HAW Kiel
Hochschule für Angewandte Wissenschaften Kiel
Kiel University of Applied Sciences

MADS-EMGAI - Generative AI

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General information	
Module Code	MADS-EMGAI
Unique Identifier	GenAI-01-MA-M
Module Leader(s)	Prof. Dr. Prange, Michael (michael.prange@haw-kiel.de)
Lecturer(s)	Brede, Max (max.brede@haw-kiel.de) Klick, Alwin (alwin.klick@haw-kiel.de)
Offered in Semester	Wintersemester 2024/25
Module duration	1 Semester
Occurrence frequency	Regular
Module occurrence	In der Regel jedes Semester
Language	Englisch
Recommended for international students	Yes
Can be attended with different study programme	Yes

Curricular relevance (according to examination regulations)

Study Subject: M.Sc. - DS - Data Science
Module type: Wahlmodul
Semester: 2

Qualification outcome

Areas of Competence: Knowledge and Understanding; Use, application and generation of knowledge; Communication and cooperation; Scientific self-understanding / professionalism.

Students
- know the fundamentals of generative AI systems.
- know various modern applications of generative AI systems.
- know the theoretical foundations and practical applications of generative AI systems.

Students
- are able to explain and apply various open-source language models.
- are able to implement and utilize agent systems and their functionalities.
- are able to understand and use embeddings and vector stores for semantic search and recommendations.
- are able to explain and practically apply different methods for image generation.
- are able to fine-tune large language models (LLMs) and diffusion models for specific tasks.

Students
- are able to successfully organize teamwork for generative AI projects.
- are able to report and present team solutions for practical project tasks.
- are able to interpret and communicate the approaches in technical and functional terms.

Students
- are able to work professionally in the field of generative AI systems.
- are able to give and accept professional feedback to different topics of generative AI systems.
- are able to select relevant scientific literature about generative AI systems.

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Content information	
Content	Open Source Language Models - Overview of model lists - Ollama - Generation of synthetic text as training sets Agent Systems - Llamaindex, LangChain & Haystack - Function calling - Data analysis Embeddings and Vector Stores - Semantic Search - Retrieval-augmented generation - Recommendations AI Image Generators - Generative Adversarial Networks (GANs) - Variational Autoencoders / Diffusion Models - Generative approaches for image dataset augmentation Fine-Tuning of LLMs and Diffusion Models - Examples: LoRA, QLoRA, MoRA
Literature	Presentation slides

Teaching formats of the courses	
Teaching format	**SWS**
Lehrvortrag + Übung	4

Workload	
Number of SWS	4 SWS
Credits	5,00 Credits
Contact hours	48 Hours
Self study	102 Hours

Module Examination	
Examination prerequisites according to exam regulations	None
MADS-EMGAI - Portfolioprüfung	Method of Examination: Portfolioprüfung Weighting: 100% wird angerechnet gem. § 11 Absatz 2 PVO: No Graded: Yes

Miscellaneous	
Recommended Prerequisites	Basic knowledge about Deep Learning and Natural Language Processing. Basic practical experience in Python programming.