KTH ROYAL INSTITUTE OF TECHNOLOGY

EL2805: Reinforcement Learning

Lab instructions

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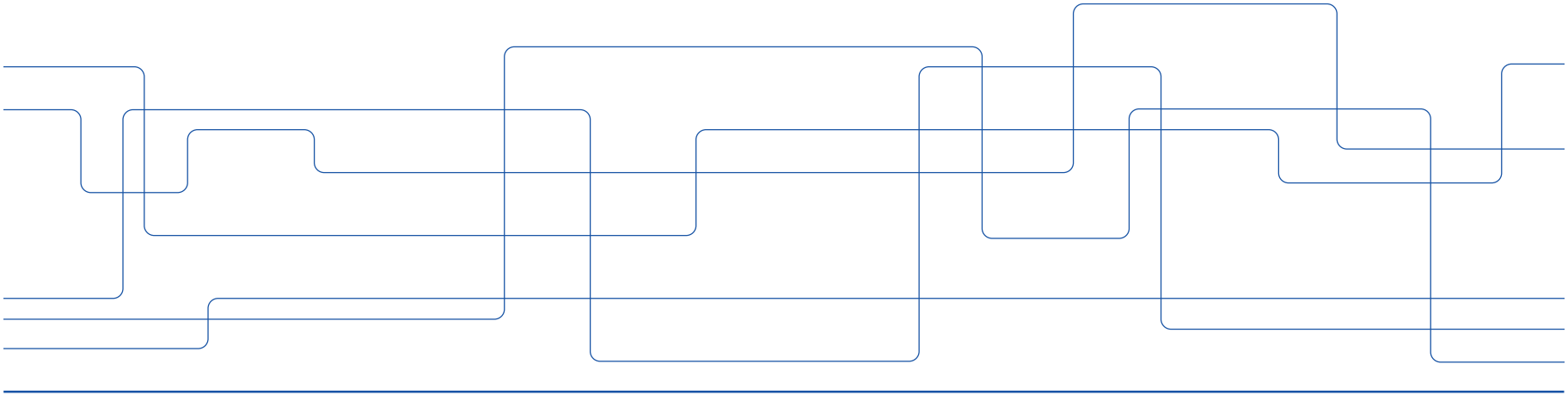
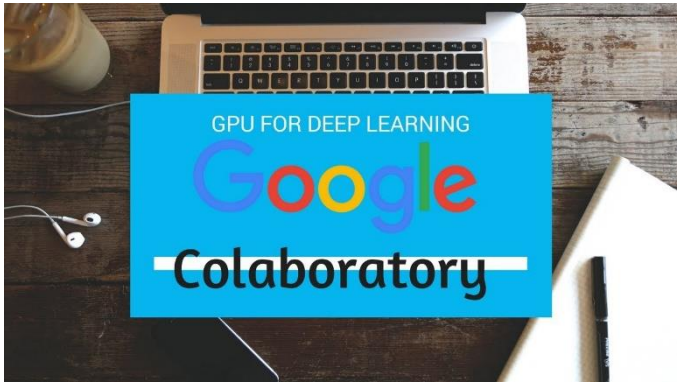


1. Prerequisites

- **We will assume that you know enough to program in Python**
  - You should know how to use a shell and run Python from it
  - You should know what is a class, an object, a variable, a function, list and dictionaries
  - Knowledge of NumPy and Matplotlib to be able to perform mathematical operations and show results
- **In case you need a refresh, you can check out the following tutorial** https://cs231n.github.io/python-numpy-tutorial/ (Stanford tutorial)

2. Running code on the cloud

- **If you do not want to run code on your computer, but on the cloud, you can use Google Colabs**
  - Google Colabs is a free resource from Google that allows deep learning code to be run on the cloud
  - Useful for problems that are computationally heavy



- You can use a GPU
- Most likely it is faster than your laptop
- Allows more people to collaborate together
- Most of the libraries we use are already installed
- **Link:** https://colab.research.google.com/

2. Running code on the cloud

el2805_random_signal_example.ipynb

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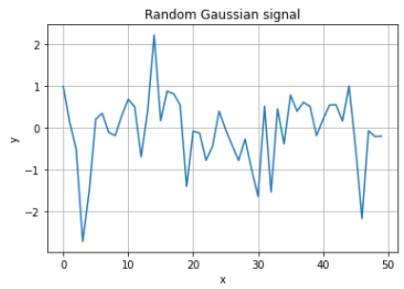
```
import numpy as np
import matplotlib.pyplot as plt

N = 50
x = [i for i in range(N)]
y = np.random.randn(50)

plt.plot(x, y)
plt.grid()
plt.xlabel('x')
plt.ylabel('y')
plt.title("Random Gaussian signal")
plt.show()
```



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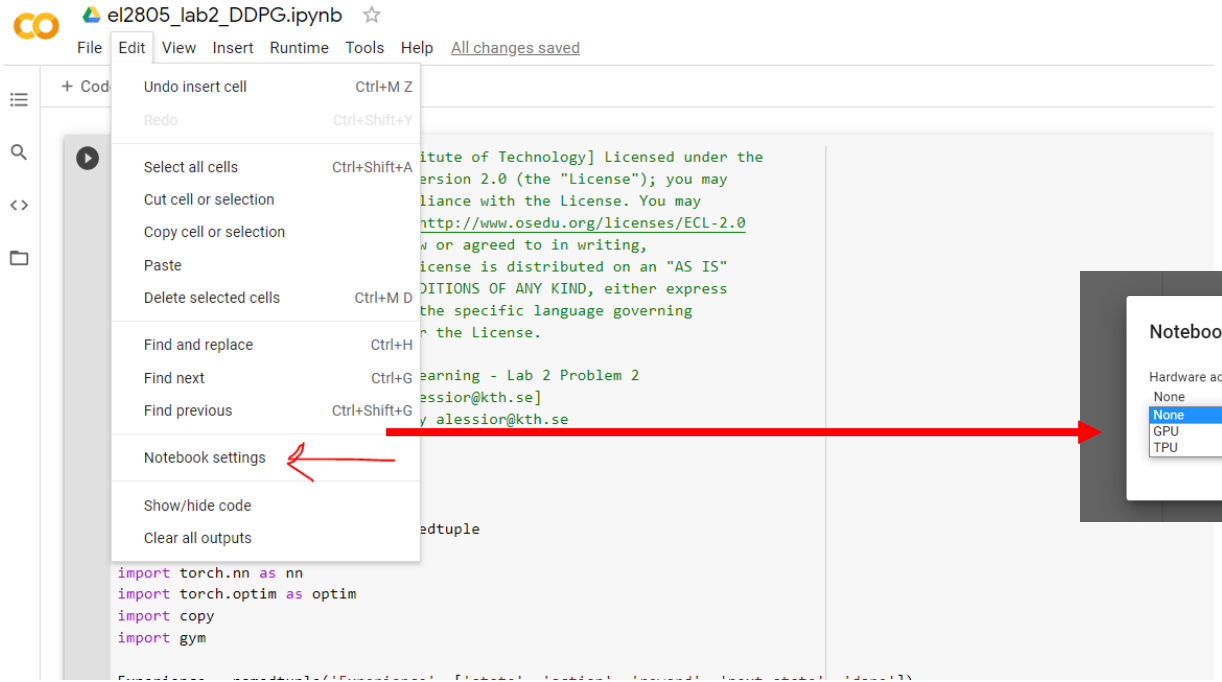
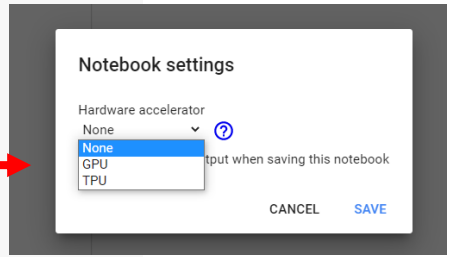
Share your work

It is exactly the same as Jupyter notebooks (check next slides for more info)

In Google colab all the libraries are already installed.
For lab2 you will have to run the command:
`!pip3 install box2d-py==2.3.8`

2. Running code on the cloud





You can also enable GPU acceleration

3. Running code on your computer: setup

- **Alternatively, if you want to run code on your computer, you can install Python (version 3 atleast)**
- **We will use Anaconda to install libraries/packages instead of Pip**
  - **Motivation**: Anaconda allows to create self-isolated virtual environments that can contain different versions of Python and different libraries. An environment is like an “island”: everything you install/put in there does not interfere with other “islands” you may have (so that it does not interfere with other environments you may have on your computer)
  - Read https://bit.ly/2YJsgMw for more information

3. Running code on your computer: setup

1. **Download Anaconda and run the installer**
    1. Link: https://www.anaconda.com/products/individual#Downloads
    2. Open the anaconda shell and run the command "`conda config --add channels conda-forge`". This will allow Conda to fetch packages also from the conda-forge channel, which is a community effort to provide packages that are not included in the default Conda channel.
2. **Create an environment for the course**
    1. Create a dedicated folder for the course where to save all the files.
    2. Open the shell and create an environment for the course. Type "`conda create --name el2805`" to create a new environment named "el2805"
3. **Other useful commands**
    1. Activate/deactivate the environment by typing "`conda activate el2805`" or "`conda deactivate`"
    2. Install/remove packages using "`conda install`" or "`conda remove`" (for example, "`conda install numpy`")
    3. Delete an environment (and all the packages therein) by typing "`conda env remove –name el2805`"

Conda cheat-sheet → Adobe Acrobat Document **(link: https://bit.ly/2G4WB1y)**

3. Running code on your computer: libraries

1. **Open the shell and activate the course environment** (“conda activate el2805”)
2. **Install the Basic libraries:**
    1. Type “conda install numpy jupyter matplotlib scipy jupyterlab ipywidgets nodejs tqdm” to install basic libraries and utilities
    2. Type “jupyter nbextension enable --py widgetsnbextension” to enable widgets on Jupyter notebooks
    3. Type “jupyter labextension install @jupyter-widgets/jupyterlab-manager” to enable widgets on Jupyter lab
3. **Install the Deep learning library:**
    1. Install the CPU version of PyTorch “conda install pytorch torchvision cpuonly -c pytorch”
    2. You can also install the GPU version if you have CUDA installed (google “cuda install”). Check the PyTorch website https://pytorch.org/ to install the GPU version.
4. **Install the Reinforcement learning environments**
    1. Install OpenGym using the command “conda install gym pybox2d”
        1. *If that does not work, run “conda config --add channels conda-forge” and then try again.*

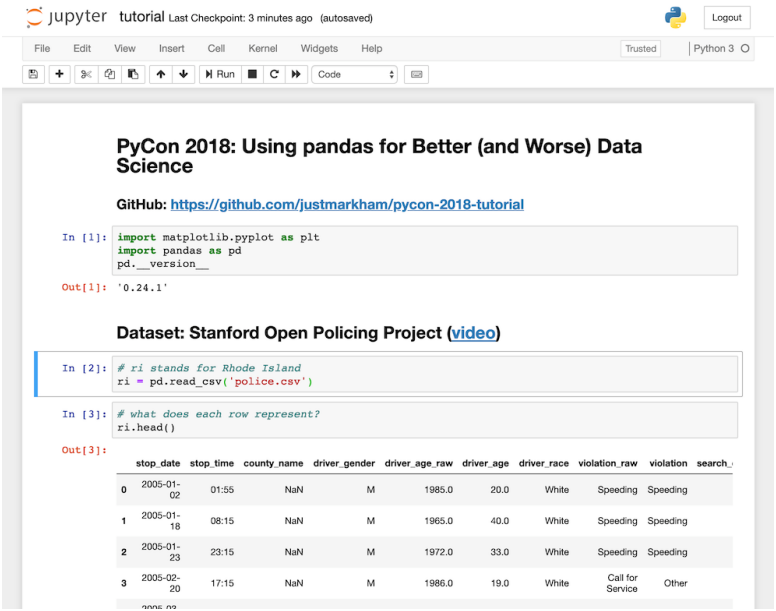
4. Running code on your computer: editors

1. If you want to use a text editor, we suggest the following ones:
    1. *Sublime Text: Nice interface, but a license must be purchased for continued use*
       Link: https://www.sublimetext.com/
    2. *Atom: nice interface, completely free, developed by GitHub*
       Link: https://atom.io/

2. If you do not want to use a text editor, but use a web application that runs on your computer, we suggest Jupyter Notebook or Jupyter Lab (check next slides).

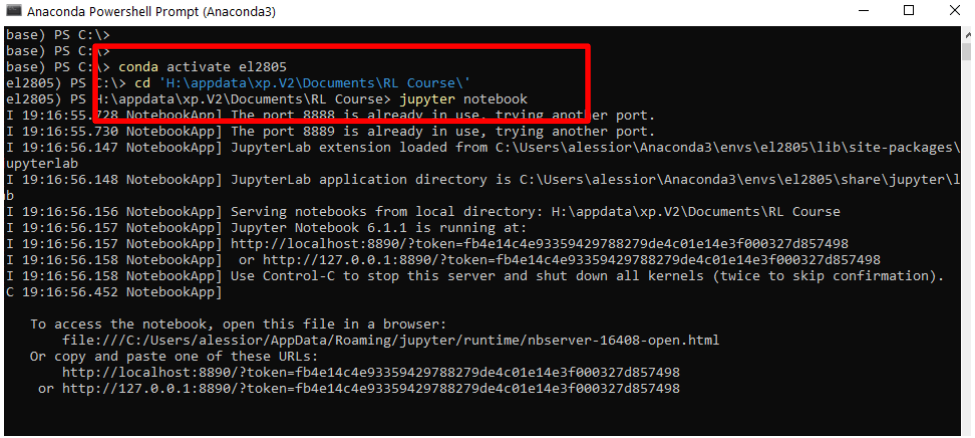
5. Running code on your computer: Jupyter notebooks

- **Jupyter notebooks allow one to run code interactively in a web browser.**



5. Running code on your computer: Jupyter notebooks

- Jupyter notebooks allow one to run code interactively in a web browser.
- **To start a notebook, open the shell and go to a folder (for example the course folder). Activate the conda course environment and then type "jupyter notebook".**

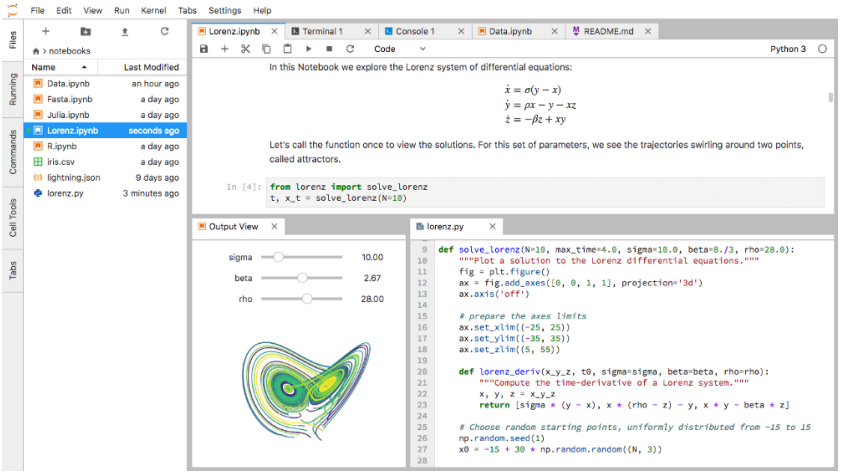


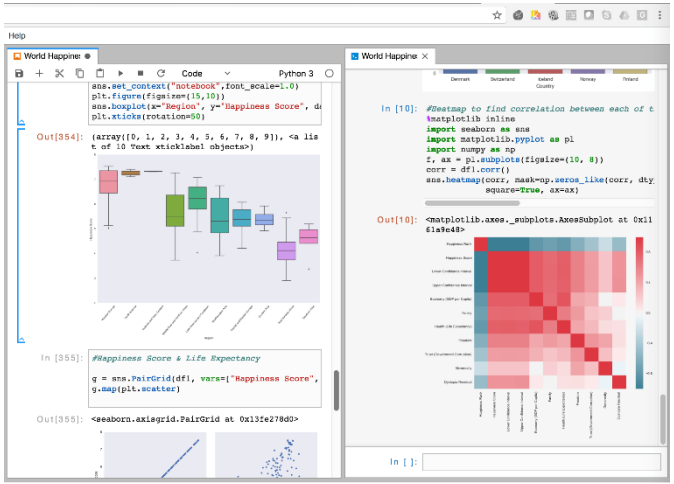
5. Running code on your computer: Jupyter notebooks

- Jupyter notebooks allow one to run code interactively in a web browser.
- To start a notebook, open the shell and go to a folder (for example the course folder). Activate the conda course environment and then type "jupyter notebook".
- **This will open a new tab in your browser, showing the list of files in the folder. You can open a file or create a new one.**
- **If you want to create a new file, click on the button "New". This will create a file named "Untitled.ipynb" inside the chosen folder.**
- **You can execute code inside the cells.**

6. Running code on your computer: Jupyter labs

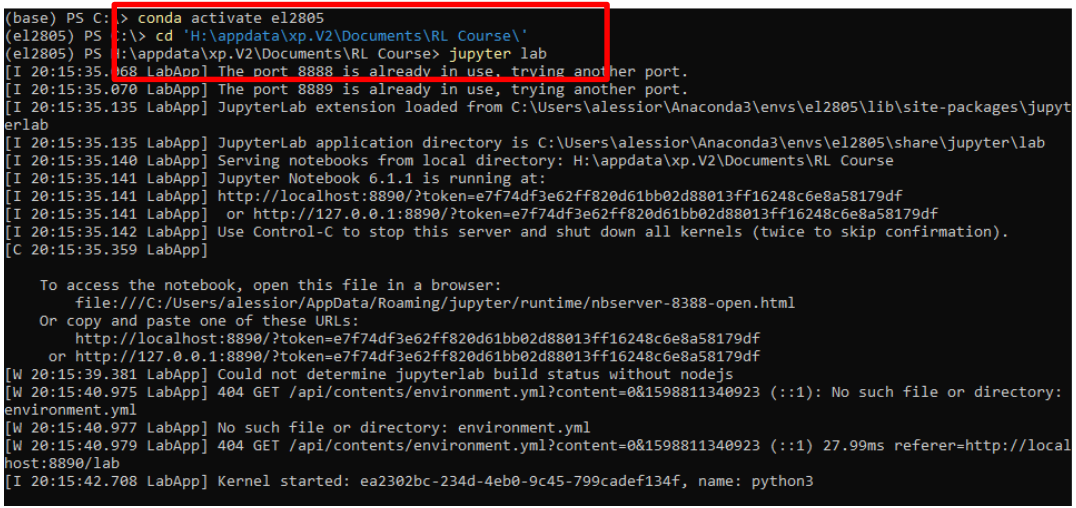
- **Jupyter lab is an interactive interface where you can open several files and notebooks as tabs in the same window, like an IDE.**





6. Running code on your computer: Jupyter labs

- **To start a jupyter lab, open the shell and go to a folder (for example the course folder). Activate the conda course environment and then type "jupyter lab".**



6. Running code on your computer: Jupyter labs

- To start a jupyter lab, open the shell and go to a folder (for example the course folder). Activate the conda course environment and then type "`jupyter lab`".

- **This will open a new tab on your browser where you can select files, create new ones and work in an integrated interface**