Constantin Seibold, Ph.D.

+49 160 3743570 | constantinseibold@gmail.com | constantinseibold.github.io | Google Scholar

As a dedicated researcher in artificial intelligence, I specialize in developing machine learning algorithms that bridge the gap between cutting-edge AI and real-world applications. My research is based on computer vision, natural language processing, as well as data analytics and has found application in automatic clinical diagnostics, assistive systems for the visually impaired and the automated analysis of documents. My work has been recognized with prestigious awards, including the KIT Doctoral Award, multiple top rankings in international AI challenges, and successful funding acquisition for innovative healthcare AI projects.

Skills: Deep Learning, Computer Vision, Natural Language Processing, Semantic Segmentation, Learning with Limited Data, Medical Image Analysis, Multimodal Deep Learning, Generative Models, Re-Identification
Programming Languages: Python, JavaScript, Java, MatLab
Tools: Pytorch, OpenCV, scikit-learn, React, plotly, d3js, Docker, ONNX, MinIO, PostgreSQL
Languages: German and English

Professional Experience

May 2023 - November 2024
Junior Research Group Leader, Institute for Artificial Intelligence in Medicine, Clinic for Nuclear Medicine, University Clinic Essen
Lead a team of multiple Ph.D. students on the development of machine learning algorithms in medicine to provide essential information directly in clinical use. Top ranking placements in multiple international challenge tracks, publications in top conferences and journals such as EMNLP and Medical Image Analysis and aquisition of an EU-Horizon grant. [Computer Vision, NLP, Clinical Studies]

July 2019- Dec. 2022
Research Assistant, Computer Vision for Human-Computer Interaction Lab, Karlsruhe Institute of Technology
Computer Vision research on medical report generation in varying image modalities. Developed the first open set pathology recognition model for chest radiographs as well as some of the first models for holistic anatomy segmentation in 2-/3-D.
[Computer Vision, NLP, Clinical Studies, Teaching]

March 2019- July 2019
Student Research Assistant, Computer Vision for Human-Computer Interaction Lab, Karlsruhe Institute of Technology
Development of computer vision algorithms for vehicle re-id. [Computer Vision]

Education

July 2019 - April 2023
PhD Computer Science, Karlsruhe Institute of Technology, Helmholtz Information & Data Science School for Health (HIDSS4Health)
Thesis Title: Towards the automatic generation of medical reports in low supervision scenarios
Grade: **Summa Cum Laudae**, **KIT Doctoral Award**
Advisor: Prof. Dr.-Ing. Rainer Stiefelhagen

Oct. 2016 - March 2019
M. Sc. Computer Science, Karlsruhe Institute of Technology
Thesis Title: Generative Models for Make-Up Style Transfer and Removal
Master Thesis Advisor: Dr.-Ing. Muhammed Saquib Sarfraz, Prof. Dr.-Ing. Rainer Stiefelhagen

Oct. 2013 - Oct. 2016
B.Sc. Computer Science, University of Stuttgart
Thesis Title:
Improving author co-citation analysis in scientific literature by using citation function classification
Bachelor Thesis Advisor: Dr.-Ing. Roman Klinger, Prof. Dr.-Ing. Sebastian Pado

Awards

2024	**2nd Place**, Automated Lesion Segmentation in Whole-Body PET/CT Challenge - autoPET III [paper]
2024	**1st Place (Spanish, Chinese), 3rd Place English**, MEDIQA-M3D Challenge at NAACL-ClinicalNLP [paper]
2023	**Winning Team of the UME - Innovation Contest**, University Medicine Essen
2023	**KIT Doctoral Award**, Karlsruhe Institute of Technology [link]
2022	**Teaching Award - Best Practical Course**, Karlsruhe Institute of Technology, CS Faculty [link]
2019	**Best Industry Paper Award**, British Machine Vision Conference [paper]

Funded Research Projects

2024	**EU HORIZON JU - Innovative Health Initiative - *HORIZON-JU-IHI-2023-05-02***, Thera4Care - THERANOSTICS ECOSYSTEM FOR PERSONALISED CARE, **Role:** PI, **Sub-Project Volume:** 257.000 [Link]
2022	**HIDSS4Health**, Using Anatomical Knowledge to Improve Medical Image Analysis, **Role:** Support in Grant Application Process, **Volume:** 130.000 (50% PhD position, 3 years) [Link]
2022	**HIDSS4Health**, Interactive Annotation of Volumetric Imaging Data Incorporating Report Information, **Role:** Support in Grant Application Process, **Volume:** 130.000 (50% PhD position, 3 years) [Link]
2019	**HIDSS4Health**, Generating Medical Imaging Reports from 3D Radiological CT Scans using Image Captioning Techniques, **Role:** Team-member, project implementation [Link]

Teaching Experience

Theses

Since 2024	**Supervision of Ph.D. Theses**, UCE; Students: H. Kalisch
2023-2024	**Co-Supervision of Ph.D. Theses**, UCE; Students: L. Heine, A. Brehmer, F. Jonske
2020-2024	**Supervision of Master Theses**, KIT, UCE; Students: P. Nguyen, W. Di, P. Albrecht, R. Chlebecec
2020, 2024	**Supervision of Bachelor Theses**, KIT, UCE; Students: C. Goos, J. Nasimzada, S. Mahler

Courses

2022	**Deep Learning for Computer Vision I: Basics**, KIT; Teaching Assistant [SS22]
2021-2022	**Deep Learning for Computer Vision II: Advanced Topics**, KIT; Teaching Assistant, Lecturer [WS 22,WS 23]
2021-2022	**Practical Course - Computer Vision for Human Computer Interaction**, KIT; Lecturer/Course Organizer **[🏆 Best Practical Course of SS21]** [WS21, SS21, WS22], consistently LQI 100 (”Lehrqualitätsindex”, 100 is the best possible value at KIT).
2020-2021	**Deep Learning for Computer Vision**, KIT; Teaching Assistant [SS20,SS21]

Outreach & Professional Development

Service and Outreach

2025	**CVPR Tutorial - Identifying Structure in Data**, Organizer [link]
2023-2024	**Initiating and organizing the Computer-Vision Reading Group at the IKIM**, Organizer, Presenter
2021-2022	**Initiating and organizing the Computer-Vision Reading Group at CV:HCI**, Organizer, Presenter
2022	**MICCAI Workshop - Medical Applications with Disentanglements**, Program Committee

Peer Review

2022	**Journals**, IEEE Transactions on Biomedical Engineering
Since 2021	**Conferences**, AAAI Conference on Artificial Intelligence (AAAI-23/24/25), IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR 2022/23/25), International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 22/24),European Conference on Computer Vision (ECCV 2022), Winter Conference on Applications of Computer Vision (WACV 2024)

Further Education

2023	**Workshop KHYS Basics of Leadership in Science 2023**, engaged with essential concepts of leadership in a scientific field.
2023	**Workshop KHYS Time-& Self-Management 2023**, presented approaches and tools for improved organization and self-reflexion.
2022	**IBM Neuro-Symbolic AI Summer School**, displayed possible combinations of knowledge-driven, symbolic AI with more traditional data-driven machine learning approaches. Distinguished speakers shared an overview of neuro-symbolic AI and how these method are applied in current applications.
2021	**Workshop Nawik Visualizing Science**, provided insights on how to properly visualize research results to convey the consequent insights.
2021	**Workshop Nawik Communicating Science**, provided insights on how to properly communicate your research results to both experts and layman.

Invited Talks

2024	**ENBIS Spring Meeting**, Dortmund, Germany Interpretable AI in Medicine: Generating Radiological Reports with Panoptic Scene Graphs
2024	**Intelligent Sensing and Perception Group**, Stuttgart, Germany The Current state of vision-language models in Radiology

Selected Publications

2025	**Every Component Counts: Rethinking the Measure of Success for Medical Semantic Segmentation in Multi-Instance Segmentation Tasks**, Jaus, Alexander, Seibold, Constantin et al., Proceedings of the AAAI conference on artificial intelligence. [A*, top 7% (CORE2023)](Poster/Proceedings)
2023	**Accurate Fine-Grained Segmentation of Human Anatomy in Radiographs via Volumetric Pseudo-Labeling**, Seibold, Constantin, et al. arXiv preprint arXiv:2306.03934, 16k Pypi downloads since release.
2022	**Reference-guided pseudo-label generation for medical semantic segmentation.**, Seibold, Constantin, et al. Proceedings of the AAAI conference on artificial intelligence. [A*, top 7% (CORE2023)](Poster/Proceedings)
2022	**Breaking with fixed set pathology recognition through report-guided contrastive training**, Seibold, Constantin, et al., International Conference on Medical Image Computing and Computer-Assisted Intervention. [A, top 15% (CORE2023)](Poster/Proceedings)
2022	**Detailed Annotations of Chest X-Rays via CT Projection for Report Understanding**, Seibold, Constantin, et al. The 33rd British Machine Vision Conference Proceedings [A, top 15% (CORE2023)] (Poster/Proceedings)

Publication List - Constantin Seibold

Peer-Reviewed Conference Publications

1. **Anatomy-guided Pathology Segmentation**, Alexander Jaus, ***Constantin Seibold*** , Simon Reiß, Lukas Heine, Anton Schily, Moon Kim, Fin Hendrik Bahnsen, Ken Herrmann, Rainer Stiefelhagen, Jens Kleesiek, MICCAI, 2025

2. **Towards unifying anatomy segmentation: automated generation of a full-body CT dataset via knowledge aggregation and anatomical guidelines**, Alexander Jaus*, ***Constantin Seibold*** *, Kelsey Hermann, Alexandra Walter, Kristina Giske, Johannes Haubold, Jens Kleesiek, Rainer Stiefelhagen, ICIP, 2024

3. **FootCapture: Towards an AR-based System for 3D Foot Object Acquisition through Photogrammetry**, Valentin Khan-Blouki, Franziska Seiz, Nicolas Walter, Alexander Jaus, Zdravko Marinov, Gijs Luijten, Jan Egger, ***Constantin Seibold*** , Dirk Solte, Jens Kleesiek, Rainer Stiefelhagen, MIDL, 2024

4. **Style Transfer and Pseudo-Label Filtering Improve Transferability in Cell Organelle Segmentation Scenarios**, Dmitrii Seletkov, Simon Reiß, Alexander Freytag, ***Constantin Seibold*** , Rainer Stiefelhagen, ISBI, 2024

5. **Enhancing Contrastive Training for Semi-Supervised Chest X-Ray Analysis Through Gaussian Mixture Models**, Phuong Quynh Le, Jens Kleesiek, ***Constantin Seibold*** , ISBI, 2024

6. **IKIM at MEDIQA-M3G 2024: Multilingual Visual Question-Answering for Dermatology through VLM Fine-tuning and LLM Translations**, Marie Bauer, Amin Dada, ***Constantin Seibold*** , Jens Kleesiek, Proceedings of the 6th Clinical Natural Language Processing Workshop, 2024 🏆 (First Place Solution: Spanish, Chinese)

7. **Autopet III challenge: Incorporating anatomical knowledge into nnUNet for lesion segmentation in PET/CT**, Hamza Kalisch, Fabian Hörst, Ken Herrmann, Jens Kleesiek, ***Constantin Seibold*** , MICCAI - AutoPET III, 2024 🏆 (Second Place Solution: Model Track), 2024

8. **Every Component Counts: Rethinking the Measure of Success for Medical Semantic Segmentation in Multi-Instance Segmentation Tasks**, Alexander Jaus, ***Constantin Seibold*** , Simon Reiß, Zdravko Marinov, Keyi Li, Zeling Ye, Stefan Krieg, Jens Kleesiek, Rainer Stiefelhagen, AAAI, 2024

9. **Multimodal Interactive Lung Lesion Segmentation: A Framework for Annotating PET/CT Images based on Physiological and Anatomical Cues**, Verena Jasmin Hallitschke, Tobias Schlumberger, Philipp Kataliakos, Zdravko Marinov, Moon Kim, Lars Heiliger, ***Constantin Seibold*** , Jens Kleesiek, Rainer Stiefelhagen, ISBI, Oral Paper

10. **Decoupled Semantic Prototypes enable learning from diverse annotation types for semi-weakly segmentation in expert-driven domains**, Simon Reiß, ***Constantin Seibold*** , Alexander Freytag, Erik Rodner, Rainer Stiefelhagen, CVPR, 2023

11. **On the Impact of Cross-Domain Data on German Language Models**, Amin Dada, Aokun Chen, Cheng Peng, Kaleb E Smith, Ahmad Idrissi-Yaghir, ***Constantin Seibold*** , Jianning Li, Lars Heiliger, Christoph M Friedrich, Daniel Truhn, Jan Egger, Jiang Bian, Jens Kleesiek, Yonghui Wu, EMNLP, 2023

12. **Flying guide dog: Walkable path discovery for the visually impaired utilizing drones and transformer-based semantic segmentation**, Haobin Tan, Chang Chen, Xinyu Luo, Jiaming Zhang, ***Constantin Seibold*** , Kailun Yang, Rainer Stiefelhagen, IEEE ROBIO, 2022

13. **Reference-guided Pseudo-Label Generation for Medical Semantic Segmentation**, ***Constantin Seibold*** , Simon Reiß, Jens Kleesiek, Rainer Stiefelhagen, AAAI, 2022

14. **Hierarchical nearest neighbor graph embedding for efficient dimensionality reduction**, Saquib Sarfraz, Marios Koulakis, ***Constantin Seibold*** , Rainer Stiefelhagen, CVPR, 2022

15. **Towards Automatic Parsing of Structured Visual Content through the Use of Synthetic Data**, Lukas Scholch, Jonas Steinhauser, Maximilian Beichter, ***Constantin Seibold*** , Kailun Yang, Merlin Knäble, Thorsten Schwarz, Alexander Mädche, Rainer Stiefelhagen, ICPR, 2022

16. **Deep Learning-basierte Synthese virtueller monoenergetischer Bilder zur Optimierung einer automatisierten Detektion von Lungenarterienembolien in konventionellen CT-Scans**, Matthias A Fink, ***Constantin Seibold*** , Hans-Ulrich Kauczor, Rainer Stiefelhagen, Jens Kleesiek, RöFo-Fortschritte auf dem Gebiet der Röntgenstrahlen und der bildgebenden Verfahren, 2022

17. **Breaking with Fixed Set Pathology Recognition through Report-Guided Contrastive Training**, ***Constantin Seibold*** , Simon Reiß, Saquib Sarfraz, Rainer Stiefelhagen, Jens Kleesiek, MICCAI, 2022

18. **Graph-constrained Contrastive Regularization for Semi-weakly Volumetric Segmentation**, Simon Reiß, ***Constantin Seibold*** , Alexander Freytag, Erik Rodner, Rainer Stiefelhagen, ECCV, 2022

19. **Detailed Annotations of Chest X-Rays via CT Projection for Report Understanding**, ***Constantin Seibold*** , Simon Reiß, Saquib Sarfraz, Matthias A Fink, Victoria Mayer, Jan Sellner, Moon Sung Kim, Klaus H Maier-Hein, Jens Kleesiek, Rainer Stiefelhagen, BMVC, 2022

20. **Every annotation counts: Multi-label deep supervision for medical image segmentation**, Simon Reiß, ***Constantin Seibold*** , Alexander Freytag, Erik Rodner, Rainer Stiefelhagen, CVPR, 2021

21. **Prediction of low-keV monochromatic images from polyenergetic CT scans for improved automatic detection of pulmonary embolism**, ***Constantin Seibold*** , Matthias A Fink, Charlotte Goos, Hans-Ulrich Kauczor, Heinz-Peter Schlemmer, Rainer Stiefelhagen, Jens Kleesiek, ISBI, 2021

22. **Pose2Drone: A Skeleton-Pose-based Framework for Human-Drone Interaction**, Zdravko Marinov, Stanka Vasileva, Qing Wang, ***Constantin Seibold*** , Jiaming Zhang, Rainer Stiefelhagen, EUSIPCO, 2021

23. **Let's Play for Action: Recognizing Activities of Daily Living by Learning from Life Simulation Video Games**, Alina Roitberg, David Schneider, Aulia Djamal, ***Constantin Seibold*** , Simon Reiß, Rainer Stiefelhagen, IROS, 2021

24. **Self-Guided Multiple Instance Learning for Weakly Supervised Thoracic Disease Classification and Localization in Chest Radiographs**, ***Constantin Seibold*** , Jens Kleesiek, Heinz-Peter Schlemmer, Rainer Stiefelhagen, ACCV, 2020

25. **Content and Colour Distillation for Learning Image Translations with the Spatial Profile Loss**, Saquib Sarfraz, ***Constantin Seibold*** , Haroon Khalid, Rainer Stiefelhagen, BMVC, 2019 🏆 (Best Industry Paper)

Journal Publications

1. **Why does my medical AI look at pictures of birds? Exploring the efficacy of transfer learning across domain boundaries**, Frederic Jonske, Moon Kim, Enrico Nasca, Janis Evers, Johannes Haubold, René Hosch, Felix Nensa, Michael Kamp, ***Constantin Seibold*** , Jan Egger, Jens Kleesiek, Computer Methods and Programs in Biomedicine, 2025

2. **MedShapeNet--A Large-Scale Dataset of 3D Medical Shapes for Computer Vision**, Jianning Li et al., Biomedical Engineering/Biomedizinische Technik, 2025

3. **Cellvit: Vision transformers for precise cell segmentation and classification**, Fabian Hörst, Moritz Rempe, Lukas Heine, ***Constantin Seibold*** , Julius Keyl, Giulia Baldini, Selma Ugurel, Jens Siveke, Barbara Grünwald, Jan Egger, Jens Kleesiek, Medical Image Analysis, 2024

4. **Is There a Role of Artificial Intelligence in Preclinical Imaging?**, Alina Küper, Paul Blanc-Durand, Andrei Gafita, David Kersting, Wolfgang P Fendler, ***Constantin Seibold*** , Alexandros Moraitis, Katharina Lückerath, Michelle L James, Robert Seifert, Seminars in Nuclear Medicine, 2023

5. **Valuing Vicinity: Memory attention framework for context-based semantic segmentation in histopathology**, Oliver Ester, Fabian Hörst, ***Constantin Seibold*** , Julius Keyl, Saskia Ting, Nikolaos Vasileiadis, Jessica Schmitz, Philipp Ivanyi, Viktor Grünwald, Jan Hinrich Bräsen, Jan Egger, Jens Kleesiek, Computerized Medical Imaging and Graphics, 2023

6. **CT angiography clot burden score from data mining of structured reports for pulmonary embolism**, Matthias A. Fink, Victoria L. Mayer, Thomas Schneider, ***Constantin Seibold*** , Rainer Stiefelhagen, Jens Kleesiek, Tim F. Weber, Hans-Ulrich Kauczor, Radiology, 2022

7. **Jointly Optimized Deep Neural Networks to Synthesize Monoenergetic Images from Single-Energy CT Angiography for Improving Classification of Pulmonary Embolism**, Matthias A Fink, ***Constantin Seibold*** , Hans-Ulrich Kauczor, Rainer Stiefelhagen, Jens Kleesiek, Diagnostics, 2022

8. **A reporting and analysis framework for structured evaluation of COVID-19 clinical and imaging data**, Gabriel Alexander Salg et al., npj Digital Medicine, 2021

Preprints

1. **Foreign object segmentation in chest x-rays through anatomy-guided shape insertion**, ***Constantin Seibold*** , Hamza Kalisch, Lukas Heine, Simon Reiß, Jens Kleesiek, Pre-Print, 2025

2. **CLUE: A Clinical Language Understanding Evaluation for LLMs**, Amin Dada, Marie Bauer, Amanda Butler Contreras, Osman Alperen Koraş, ***Constantin Seibold*** , Kaleb E Smith, Jens Kleesiek, Pre-Print, 2024

3. **Tumor likelihood estimation on MRI prostate data by utilizing k-Space information**, Moritz Rempe, Fabian Hörst, ***Constantin Seibold*** , Boris Hadaschik, Marco Schlimbach, Jan Egger, Kevin Kröninger, Felix Breuer, Martin Blaimer, Jens Kleesiek, Pre-Print, 2024

4. **De-Identification of Medical Imaging Data: A Comprehensive Tool for Ensuring Patient Privacy**, Moritz Rempe, Lukas Heine, ***Constantin Seibold*** , Fabian Hörst, Jens Kleesiek, Pre-Print, 2024

5. **Towards Synthetic Data Generation for Improved Pain Recognition in Videos under Patient Constraints**, Jonas Nasimzada, Jens Kleesiek, Ken Herrmann, Alina Roitberg, ***Constantin Seibold*** , Pre-Print, 2024

6. **Spacewalker: Traversing Representation Spaces for Fast Interactive Exploration and Annotation of Unstructured Data**, Lukas Heine, Fabian Hörst, Jana Fragemann, Gijs Luijten, Miriam Balzer, Jan Egger, Fin Bahnsen, Saquib Sarfraz, Jens Kleesiek, ***Constantin Seibold*** , Pre-Print, 2024

7. **Accurate Fine-Grained Segmentation of Human Anatomy in Radiographs via Volumetric Pseudo-Labeling**, ***Constantin Seibold*** , Alexander Jaus, Matthias A Fink, Moon Kim, Simon Reiß, Ken Herrmann, Jens Kleesiek, Rainer Stiefelhagen, Pre-Print, 2023