

Reproducible Computational Neuroscience Teaching



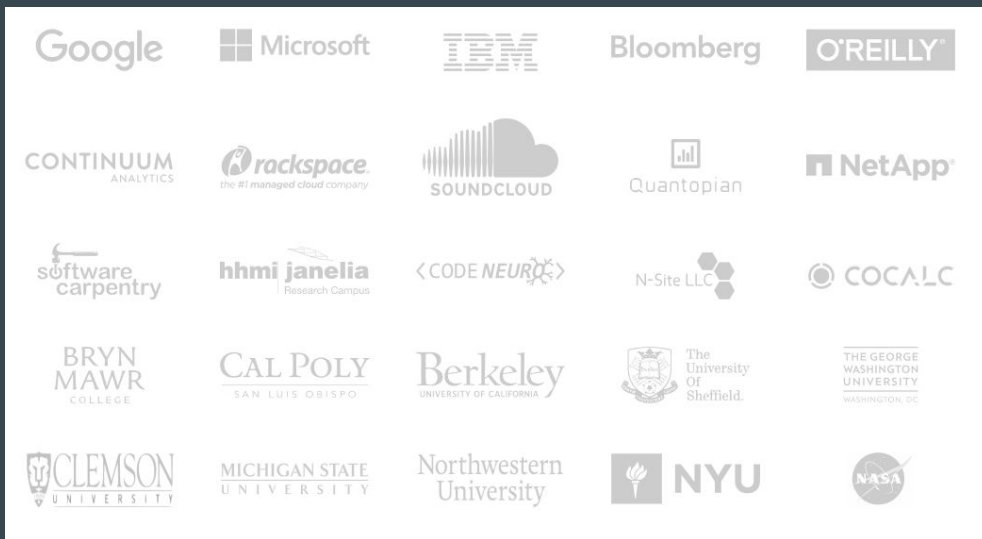
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Teaching Wishlist

- No technological obstacles to teaching goals
- Use tools that the instructor has already mastered
- If it runs without error for you, it will run without error for them
- No configuration/installation requirements for students
- No prerequisites for students
- Ability to lead graduate/advanced sections using the same tools
- Ability to attack cutting edge neuroscience problems
- No need to setup environment year after year
- No permission/assistance needed from department/university



jupyter



Jupyter Lorenz Differential Equations (autosaved)

File Edit View Insert Cell Kernel Help Python 3

Code Cell Toolbar: None

Exploring the Lorenz System

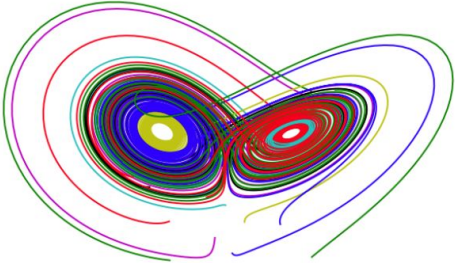
In this Notebook we explore the [Lorenz system](#) of differential equations:

$$\begin{aligned}\dot{x} &= \sigma(y - x) \\ \dot{y} &= \rho x - y - xz \\ \dot{z} &= -\beta z + xy\end{aligned}$$

This is one of the classic systems in non-linear differential equations. It exhibits a range of complex behaviors as the parameters (σ, β, ρ) are varied, including what are known as *chaotic solutions*. The system was originally developed as a simplified mathematical model for atmospheric convection in 1963.

```
In [7]: interact(Lorenz, N=fixed(10), angle=(0., 360.),
                sigma=(0.0, 50.0), beta=(0., 5), rho=(0.0, 50.0));
```

angle 308.2
max_time 12
 σ 10
 β 2.6
 ρ 28



- Interactive web technology
- Supports Python, R, Julia, ...
- Sequential
- Reproducible

<https://try.jupyter.org>



Turn a GitHub repo into a collection of interactive notebooks

Have a repository full of Jupyter notebooks? With Binder, you can add a badge that opens those notebooks in an executable environment, making your code immediately reproducible by anyone, anywhere.

100% free and [open source](#). Browse [examples](#). Read the [FAQ](#).

Build a repository

submit

- You provide notebooks and a list of dependencies
- Binder launches a VM to serve those notebooks from <http://mybinder.org>
- Created by Jeremy Freeman lab (HHMI -> Chan Zuckerberg)



A multi-user version of the notebook designed for companies, classrooms and research labs



Pluggable authentication

Manage users and authentication with PAM, OAuth or integrate with your own directory service system. Collaborate with others through the Linux permission model.



Centralized deployment

Deploy the Jupyter Notebook to all of the users in your organization on centralized servers on- or off-site.



Container friendly

Use Docker containers to scale your deployment and isolate user processes using a growing ecosystem of prebuilt Docker containers.



Code meets data

Deploy the Notebook next to your data to provide unified software management and data access within your organization.