

# Keras

For the last assignment of Artificial Intelligence ([www.liacs.leidenuniv.nl/~kosterswa/AI/](http://www.liacs.leidenuniv.nl/~kosterswa/AI/)), we want to develop Neural networks.

We also want to use KERAS for this purpose. KERAS is a Python Deep learning library. All information can be found at [www.keras.io/](http://www.keras.io/).

## Installation

The many different installation possibilities are aptly described at the website mentioned above. For my Ubuntu 16.04 Linux machine, I did the following. First install TENSORFLOW with the help of <https://www.tensorflow.org/install/>:

```
$ sudo apt-get install python3-pip python3-dev python-virtualenv
$ virtualenv --system-site-packages -p python3 tensorflow
$ source ~/tensorflow/bin/activate
(tensorflow)$ easy_install -U pip
(tensorflow)$ pip3 install --upgrade tensorflow
```

Then install KERAS:

```
$ pip install keras
```

On my old machine I had to downgrade TENSORFLOW:

```
$ pip uninstall tensorflow
$ pip install tensorflow==1.5
```

## The network

In order to build a Neural network in Python, use Teddy Etoeharnowo's sample code, available through [www.liacs.leidenuniv.nl/~kosterswa/AI/samplekeras.tgz](http://www.liacs.leidenuniv.nl/~kosterswa/AI/samplekeras.tgz). After unpacking the file, the program can be run using

```
(tensorflow) python xorNeuralNetworkKeras.py
```

The task is to adjust the parameters in this program (see lines marked with "TODO"), and deliver an acceptable error rate for the XOR function. Note that appropriate data sets are also included with the sample code. And remember to always activate the TENSORFLOW environment as described above (third line of the installation).

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