Exercise 1: Preface & Practice Tasks   25. April 2023

Preface 1: Proceed & Syllabus

The exercises compliment the lecture by providing practical knowledge for selected topics and thereby build essential skills for the final assignment. In the exercise, the novel content to practice will be presented. You will then receive mandatory assignments to be worked through and submitted by Sunday 9 p.m. the following week (i.e., 12 days later) via WueCampus. You have to successfully complete and submit four out of five assignments. These weekly assignments will start in Exercise 2 on the 2nd of March.

The detailed tentative syllabus is as follows:

Session	Content	Schedule
Lecture 1	Introduction to Enterprise AI	18.04.2023
Lecture 2	Business Requirements for AI Systems	18.04.2023
Lecture 3	Data Engineering Fundamentals	25.04.2023
Exercise 1	Preface & Prerequisites	25.04.2023
Lecture 4	Generating Training Data	02.05.2023
Exercise 2	Tensorflow Data Validation *(Ass. due 14.05.)*	02.05.2023
Lecture 5	Feature Engineering	09.05.2023
Exercise 3	Hyperparameter Tuning and Model Training *(Ass. due 21.05.)*	09.05.2023
Lecture 6	Model Development and Offline Evaluation	16.05.2023
Exercise 4	Tensorflow Model Analysis *(Ass. due 28.05.)*	16.05.2023
Lecture 7	Model Deployment and Prediction Service	23.05.2023
Exercise 5	Deploy a Model with FastAPI and Docker *(Ass. due 11.06.)*	23.05.2023
Lecture 8	Data Distribution Shifts and Monitoring	06.06.2023
Exercise 6	Serving a Model with TF Serving *(Ass. due 18.06.)*	06.06.2023
Lecture 9	Continual Learning and Test in Production	13.06.2023
Exercise 7	Autoscaling und Online Inferencing *(Ass. due 25.06.)*	13.06.2023
Final Project	Team Selection	13.06.2023
Lecture 10	Guest Lecture: ML Ops in Practice	20.06.2023
Final Project	Kickoff	20.06.2023
Final Project	Report Submission	17.07.2023
Final Project	Presentation	18.07.2023

Preface 2: Tooling

During the exercises you will perform various coding tasks and get to know a few tools in the realm of MLOps.

- We will primarily use the Python programming language as it is the world's most popular coding language and hence recommend to get acquainted with it. Here is some practice material:

  - w3schools: Learning material on syntax, classes, variables, lists, tuples, comments, loops and much more

  - DataCamp: Introductory course to Python programming and popular packages

  - Python Wiki: An extensive list for learning material (ressources, interactive tools, videos and courses)

  - TensorFlow for Deep Learning: Introductory course to deep learning

  - codeacademy: Introductory course to Python programming

  - FreeCode Camp: Comprehensive introductory video to learn the Python programming language

- Here are some of many possible useful readings:

  - Python Data Science Handbook: Working scientists and data crunchers familiar with reading and writing Python code will find this comprehensive desk reference ideal for tackling day-to-day issues: manipulating, transforming, and cleaning data; visualizing different types of data; and using data to build statistical or machine learning models. [VanderPlas, Jake. Python data science handbook: Essential tools for working with data. O'Reilly Media, Inc., 2016.]

  - Designing Machine Learning Systems (2022): In this book, you'll learn a holistic approach to designing ML systems that are reliable, scalable, maintainable, and adaptive to changing environments and business requirements. It is also a primary reference for this course. [Huyen, Chip. Designing Machine Learning Systems. O'Reilly Media, Inc., 2022.]

  - Practical MLOps (2021): This insightful guide takes you through what MLOps is (and how it differs from DevOps) and shows you how to put it into practice to operationalize your machine learning models. [Gift, N., & Deza, A. (2021). Practical MLOps. O'Reilly Media, Inc..]

Preface 3: Final Project

Equipped with the knowledge and practice of the lectures and exercises you will be challenged with an examination task. In particular, you will build and deploy an end-to-end MLOps solution. The task will be handled in groups of 2-3 students.

Prior to final project participation, four out of five of the previous assignments are required to be submitted and successfully graded via GitHub. We will release the detailed modalities of this final project examination later within the course.

Practice Tasks

Task 1: Introduction to Jupyter Notebooks: We will now start with a short introduction to Jupyter Notebooks. Please do not hesitate to ask if you have any question regarding the subject matter.

Home Task 2: Google Colaboratory: Familiarize with Google Colaboratory in your own pace after today's exercise. If you have any question regarding the subject matter, please write us on Discord or via WueCampus.

Task 3: Introduction to Git and GitHub: Based on the slides, we will now create our own repository and Please do not hesitate to ask if you have any question regarding the subject matter.