

Pre-Exercises: Cheat Sheet

This is your personal cheat sheet for the pre-exercises of the upcoming block seminar! You can use this to take notes and to answer the questions/tasks of the pre-exercises.

1. Python

- A. How to define a function and a class?
- B. What is a method and what is a property of a class?
- C. For what is the self parameter needed?
- D. Explain class inheritance (very briefly)!
- E. How to import a function or a package?

2. Numpy

- A. What is the rank of an array?

B. How to create arrays of zeros/ones?

C. How to slice an array? How to access specific elements/columns?

D. How to use boolean indexing, use combine multiple conditions?

E. How to mask an array and work on a subset of its elements?

F. How to reshape, stack, squeeze an array?

G. Implement a KNN in numpy

3. Plotting

A. How to create a basic line plot with title, labels, and legend?

B. How to use `plt.subplots()`?

C. How to create 1D and 2D histograms with a given bin number?

D. How to create a scatterplot?

4. **Pandas**

A. What are the three building blocks of the pandas library?

B. How to access the columns and indices of a DataFrame?

C. How to create a DataFrame?

D. How to index a DataFrame? How to access a subset of columns?

E. How to mask a DataFrame?

F. How to access common statistics?

G. How to calculate statistics for subgroups?

H. How to create new columns?

5. PyTorch

5.1. Tensor & Gradients

A. How to initialize a tensor (from Numpy)?

B. On which devices can you place a tensor? How to move it between devices?

C. Explain the basic principle of PyTorch's autograd function. (Keywords: requires_grad, automatic differentiation, Graph)

D. How to disable gradient tracking?

5.2. Initialize a PyTorch model

A. How to initialize a PyTorch model? From which module should it inherit?

B. Which private function must be defined?

C. Which PyTorch module can you use to wrap a sequence of PyTorch layers/activation functions?

D. Name an example for a layer type and an activation function

E. Where in your PyTorch model are the trainable weights defined?

5.3. Training loop

A. Explain the basic principle of a convolutional layer: What is a kernel? What is a channel?

B. Name three hyperparameters of a typical training.

- C. Why should you split your data at least in two datasets?
- D. Which module does PyTorch provide to manage your data?
- E. What is an epoch?
- F. Name an example for a loss function!

6. WandB

- A. What is “Weights and Bias (wandb)” used for?
- B. Give an example of useful parameters to log with wandb.
- C. What are the basic steps you need to add to your training loop to log your training loss via wandb?