MACHINE LEARNING IN PHYSICS
TUTORIAL 1

HARRISON B. PROSPER

PHY6937 / PHY4636

Installation of `miniconda3`

1. Go to website:
   https://www.anaconda.com/docs/getting-started/miniconda/install
2. Download the installer for your operating system and follow the prompts to install **miniconda3**. Then…
3. Create a miniconda3 environment (e.g., here named mlp)

   ```
   conda create -n mlp
   ```

   (use `conda env remove -n name` to remove the environment "name".)
4. Activate environment

   ```
   conda activate mlp
   ```
5. Install PyTorch:

   ```
   conda install pytorch
   ```

For PyTorch, check for

pytorch
numpy
sympy

```
The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    blas-1.0                   |         openblas          10 KB
    deprecated-1.2.13          |  py313hca03da5_0          18 KB
    filelock-3.17.0            |  py313hca03da5_0          39 KB
    fsspec-2025.7.0            |  py313h7eb115d_0         655 KB
    gmp-6.3.0                  |       h313beb8_0         494 KB
    gmpy2-2.2.1                |  py313h5c1b81f_0         216 KB
    importlib-metadata-8.5.0   |  py313hca03da5_0          54 KB
    libabseil-20250127.0       | cxx17_h313beb8_0         1.2 MB
    libgfortran-5.0.0          |11_3_0_hca03da5_28         142 KB
    libgfortran5-11.3.0        |      h009349e_28         1.0 MB
    libopenblas-0.3.29         |       hea593b9_0        10.1 MB
    libprotobuf-5.29.3         |       h14f15fd_1         2.8 MB
    libtorch-2.6.0             |cpu_openblas_h5ebe3f5_6        29.9 MB
    libuv-1.48.0               |       h80987f9_0         432 KB
    llvm-openmp-19.1.7         |       h3b2fb71_2         325 KB
    mpc-1.3.1                  |       h80987f9_0         119 KB
    mpfr-4.2.1                 |       h80987f9_0         456 KB
    mpmath-1.3.0               |  py313hca03da5_0        1000 KB
    networkx-3.4.2             |  py313hca03da5_0         3.1 MB
    nomkl-3.0                  |                0          10 KB
    numpy-2.3.1                |  py313h50dd0cd_0          13 KB
    numpy-base-2.3.1           |  py313h2506b34_0         6.7 MB
    opentelemetry-api-1.30.0   |  py313hca03da5_0          99 KB
    pytorch-2.6.0              |cpu_openblas_py313h9475015_6        30.5 MB
    setuptools-72.1.0          |  py313hca03da5_0         2.6 MB
    sleef-3.5.1                |       h80987f9_2         357 KB
    sympy-1.13.3               |  py313hca03da5_1        15.0 MB
    wrapt-1.17.0               |  py313h80987f9_0          64 KB
    zipp-3.21.0                |  py313hca03da5_0          31 KB
    ------------------------------------------------------------
                                           Total:       107.3 MB
```

Installation of `miniconda3`

6. Then install packages:

```
conda install jupyterlab
conda install matplotlib
conda install pandas
conda install scipy
conda install scikit-learn
conda install ffmpeg
conda install tqdm
```

Installation of `mlinphysics`

7. Create a folder for your work this semester (on Linux, macOS)

```
mkdir mlprojects
cd mlprojects
```

8. Download from GitHub the package **mlinphysics**

```
git clone https://github.com/hbprosper/mlinphysics
```

From your current folder (e.g., mlprojects) do

```
source mlinphysics/setup.sh
```

(for PYTHONPATH)

9. Navigate to mlprojects and launch **jupyterlab**,

```
jupyter lab
```

which should appear in your default browser. In jupyterlab, you should see the folder **mlinphysics** listed as a folder icon.

Installation of `mlinphysics`

Please NOTE:

1. Work in your own folder (e.g., mlprojects), NOT in **`mlinphysics`**!

2. The package **`mlinphysics`** is being restructured and improved, so code etc. could change without notice!

Tutorial 1

1. Copy the following notebooks from **`mlinphysics`** to your working folder
   1. test.ipynb
   2. python_minimum_part1.ipynb
   3. python_minimum_part2.ipynb

2. In your jupyterlab environment:
   1. Test your installation by executing the test.ipynb notebook.
   2. Work through the python minimum tutorials *line-by-line* and try to understand what each line or set of lines does.