Essential software and tools I wish someone had told me about when I started my PhD

Ángel Javier Omella

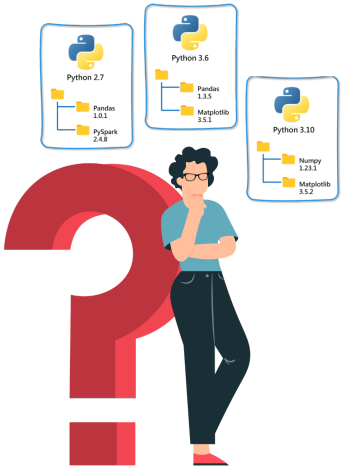
University of the Basque Country (UPV/EHU), Bilbao, Spain

$19^{th} - 24^{th}$ **January 2025, Chile**

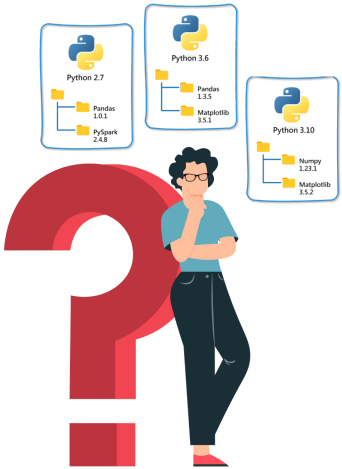
COURSE: Introduction to coding neural networks and partial differential equations

Outline

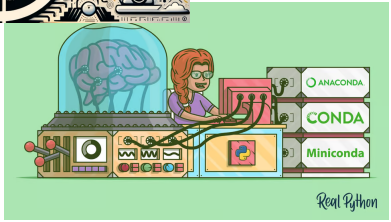
Environment and Dependency Management



Environment and Dependency Management

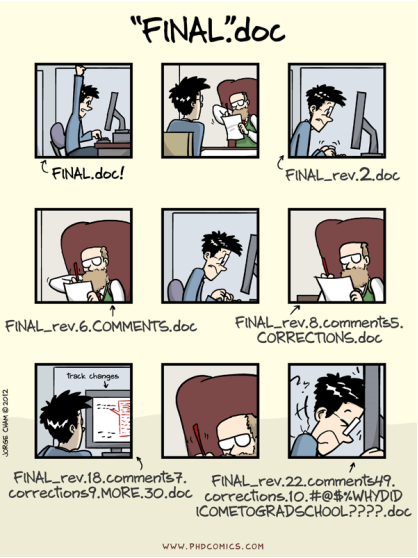


venv vs conda

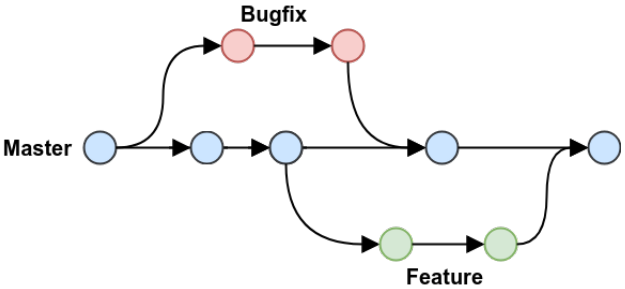


Version Control

Version Control



GitHub for version Control on the cloud




```
git clone
```

```
git pull
```

```
git status
```

```
git add "file.py"
```

```
git commit -m "comment"
```

```
git push
```

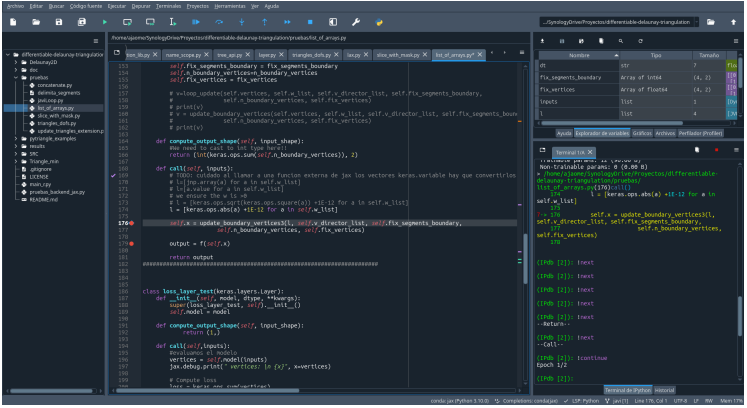
```
git log -3
```

```
git branch Feature
```

```
git checkout main
git merge Feature
```

Development Environments

Development Environments



Tools for Deep Learning: Keras and its Backends

Tools for Deep Learning: Keras and its Backends

Keras

@*torch.jit.script* @*jax.jit* @*tf.function*(*jit_compile* = *True*)

Hydra for Efficient Configuration Management

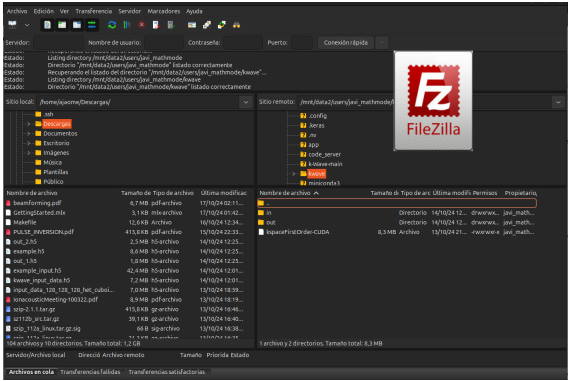
- Dynamic Configurations: Quickly change parameters in an organized manner
- Experimentation: Ideal for handling multiple experiment runs with different configurations

A simple example of use developed by Tomas Teijeiro:
https://github.com/Mathmode/hydra-examples

File Transfer Tools

```
% secure copy
scp -r <user>@<host>:/path/directory /path/local/directory

% sincronize archives
rsync -a <user>@<host>:/path/directory /path/local/directory
```



Conclusions

- Conda or venv are useful tools to manage different packages and versions
- You have to use a control version in the cloud:
  - keep your code save
  - collaborate with other researchers
  - share your code with the community
- Use Keras
  - encode to run at the end with XLA compilation
  - use and read the documentation every day
  - read code from others
  - be updated