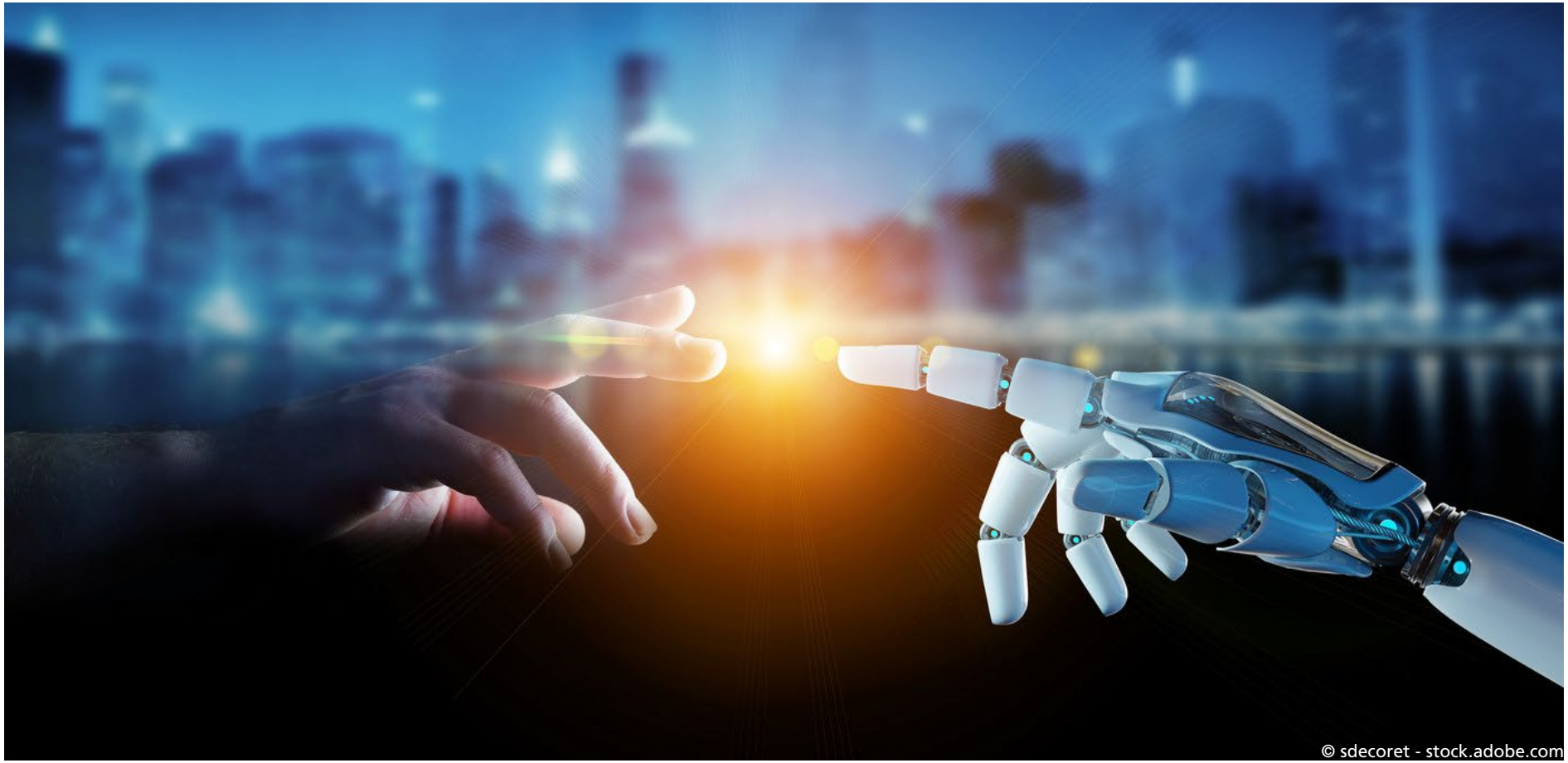
Welcome to the Fraunhofer Certified Course Deep Learning and Generative AI



Fraunhofer
BIG DATA AI

Kommunikationsregeln

1. Wir schlagen das „Du“ als Umgangsform vor.

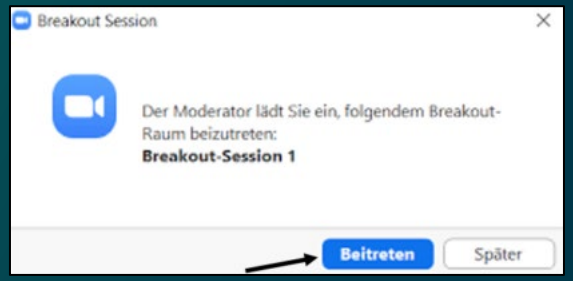
2. Bitte das Mikrofon stumm schalten.

3. Wir würden wir euch gerne sehen, bitte Video einschalten (Ausnahme: Langsame Internetverbindung)

4. Bei Fragen, Anmerkungen oder Diskussionsbedarf gerne mit einem kurzen „Frage“ (über Chat oder Audio) den Dozenten unterbrechen.

Pausen

- Kaffeepausen ca. 15-30 Minuten:
- Trefft andere Teilnehmende in unseren Pausenräumen zum zwanglosen Austausch!
- Den Zugang erhaltet Ihr von den Dozenten
- (Ihr könnt den Pausenraum betreten oder wieder verlassen und zurück in den Schulungsraum gelangen.)



- Mittagspause von 12:00 bis 13:00

Ausreichend lang für Euch?

Wir werden immer wieder 5-10 minütige Pausen einlegen. (Gerne bei Bedarf erinnern!)

Vorstellungsrunde

- Name
- Beruf & Background
- Erwartungen & Wünsche an den Kurs
- Berührungspunkte mit dem Themenfeld und/oder konkrete Anwendungsideen

Zeit: 1-2 Minuten

Deep Learning and Generative AI

Day 1

Agenda

Welcome, Round of Introductions, Expectations of Participants

Lecture: **Introduction to the Course**

Lecture: **Introduction to Machine Learning & Deep Learning**

Coffee break

Lecture: **Introduction to Tensorflow**

Lunch

Hands-on Exercise: Classification with a Simple Model

Hands-on Exercise: Classification of Images with Simple Neural Networks

Coffee break

Lecture: **Building Blocks of Deep Learning**

Hands-on Exercise: Multilayer Neural Networks and Hyperparameter Search

Deep Learning and Generative AI

Day 2

Agenda

Hands-on Exercise: Tensorflow and Overfitting

Lecture: **Unsupervised Learning**

Coffee break

Hands-on Exercise: Static Embeddings

Lunch

Hands-on Exercise: Visualize Contextual Embeddings

Hands-on Exercise: Model Finetuning for Sentiment Analysis

Coffee break

Lecture: **Image Recognition**

Deep Learning and Generative AI

Day 3

Agenda

Hands-on Exercise: Classify Images with Convolutional Neural Networks

Hands-on Exercise: Classify Images with the Vision Transformer

Coffee break

Lecture: **Generating Text Sequences**

Lunch

Hands-on Exercise: Evaluating GPT Models

Hands-on Exercise: Time Series Modelling with Recurrent Neural Networks

Coffee break

Lecture: **Sequence-to-Sequence and Dialog Models**

Hands-on Exercise: Training a Transformer for Language Translation

Deep Learning and Generative AI

Day 4

Agenda

Hands-on Exercise: Multitask Transformers

Lecture: **Reinforcement Learning for Game Playing and Control**

Coffee break

Hands-on Exercise: Learning Game Contol with Deep Q-Networks

Hands-on Exercise: Comparison of Various Control Approaches

Lunch

Lecture: **Generative Models**

Hands-on Exercise: Image Generation with Generative Adversarial Networks

Coffee break

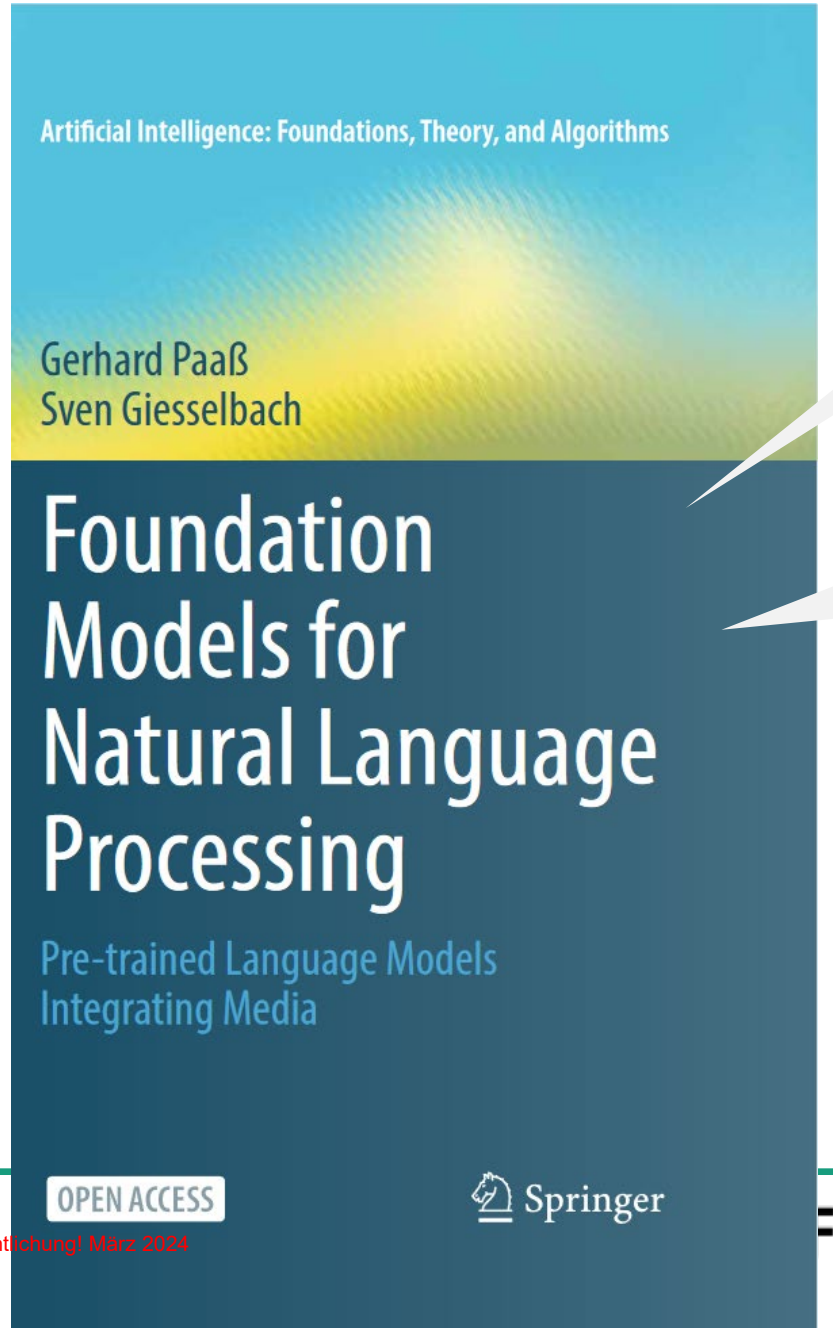
Hands-on Exercise: Image Generation with Stable Diffusion

Recap, Discussion and Feedback

Textbooks

Less formal neural network intro with many graphics

Springer 2020



Comprehensive introduction to Foundation Models

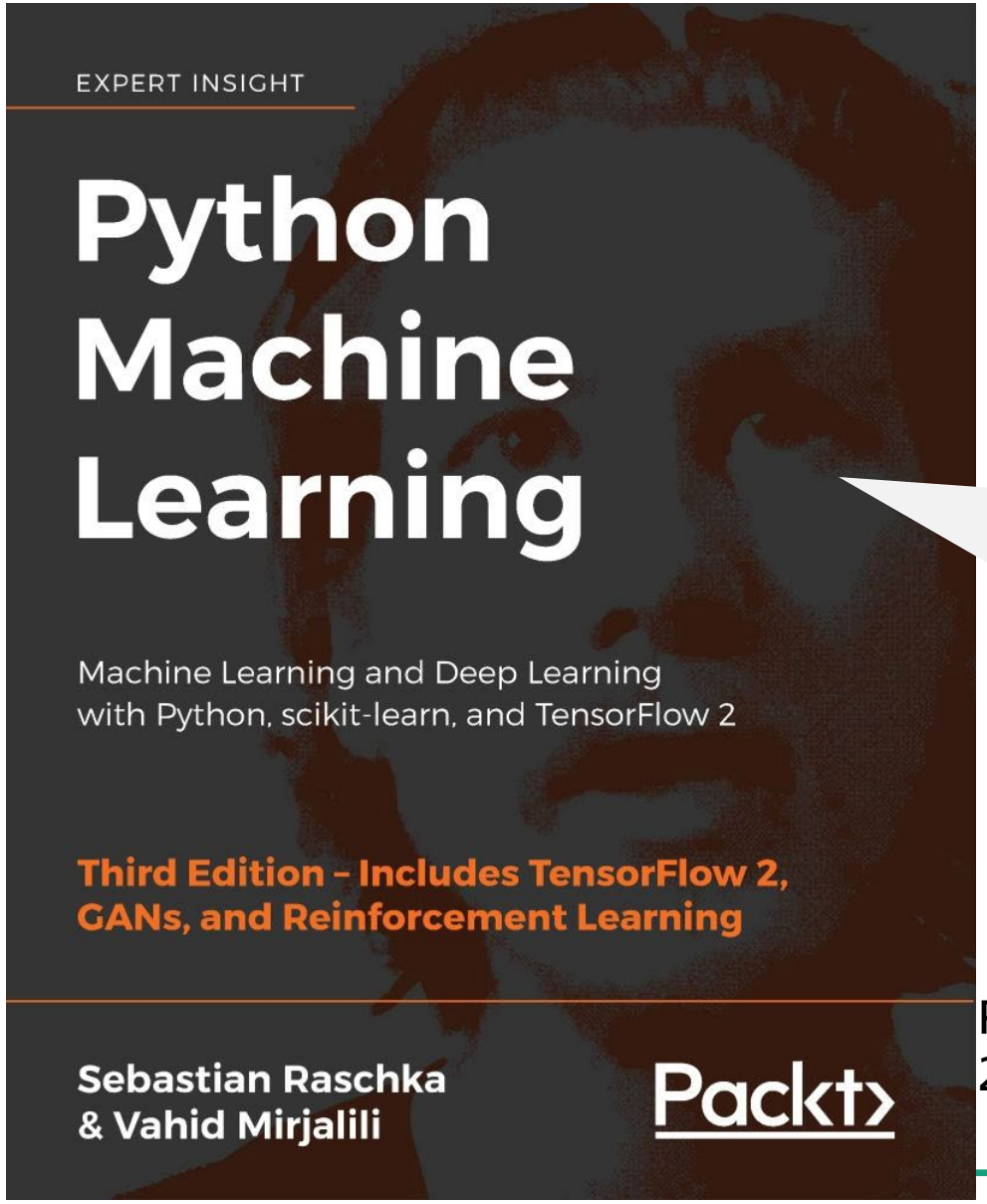
Many applications and different media: sound, images, video

Springer Nature 2023

Download link

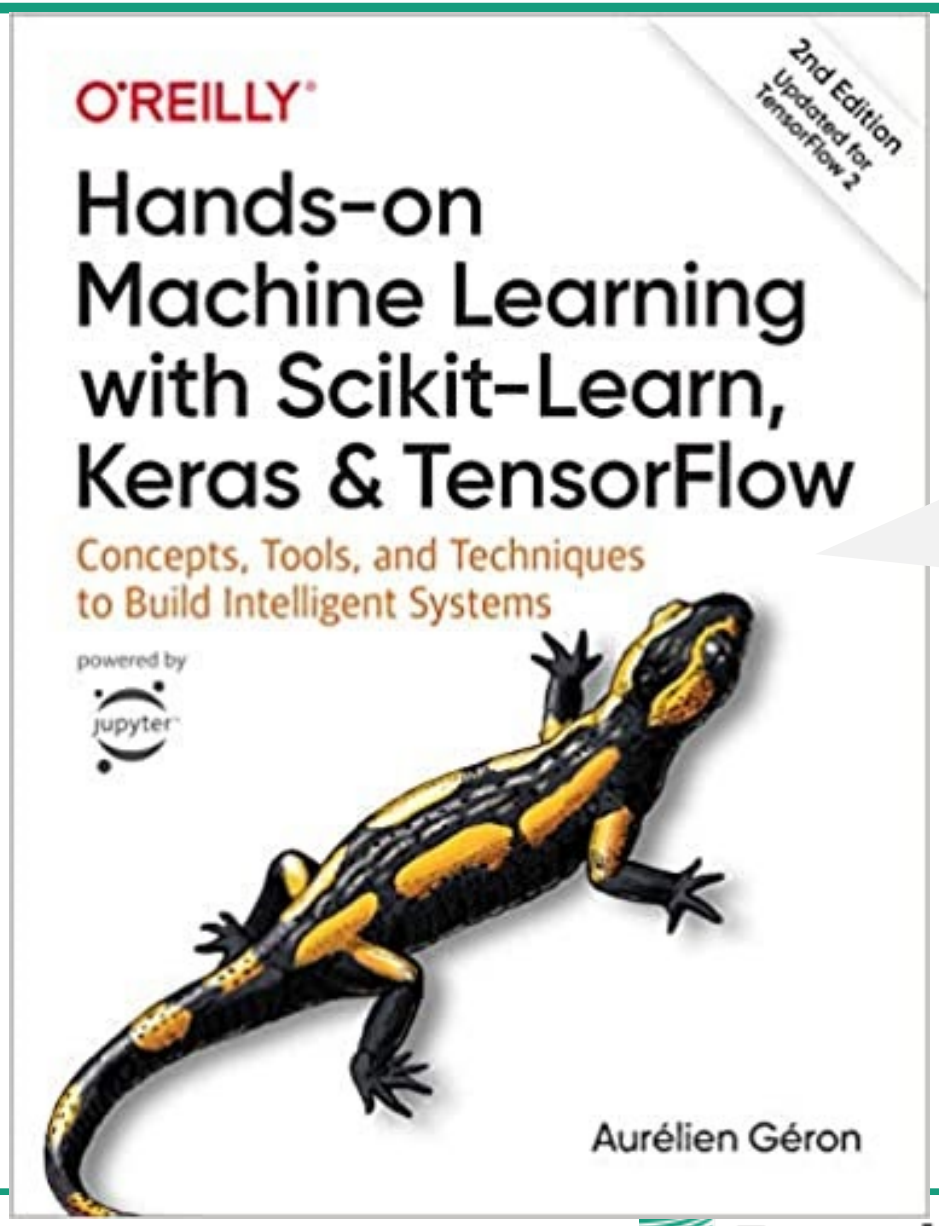
Fraunhofer BIG DATA AI

Textbooks



Intro to neural network implementation with tensorflow 2

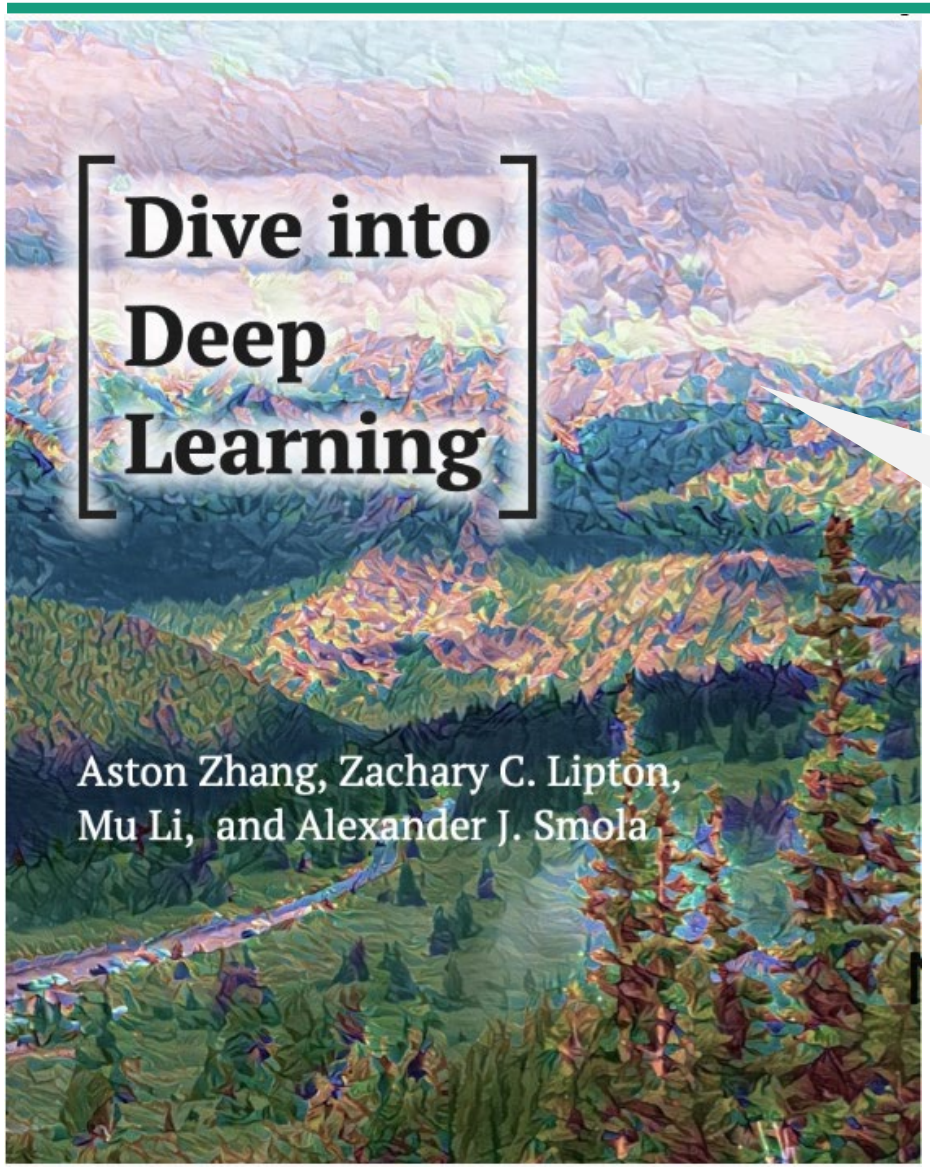
Packt 2019



Intro to neural network implementation with tensorflow 2

O'Reilly 2019

Textbooks

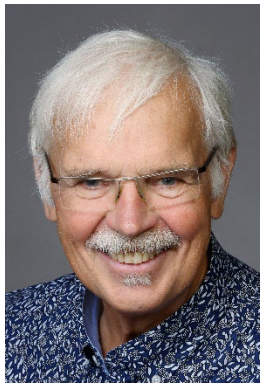


A free interactive deep learning book with code, math, and discussions

Free https://d2l.ai/

Dozenten

- Dr. rer. pol. Dipl. Math. **Gerhard Paaß**
- Fraunhofer-Institut für
  Intelligente Analyse- und Informationssysteme IAIS



- Prof. Dr.-Ing. **Marco Huber**
- Fraunhofer-Institut für
  Produktionstechnik und Automatisierung IPA

Data Scientist Mailing List

- **After the training we are still at your disposal for further comments, feedback or questions.**

  Please write to our mailing list:

  data_scientist_schulung@iais.fraunhofer.de