Introduction to Artificial Intelligence & Data Science

Exercise 2

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Exercise 2

- Introduction to the exercise
- Creating a virtual environment
- Installing Jupyter Notebook and needed libraries
- Preparation for the ML-part
- Preparation for the DL-part

Credits: René Goldschmid, MSc, and Matthias Schmid-Kietreiber, MSc

Exercise 2 - important information

- start with an existing Jupyter notebook
- fill in the code-gaps until the expectations are met
- grading:
  - make sure your console outputs remain saved in your Notebook, so we can easily see what you‘ve done
  - add documentation in the Notebook
  - document your decisions and what you‘ve learned from the outcomes e.g. model-accuracy with ML vs. DL

Exercise 2 - setup

- download the Jupiter notebook from Moodle - Exercise 2 `Exercise_2_cifar.ipynb`
- download the data from Exercise 2 `data.zip`

For this exercise, you only work within the Notebook!

Install and activate virtual environment

Unix/MaxOS

```
# install environment, ensure python > 3.10 version
python3 -m venv .venv

# activate environment
source .venv/bin/activate
```

Windows

```
# install environment, ensure python 3.10 version
py -m venv .venv

# activate environment
.venv\Scripts\activate
```

Note: *.env* denotes the name of the directory in which the environment is installed to. Repeating the install instruction overwrites/deletes all previously installed python packages and configurations

Readings: Install packages in a virtual environment using pip and venv

Exercise 2 - installing Jupiter

Follow instructions on
https://jupyter.org/install

Install required python packages in virtual environment

```
#install all required packages manually

pip install tensorflow
pip install keras
pip install matplotlib
pip install numpy
pip install scikit-learn
```

Ensure compliance with the packages and their versions according to:
CPU run https://www.tensorflow.org/install/source#cpu
GPU run https://www.tensorflow.org/install/source#gpu

Exercise 2 - Setup exercise data and notebook

Start the notebook-server

Jupyter notebook runs on a local server you need to boot up.

1. create project folder/directory: `mkdir exercise2`
2. navigate to project folder/directory: `cd exercise2`
3. move downloaded `data.zip`, `Exercise_2_cifar.ipynb` from your download folder/directory to project folder/directory `exercise2`:
   Mac/Linux `mv $HOME/Downloads/data.zip .`
   Windows `move %userprofile%/Downloads/data.zip .`
4. extract the `data.zip` file in the project folder/directory `exercise2`
5. start Jupyter with the following command:
   jupyter-notebook
6. standard browser should open automatically
   otherwise use the following link
   Example: http://localhost:8888/lab

Important note:

Leave your terminal open as long as you work on your notebook!

Backend with Keras (TensorFlow versus Theano)

create or modify the keras.json file if it doesn't already exist

Mac/Linux:

/.keras/keras.json

Windows:

%USERPROFILE%/.keras/keras.json

ensure the backend variable set to *tensorflow* as follows:

```
{
    "floatx": "float32",
    "epsilon": 1e-07,
    "backend": "tensorflow",
    "image_data_format": "channels_last"
}
```

alternatively set the environment variable KERAS_BACKEND before calling the programme (python or jupyter)

```
KERAS_BACKEND=tensorflow python3 [script]
```