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**Modulbezeichnung:** Biomedical Image Analysis Project (BIMAP) 10 ECTS  
 (Biomedical Image Analysis Project)

Modulverantwortliche/r: Andreas Kist  
 Lehrende: René Groh, Andreas Kist

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Startsemester: SS 2022	Dauer: 1 Semester	Turnus: jährlich (SS)
Präsenzzeit: 60 Std.	Eigenstudium: 240 Std.	Sprache: Englisch

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**Lehrveranstaltungen:**

Biomedical Image Analysis Project (SS 2022, Projektseminar, 4 SWS, Andreas Kist et al.)

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**Empfohlene Voraussetzungen:**

Prior programming knowledge of the programming language Python. Prior experience with image processing and deep learning techniques are recommended, for example shown by attending successfully courses like "Pattern Recognition", "Deep Learning", "Data Science Survival Skills" or similar.

**Es wird empfohlen, folgende Module zu absolvieren, bevor dieses Modul belegt wird:**

Data Science Survival Skills  
 Deep Learning  
 Pattern Recognition

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**Inhalt:**

Computer vision is one of the major tasks and applications of artificial intelligence (AI). In this project seminar, we provide several biomedical image analysis projects, such as image classification, image segmentation and image embeddings. Students will approach these projects individually and will develop software prototypes in the light of good scientific practice.

**Lernziele und Kompetenzen:**

Students

- will be able to develop and implement an algorithm for a biomedical image analysis problem
- can document their code
- will gain hands-on experience in training, evaluating, and optimizing deep neural networks
- can present complex topics
- can extract relevant information from journal papers
- gain experience in scientific writing

**Literatur:**

- Burger and Burge, Principles of Digital Image Processing (all volumes)
  - Howes and Minichino, Learning OpenCV 4 Computer Vision with Python 3
  - Sebastian Raschka, Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow 2
  - Aurélien Géron, Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow
  - Pereira et al., Quantifying behaviour to understand the brain, Nat Neurosci 2020
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**Studien-/Prüfungsleistungen:**

Project achievement (Prüfungsnummer: 688993)

(englische Bezeichnung: Project achievement)

Seminarleistung

weitere Erläuterungen:

Seminar achievement: working software prototype, talk 10 min, academic report in PMLR style (4 pages, excl. references). Grading procedure: Software prototype (50%), talk (25%), report (25%)

Prüfungssprache: Englisch

Erstablingung: SS 2022, 1. Wdh.: WS 2022/2023

1. Prüfer: Andreas Kist

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**Organisatorisches:**

We will have a kick-off meeting at the beginning of the semester where potential projects are presented. In the first week, students select or propose a project and will continue working on the project during the semester. Supervision is granted by (bi-)weekly meetings with the lecturers. At the end, the project will be presented.