Digi2Cloud GmbH
The Circle 6
Zürich Airport
5058 Zürich
info@digi2cloud.ch
www.digi2cloud.ch
+41 44 524 57 32

Künstliche Intellegenz: Data Science Programming 2 #010204

Daily Lecture Topics, Exercises and Tutorials: (See next page)

The minimum hardware requirements for Training Students:

- 1 GHz single-core processor,
- 2 GB of RAM,
- 10 GB of free disk space,

Software requirements on Training Server:

- Basic operating system like Windows 10/11, macOS, or Linux
- Office, Browser and Internet Verbindung
- PyChar als integrierte Entwicklungsumgebung (open source full featured IDE)
- PostgreSQL DB (Installer: certified by EnterpriseDB for all supported PostgreDB Versions)
- SQLAlchemy/Alembic
- Pydantic (Python Package)
- Redis (NoSQL database)
- Java Script

Data Science Programming 2 #010204

Target:

To enable advanced learners to design, optimize, and deploy data science solutions using Python, applying advanced analytics, machine learning, and scalable data processing techniques to complex, real-world problems.

Target Audience – Advanced Level

This training is intended for professionals who already have a solid foundation in Python and data science and want to advance to complex, production-ready data science and machine learning solutions.

Primary Audience

- Experienced Data Scientists seeking to deepen expertise in advanced modeling, optimization, and deployment
- Machine Learning Engineers aiming to strengthen Python-based ML pipelines and MLOps practices
- Senior Data Analysts transitioning into advanced machine learning and predictive analytics
- AI Engineers working on scalable and high-performance data-driven systems

Secondary Audience

- Software Engineers / Backend Developers with strong Python skills moving into data science or ML engineering
- Data Engineers expanding into advanced analytics and model development
- Researchers and Technical Specialists applying advanced data science techniques to complex datasets

Requirements

- Strong proficiency in Python programming
- Practical experience with Pandas, NumPy, and data analysis
- Basic knowledge of machine learning concepts
- Familiarity with Jupyter Notebooks and Git (recommended)

1 Woche	Modul	Methode	Bemerkung / Hilfsmittel
Mon	(9:00) Data Normalization (10:00) Exercises data normalization (11:00) 1 hour (coding together) Big Data Normalization and model preparation	Frontal & Brainstorming Selbstorganisiertes Lernen Frontal	PP Präsentation
	(13:00) Imputation and Data Cleaning (14:30) Exercises in data cleaning: how fast can you clean your dataset? (15:30) 1 hour (coding together) tutorial: Working with massive datasets (16:30) Independent work on Projects	Frontal & Brainstorming Plenum & Trainer shows how to use Python Environment in Git. Gruppenarbeit, Diskussion und anschliessend Lösung im Plenum Einzelarbeit (Indiv.) Als Hausaufgabe	Github Account und Open source Programmierung Einzelarbeit. Anschliessend wird der Trainer das Frontal bewerten und analysieren. Verbindung mit dem Training Server muss da durch RDP (Remote Desktop Protocol) hergestellt werden. Technische Anforderung auf dem Training Server: PyChar (as open source full featured IDE). It must be downloaded and installed locally on every Student-Laptop.
Tue	(9:00) Multicollinearity (10:00) 30 min exercises and 30 min solutions on solving Multicollinearity (11:00) 1 hour (coding together) implementing automated checks	Frontal Einzelarbeit Gruppenarbeit	Verbindung mit dem Training Server muss da durch RDP (Remote Desktop Protocol) hergestellt werden.
	(13:00) Advanced data transformations for addressing multicollinearity (14:30) Exercises in multicollinearity: when	Frontal Gruppenarbeit	PP Präsentation Github Account und Open source Programmierung

	to transform? (15:30) 1 hour (coding together) advanced data imputation (16:30) 1.5 hours Project Work & Questions	Gruppenarbeit Einzelarbeit	through Git Repository. (Local Desc Drive & SSH Key for Remote) -For all afternoon-
Wed	(9:00) Dimensionality Reduction (10:00) Exercises in PCA, kPCA (11:00) 1 hour (coding together) tutorial in Python - Reducing data dimension, and making predictions.	Frontal Plenum & Trainer shows how to create SQL Queries in Git. Gruppenarbeit	Alle Studenten installieren Postgre DB auf Ihre Laptops
	(13:00) 1 hour QUIZ to re-cap major topics in statistics (14:00) 1.5 hour lecture on Heteroscedasticity and ANOVA (15:30) 1 hour (coding together) tutorial on analysis of variance in python (16:30) 1.5 hours Project Work & Questions	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit	Alle Studenten installieren SQLAlchemy/Alembic auf Ihre Laptops.
Thur	(9:00) Introduction to Object Relational Databases (10:00) 30 min exercises on Database Queries & 30 min solutions & explanation (11:00) 1 hour (coding together) Setting up a Postgres Database	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit	Cheat-Sheet for python modules used in Boot Camp

	(13:00) 1.5 hour lecture on Postgres + Pandas and SQLAlchemy (14:30) 30 min exercises on Postgres Operations and SQLAlchemy & 30 min solutions and explanations (15:30) 1 hour (coding together) tutorial on Pandas + SQLAlchemy (16:30) 1.5 hours Home exercises and coding practice.	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit	
Fri	(9:00) Lecture: Bit Data - how to deal with super massive datasets? (10:00) Exercises and Solutions for manipulation of big data (11:00) 1 hour (coding together) tutorial on Big Data handling	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit	Pydantic is a Python package that can offer simple data validation and manipulation. It must be downloaded and installed on Students Laptops.
	(13:00) 1.5 hour lecture on Time-Series data: How is it different? (14:30) 1-hour exercises on manipulation of dependant datasets (15:30) 1 hour (coding together) tutorial on timeseries datasets in python (pandas) (16:30) 1.5 hours Project Work & Questions	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit	Redis is an in-memory key-value pair database typically classified as a NoSQL database. It must be downloaded and installed on Students Laptops.

2 Woche	Modul	Methode	Bemerkung / Hilfsmittel
Mon	(9:00) Lecture: Non-Linear regression for classification (10:00) Exercises in Scikit-learn (11:00) 30 min solutions and explanations	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit	Visual Studio Code (inkl. Javascript) muss vorher runtergeladen und auf Laptops der Studenten installiert werden. Internet Browser muss auch da verfügbar sein. Internetverbindung auch.
	(13:00) Lecture on Assessing Classification Accuracy (14:30) 30 min exercises + 30 min solutions Classification Accuracy (Predicted vs. Observed, ROC, MSE) (15:30) 1 hour (coding together) tutorial: Setting up a classification pipelin (16:30) 1.5 hours project work and questions	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit Gruppenarbeit & Quiz	
Tue	(9:00) Introduction to Classification Trees (10:00) Exercises in using Classifiers (11:00) Classification Tree Tutorial -- voting on Thursday's topic --	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit	Browser und Internet muss da verfügbar sein. Verbindung zum Trainingsserver muss vorher verfügbar sein
	(13:00) 1.5 hour lecture on Random Forest (14:30) 30 min exercises + 30 min solutions in using the Random Forest Algorithm (Machine Learning) (15:30) 1 hour (coding together) tutorial:	Frontal Einzelarbeit & Support vom Trainer	Cryptools wie Whireshark oder cleopatra.

	Preparing data for Random Forest (16:30) Project work and questions	Gruppenarbeit Gruppenarbeit & Quiz	
Wed	(9:00) Machine Learning Lecture (SVM) (10:00) Exercises in Scikit-learn (11:00) 30 min solutions and explanations	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit	Verbindung zum Trainingsserver muss vorher verfügbar sein
	(13:00) 1.5 hour lecture on Bagging and Ensemble methods (14:30) 30 min exercises + 30 min solutions on Machine Learning: how to use machine learning methods ? (15:30) 1 hour (coding together) tutorial: Setting up a machine learning model (16:30) 1.5 hours project work and questions	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit Gruppenarbeit & Quiz	
Thur	(9:00) Free Lecture (on voted topic) (10:00) 30 min exercises and 30 min solutions on Forecasting (11:00) 1 hour (coding together) Setting up a forecasting pipeline	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit	Flask als Python geschriebenes Webframework Muss da mit installiert sein.
	(13:00) Data Structures and Algorithms (14:30) 1 hour data-structures & algorithms (15:30) 1 hour (coding together) tutorial on Data Structures and Algorithms (Technical Interview Prep) (16:30) 1.5 hours Project Work & Questions	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit Gruppenarbeit & Quiz	Flask als Python geschriebenes Webframework Muss da mit installiert sein.
Fri	(9:00) Common Technical Interview		

	Questions (algorithms walkthrough) (11:00) Common project management frameworks (SCRUM / Agile)	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit	Cryptools wie Whireshark oder cleopatra.
	(13:00) Technical Interview Drilling (all bootcamp participants practice job interviews + reviewing interviews) (16:30) 1.5 hours Project Work & Questions	Frontal Einzelarbeit & Support vom Trainer Gruppenarbeit Gruppenarbeit & Quiz	Browser und Cryptools wie Whireshark oder cleopatra.