performance
- Design!



January
2018

JupyterLab Today

- <https://github.com/jupyterlab>
- ~2.5 years worth of development
- ~100 contributors, ~60 components
- ~1,800 releases (npm+python)
- Over 11,000 commits, ~classic notebook
- Currently Beta



Roadmap

JupyterLab Beta: Use It Today

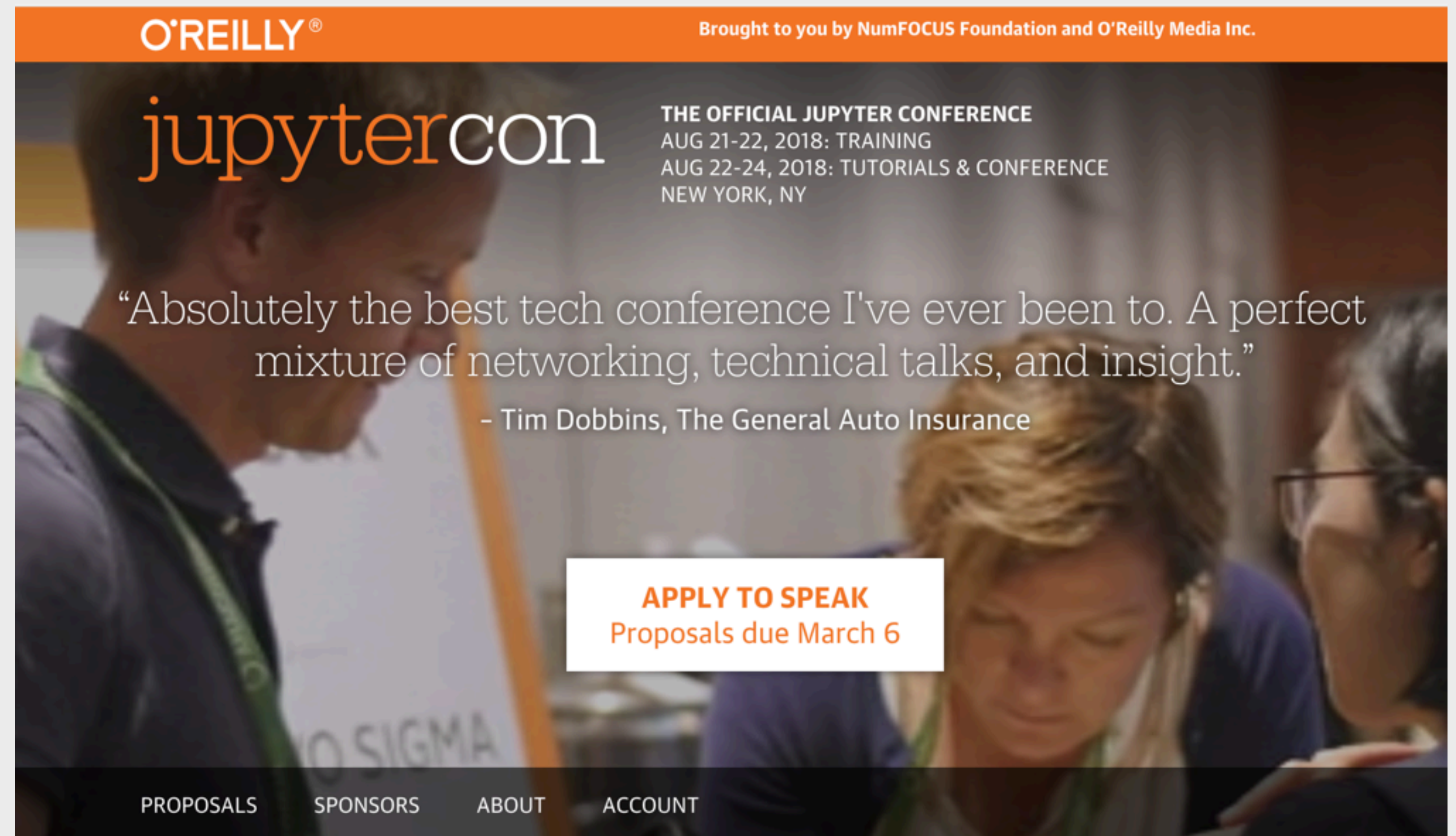
`conda install -c conda-forge jupyterlab`
or `pip install jupyterlab`

- Beta releases, January 2018
 - For all users
 - For adventurous extension developers
- 1.0 this year
 - For all users, extension developers
- Eventually:
 - Classic notebook will be retired



JupyterCon, Aug 21-25, New York

JupyterCon

A promotional banner for JupyterCon 2018. The background is a blurred photo of three people looking at a laptop. The banner has an orange header with the O'Reilly logo and a sponsor line. The main text includes the event name, dates, location, and a quote from Tim Dobbins. A white box with orange text says 'APPLY TO SPEAK' and 'Proposals due March 6'. The bottom has a dark navigation bar with links to PROPOSALS, SPONSORS, ABOUT, and ACCOUNT.

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jupytercon THE OFFICIAL JUPYTER CONFERENCE
AUG 21-22, 2018: TRAINING
AUG 22-24, 2018: TUTORIALS & CONFERENCE
NEW YORK, NY

“Absolutely the best tech conference I've ever been to. A perfect mixture of networking, technical talks, and insight.”
– Tim Dobbins, The General Auto Insurance

APPLY TO SPEAK
Proposals due March 6

PROPOSALS SPONSORS ABOUT ACCOUNT

Discover how the most data-driven organizations are using Jupyter to analyze data, share insights, and create dynamic, reproducible data science.

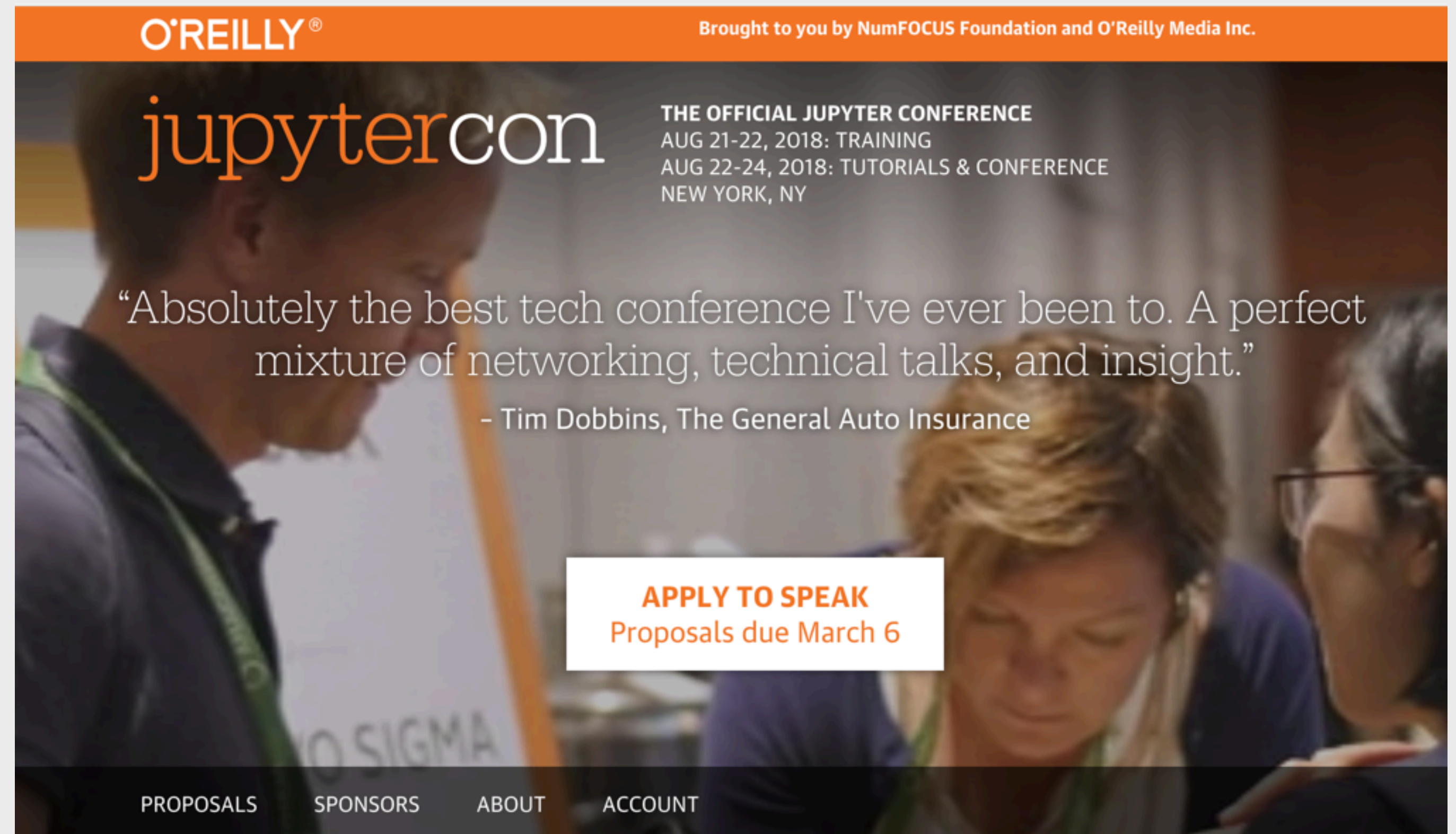


Live Demos!



JupyterCon, Aug 21-25, New York

Thank You!



Discover how the most data-driven organizations are using Jupyter to analyze data, share insights, and create dynamic, reproducible data science.

```
conda install -c conda-forge jupyterlab  
or pip install jupyterlab
```

