AI Engineering and Computer Vision

Maschinelles Lernen & Deep Learning · Anbieter: IU Akademie IU Internationale Hochschule

FÖRDERUNG & KOSTEN

Kurspreis: auf Anfrage

Förderfähig über: Bildungsgutschein

AZAV-zertifizierter Bildungsträger — Förderung durch die Agentur für Arbeit möglich

Kursdaten auf einen Blick

Durchführung	Online
Lernformat	Self-Paced
Dauer	6 Monate in Vollzeit oder 12 Monate in Teilzeit
Unterrichtssprache	Deutsch, Englisch
Kursstart	Startet alle 14 Tage
Vorkenntnisse	Keine Vorerfahrung
Abschluss	Zeugnis auf Hochschulniveau
Inklusive	Berufscoaching, Notebook / Tablet (geliehen)

Bildungsträger & Kontakt

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Kurs online ansehen

01 Kursbeschreibung

In einer Welt, in der Daten die neue Währung sind und Künstliche Intelligenz (KI) immer mehr an Bedeutung gewinnt, bist Du gefragt. Du hast verstanden, dass die Kombination von KI und Computer Vision entscheidend ist, um Unternehmen in die Zukunft zu führen. Um diese technologischen Herausforderungen meistern zu können, brauchen Unternehmen zukünftig Dich. Nach Deiner Online-Weiterbildung AI Engineering and Computer Vision revolutionierst Du den Umgang mit Daten, schaffst neue Perspektiven und machst KI-Strategien zur treibenden Kraft von Unternehmen. In Deiner Online-Weiterbildung AI Engineering and Computer Vision erwirbst Du fundierte Kenntnisse in Machine Learning, Deep Learning, Reinforcement Learning und Software Engineering für datenintensive Wissenschaften. Im Modul Machine Learning befasst Du Dich mit den Grundlagen von überwachten, unüberwachten und verstärkenden Lernansätzen. Zudem beschäftigst Du Dich mit Regression und Klassifikationslernproblemen und erlernst Techniken zur Schätzung funktionaler Abhängigkeiten. Im Deep Learning Modul tauchst Du in die Welt der neuronalen Netzwerke ein und lernst verschiedene Netzwerkarchitekturen sowie Trainingsmethoden kennen. Anschließend erwirbst Du Kenntnisse über Markov-Ketten, Banditen und Q-Learning. Du lernst, wie Computer problemorientierte Strategien entwickeln können, ohne explizit für die spezifische Aufgabe programmiert zu werden. Im Modul Software Engineering für datenintensive Wissenschaften befasst Du Dich mit agilen Projektmanagementmethoden sowie DevOps und erfährst, wie Du Modelle in die Produktion bringst. Die Module Image Processing and Low Level Vision und Mid-Level Vision and Video runden Deine Online-Weiterbildung ab. Hier lernst Du, wie Bilder erfasst und repräsentiert werden, und beschäftigst Dich mit Themen wie Filterung sowie Textur. Du erwirbst Kenntnisse über mittlere Bildmerkmale, Segmentierung, Bewegung, Tracking und Form. Hinweis: Durch den erfolgreichen Abschluss dieser Weiterbildung erlangen die Teilnehmenden keinen offiziellen Ingenieur-Titel.

02 Lehrplan & Module

1. Deep Learning

Neural networks and deep learning approaches have revolutionized the fields of data science and artificial intelligence in recent years, and applications built on these techniques have reached or surpassed human performance in many specialized applications.
After a short review of the origins of neural networks and deep learning, this course will cover the most common neural network architectures and discuss in detail how neural networks are trained using dedicated data samples, avoiding common pitfalls such as overtraining.
The course includes a detailed overview of alternative methods to train neural networks and further network architectures which are relevant in a wide range of specialized application scenarios.
Kursinhalte
Introduction to Neural Network and Deep Learning The Biological Brain
Perceptron and Multi-Layer Perceptrons
Network Architectures Feed-Forward Networks
Convolutional Networks
Recurrent Networks, Memory Cells and LSTMs
Neural Network Training Weight Initialization and Transfer Function
Backpropagation and Gradient Descent
Regularization and Overtraining
Alternative Training Methods Attention
Feedback Alignment
Synthetic Gradients
Decoupled Network Interfaces
Further Network Architectures Generative Adversarial Networks
Autoencoders
Restricted Boltzmann Machines
Capsule Networks
Spiking Networks
Fakten zum Modul: Niveau: Master · Unterrichtssprache: English · 5 ECTS-Punkte · Modulprüfung: Mündliche Prüfung

2. Reinforcement Learning

Reinforcement learning allows computers to derive problem-solving strategies without being explicitly programmed for the specific task, similar to the way humans and animals learn.
After introducing the concepts of reinforcement learning, the course discusses the properties of Markov chains and single- and multi-armed bandits in detail. Special attention is given to the understanding of value functions and discounted value functions.
The course connects reinforcement learning with neural networks and deep learning and discusses how Q-Learning approaches can be used to utilize deep learning methods in reinforcement learning problems, including extensions such as double Q-Learning, hierarchical learning, and actor-critic learning.
Finally, the course discusses reinforcement learning approaches such as model-free and model-based learning and the tradeoff between exploration and exploitation.
Kursinhalte
Introduction to Reinforcement Learning Understanding Reinforcement Learning
Components of Reinforcement Learning Systems
Markov Chains Markov Decision Process & Markov Property
Value Functions and Discounted Value Functions
General Utility Function
Actions & Policy
Bellman’s Equation
Value Iteration
Markov Chain Monte Carlo (MCMC)
Bandit Single-Arm Bandit
Multi-Arm Bandit
Q-Learning Time-difference Learning
Reinforcement Learning with Neural Networks & Deep Q Learning
Experience Replay
Double Q-Learning
Delayed Sparse Rewards
Hierarchical Learning
Value- vs Policy-Based Learning
Actor Critic Learning
Reinforcement Learning Approaches Model-Free Learning
Model-Based Learning
Exploration vs Exploitation
Fakten zum Modul: Niveau: Master · Unterrichtssprache: English · 5 ECTS-Punkte · Modulprüfung: Hausarbeit

3. Software Engineering for Data Intensive Sciences

Building a successful data-based product requires a significant amount of high-quality code which needs to run in a professional production environment. This course starts by introducing the agile approaches Scrum and Kanban and then discusses the shift from more traditional software development approaches to the DevOps culture.
Special focus is given to the discussion and understanding of techniques and approaches for producing high-quality code such as unit and integration testing, test-driven development, pair programing, and continuous delivery and integration.
Since many software artefacts are accessed via APIs, this course introduces concepts of API design and paradigms.
Finally, this course addresses the challenges of bringing code into a production environment, building a scalable environment, and using cloud-cased approaches.
Kursinhalte
Agile Project Management Introduction to SCRUM
Introduction to Kanban
DevOps Traditional lifecycle management
Bringing development and operations together
Impact of team structure
Building a DevOps infrastructure
Software Development Unit & integration test, performance monitoring
Test-driven development & pair programing
Continuous delivery & integration
Overview of relevant tools
API API design
API paradigms
From Model to Production Building a scalable environment
Model versioning and persistence
Cloud-based approaches
Fakten zum Modul: Niveau: Master · Unterrichtssprache: English · 5 ECTS-Punkte · Modulprüfung: Mündliche Prüfung

4. Machine Learning

Machine learning is a field of scientific study concerned with algorithmic techniques that enable machines to learn performance on a given task via the discovery of patterns or regularities in exemplary data. Consequently, its methods commonly draw upon a statistical basis in conjunction with the computational capabilities of modern computing hardware.
This course aims to acquaint the student with the main branches of machine learning and provide a thorough introduction to the most widely used approaches and methods in this field.
Kursinhalte
Introduction to Machine Learning Regression & Classification
Supervised & Unsupervised Learning
Reinforcement Learning
Clustering Introduction to clustering
K-Means
Expectation Maximization
DBScan
Hierarchical Clustering
Regression Linear & Non-linear Regression
Logistic Regression
Quantile Regression
Multivariate Regression
Lasso & Ridge Regression
Support Vector Machines Introduction to Support Vector Machines
SVM for Classification
SVM for Regression
Decision Trees Introduction to Decision Trees
Decision Trees for Classification
Decision Trees for Regression
Genetic Algorithms Introduction to Genetic Algorithms
Applications of Genetic Algorithms
Fakten zum Modul: Niveau: Master · Unterrichtssprache: English · 5 ECTS-Punkte · Modulprüfung: Examen, 90 Minuten

5. Image Processing and Low Level Vision

Computer vision is generally understood as a subfield of artificial intelligence and primarily concerned with developing and researching methods that enable computers to gain a high-level understanding of images or videos. This allows computers to perform high level visual cognitive tasks, emulating or even surpassing the human capability to derive information from visual input.
This course provides an exposition to the foundational aspects from the domain of image processing which underly many of the more cognitive oriented approaches of computervision.
Starting from an overview on image acquisition the topic of image geometry is explored. Subsequently, common digital image representations are introduced together with basic morphological operations on them. The course closes with an introduction to filtering and texture representation.
Kursinhalte
Image Acquisition The Human Visual System
Cameras and Sensors
Single and Multi-View Geometry Camera Geometry and Perspective Projection
Stereopsis and Multiple Views
Image Representation and Morphology Image Types
Morphology of Binary and Greyscale Images
Filtering Filtering in the Spatial Domain
Fourier Transformation and Filtering in the Frequency Domain
Texture Classical Texture Representations
Bag of Words and Representation in CNNs
Fakten zum Modul: Niveau: Master · Unterrichtssprache: English · 5 ECTS-Punkte · Modulprüfung: Klausur, 90 Minuten

6. Mid-Level Vision and Video

Computer vision is generally understood as a subfield of artificial intelligence and primarily concerned with developing and researching methods that enable computers to gain a high-level understanding of images or videos. This allows computers to perform high level visual cognitive tasks, emulating or even surpassing the human capability to derive information from visual input.
This course treats subjects that belong to the mid-level of the Computer Vision hierarchy. As such, it forms the bridge from low-level image processing to high-level computer vision. In particular, important image features like lines, edges, corners and other points of interest will be introduced. Based on this,an overview on segmentation and shape inference is given. Moreover, in the course the relevant topics of motion estimation and tracking are covered.
Kursinhalte
Mid-Level Image Features Edges & Lines
Corners, Points of Interest, and Blobs
Feature Based Alignment
Segmentation Region Based Segmentation
Contour Based Segmentation
Motion Optical Flow
Classical Approaches
CNN Based Methods
Tracking Kalman Filters
Particle Filters
Tracking Via Deep Networks
Shape Shape from X
Geometric Methods
Radiometric Approaches
Fakten zum Modul: Niveau: Master · Unterrichtssprache: English · 5 ECTS-Punkte · Modulprüfung: Mündliche Prüfung

03 Enthaltene Zertifikate

Trägerzertifikat: Zeugnis auf Hochschulniveau

04 Voraussetzungen

Vorkenntnisse

Niveau: Keine Vorerfahrung

Zulassungsvoraussetzung: gute Deutschkenntnisse auf B2-Niveau.

Zugangsempfehlung: Englisch auf B2 Niveau; Advanced Mathematics; Programming with Python

Die Weiterbildung ist auf dem inhaltlichen Niveau eines Master Studiengangs. Eine Weiterbildung auf

Master-Niveau ist anspruchsvoller als auf Bachelor-Niveau. Vorhandenes Grundlagenwissen im gewählten Fachbereich ist deshalb von Vorteil.

Technische Voraussetzungen

Laptop mit Internetzugang.

05 Zielgruppen & Berufsperspektiven

- Arbeitssuchende
- Fachkräfte

Mögliche Berufsbilder: Computer Vision Engineer, Machine Learning Engineer, Ingenieur für künstliche Intelligenz

NÄCHSTER SCHRITT

Kursdetails online ansehen und Anbieter kontaktieren

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Online ansehen