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# Prerequisites for Laboratory Exercises
## Neural Networks (127251)

Laboratory exercises are prepared as Jupyter notebooks (https://jupyter.org/) that are supposed to be run and completed at home. All prepared notebooks for laboratory exercises were tested on the Windows operating system using Anaconda v5 (https://www.anaconda.com/) Python distribution with TensorFlow v1.3 software library (https://www.tensorflow.org/).

# 1. Installing Anaconda and Jupyter Notebook

To install Anaconda direct your web browser to https://www.anaconda.com/download/ and download the appropriate version for the operating system you use.

After installing Anaconda we recommend you create a dedicated Phyton environment for the course Neural Networks using the Anaconda Navigator GUI as shown in Fig. 1. After the environment for the course is created it should be visible in the Anaconda Navigator GUI (Fig. 2) and a new shortcut named `Anaconda Prompt (nnets)` shold be created in the Windows Start Menu. Besides using the GUI the environment may also be created by issuing the command

```
(D:\Anaconda3) d:\>conda create --name nnets python=3.6
```

in the `Anaconda Prompt`.

The created `nnets` environment is activated by starting the `Anaconda Prompt (nnets)` from the Windows Start Menu or by issuing the following command in the regular `Anaconda Prompt` command window:

```
(D:\Anaconda3) d:\>activate nnets

(nnets) d:\>
```

Note that active environment `nnets` must be indicated in the parentheses.

Once the environment `nnets` is active install juypter via Anaconda GUI by entering jupyter in the search box in the upper left corner and by selecting the package as shown in Fig. 3. Besides using the GUI jupyter package may also be installed by issuing the following command in the command window:

```
(nnets) d:\>conda install jupyter
Fetching package metadata ..........
Solving package specifications: .

Package plan for installation in environment D:\Anaconda3\envs\nnets:

The following NEW packages will be INSTALLED:

    bleach:            1.5.0-py36 0
…
    zlib:              1.2.11-vc14 0     [vc14]

Proceed ([y]/n)? y
```
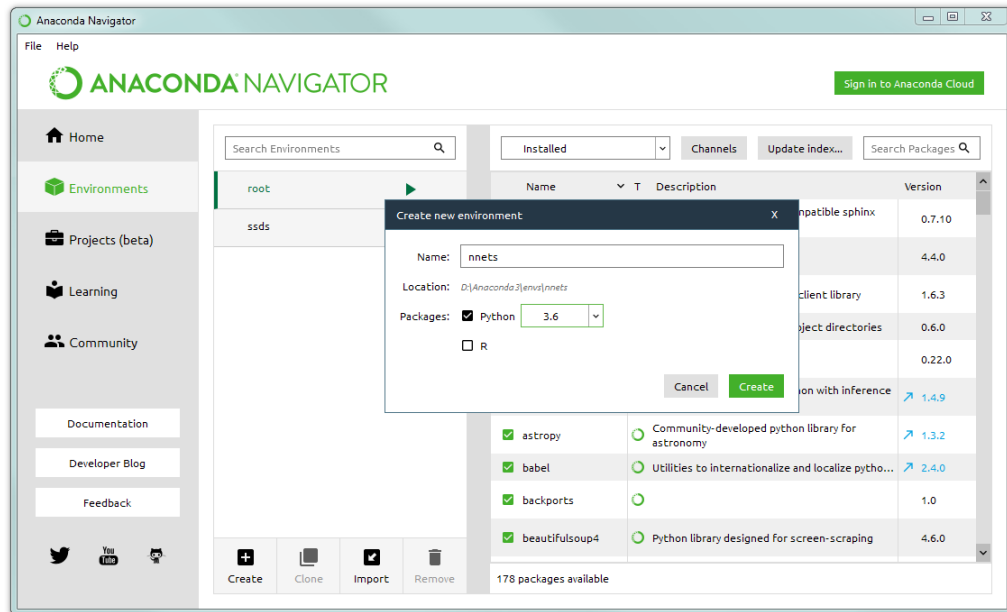
Figure 1. Creating a new environment in Anaconda: (1) select Environments tab, (2) click on Create; and (3) enter the name of the new environment.
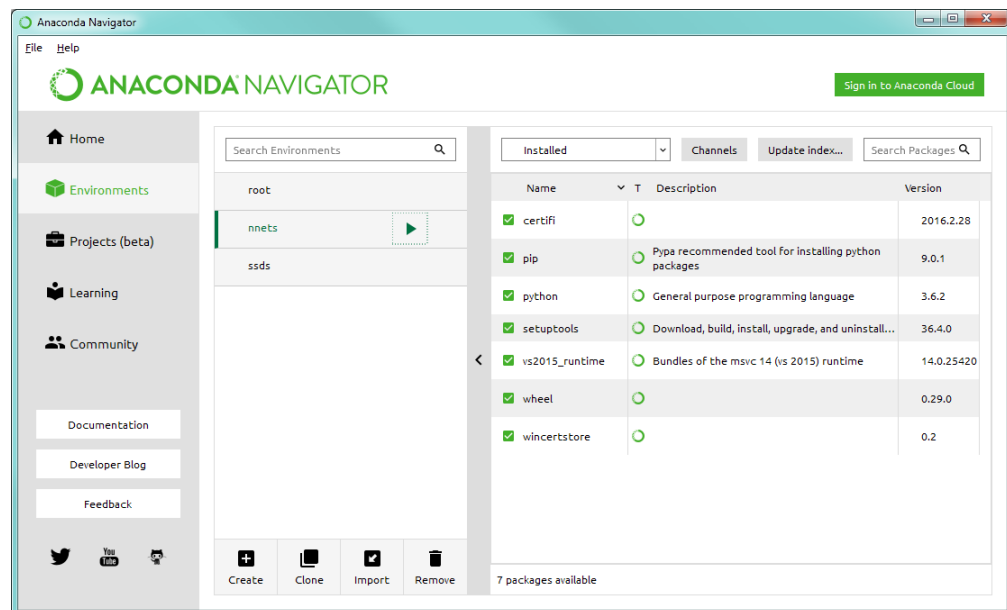


Figure 2. A newly created environment `nnets` is visible in the list of environments.
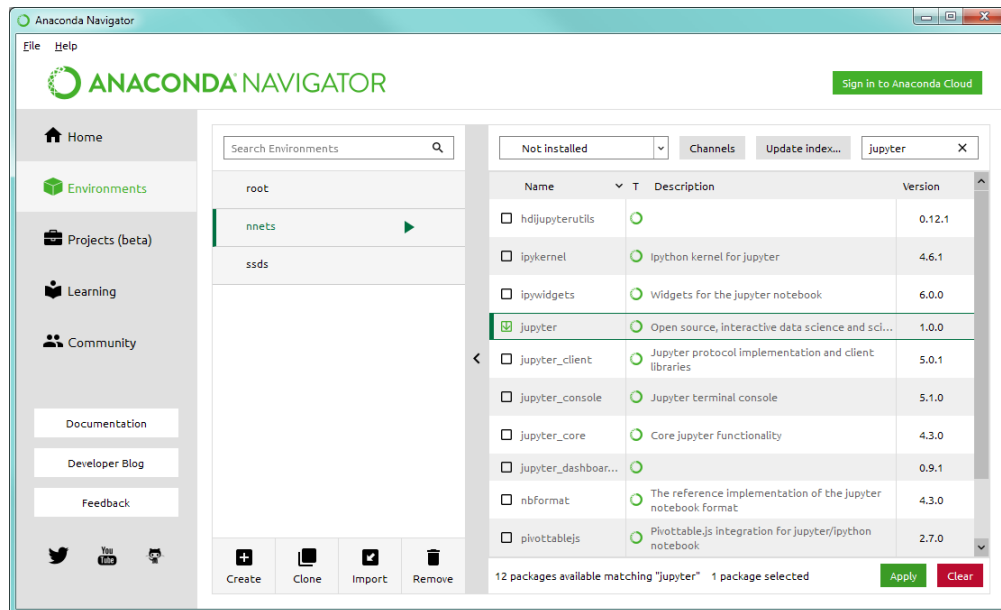
Figure 3. Installing the jupyter package: (1) set package indicator to "Not installed";
(2) enter jupyter in the search box; (3) select jupyter package; and (4) click on Apply to install it.

# 2. Installing TensorFlow

Detailed instructions for installing TensorFlow software library are available at https://www.tensorflow.org/install/. For the purpose of completing all laboratory exercises for the course Neural Networks it is enough to install TensorFlow with CPU-support only.

We recommend you install TensorFlow using `pip install` command within the `nnets` environment (do not use the Anaconda GUI):

```
(nnets) d:\> pip install --ignore-installed --upgrade tensorflow
Collecting tensorflow
  Using cached tensorflow-1.3.0-cp36-cp36m-win amd64.whl
Collecting numpy>=1.11.0 (from tensorflow)
  Downloading numpy-1.13.3-cp36-none-win amd64.whl (13.1MB)
    100% |████████████████████████████████████████████| 13.1MB
70kB/s
```
…
```
Successfully installed bleach-1.5.0 html5lib-0.9999999 markdown-2.6.9
numpy-1.13.3 protobuf-3.4.0 setuptools-36.6.0 six-1.11.0 tensorflow-1.3.0
tensorflow-tensorboard-0.1.8 werkzeug-0.12.2 wheel-0.30.0

(nnets) d:\>
```

# 3. Running the Jupyter Notebook

A Jupyter notebook is viewed and edited via a web browser after the notebook server is activated from the Anaconda command prompt. To activate a notebook server issue the following command:

```
(nnets) d:\>jupyter notebook --notebook-dir=d:\NNETS --port=8888
[I 22:23:41.439 NotebookApp] Serving notebooks from local directory:
d:\NNETS
[I 22:23:41.440 NotebookApp] 0 active kernels
```

```
[I 22:23:41.440 NotebookApp] The Jupyter Notebook is running at:
http://[all ip addresses on your system]:8888/
[I 22:23:41.440 NotebookApp] Use Control-C to stop this server and shut
down all kernels (twice to skip confirmation).
```

Here `d:\NNETS` is path of the directory that contains the notebook(s) of laboratory exercises for the course Neural Networks and `8888` is the number of the port where the web server will listen to clients. Direct your web browser to http://localhost:8888 to view and activate the notebooks as shown in Figs. 4 and 5.

Alternatively, you may simply change your current directory to the one containing the notebooks and run the server on default port as follows:

```
(nnets) D:\>cd NNETS

(nnets) D:\NNETS>jupyter notebook
[I 22:33:13.340 NotebookApp] Serving notebooks from local directory:
D:\NNETS
[I 22:33:13.340 NotebookApp] 0 active kernels
[I 22:33:13.341 NotebookApp] The Jupyter Notebook is running at:
http://[all ip addresses on your system]:8888/
[I 22:33:13.341 NotebookApp] Use Control-C to stop this server and shut
down all kernels (twice to skip confirmation).
```
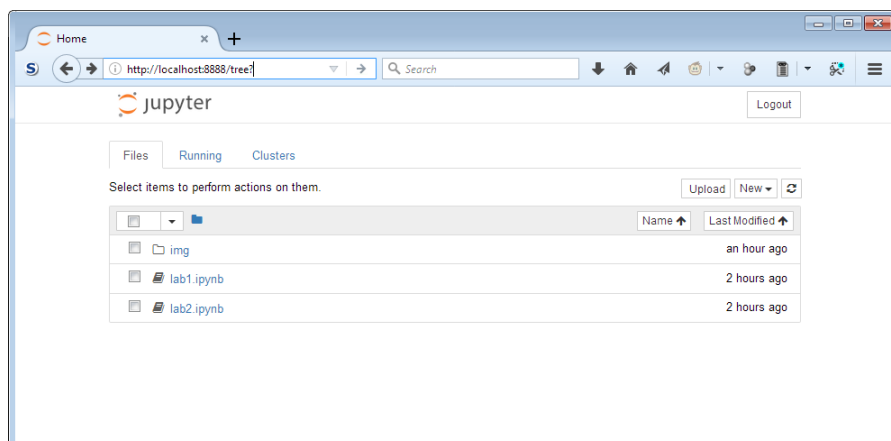


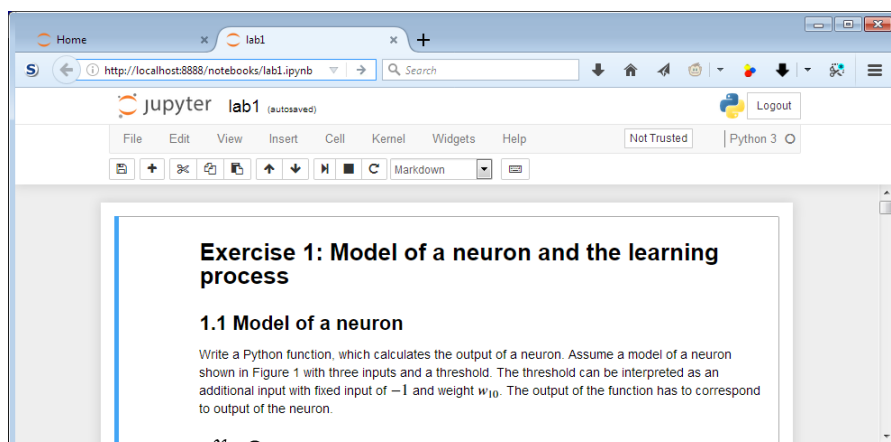Figure 4. Direct your web browser to http://localhost:8888 to see all available notebooks.



Figure 5. Each laboratory exercise is contained in a separate Jupyter notebook.