

Fredrik K. Gustafsson

POSTDOCTORAL RESEARCHER · KAROLINSKA INSTITUTET

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Education

Uppsala University

2018 - 2023 | *Doctor of Philosophy (PhD), Machine Learning*

Linköping University

2016 - 2018 | *Master of Science (MSc), Electrical Engineering*

Stanford University

2016 - 2017 | *Graduate Exchange Student, Electrical Engineering*

Linköping University

2013 - 2016 | *Bachelor of Science (BSc), Applied Physics and Electrical Engineering*

Professional Experience

Postdoctoral Researcher

Karolinska Institutet, Department of Medical Epidemiology and Biostatistics

• Machine learning and computer vision for computational pathology, in the group of Mattias Rantalainen.

Stockholm, Sweden

Dec. 2023 - present

PhD Student

Uppsala University, Department of Information Technology

- Thesis: *Towards Accurate and Reliable Deep Regression Models.*
- Supervisors: Thomas Schön & Martin Danelljan.

Uppsala, Sweden

Oct. 2018 - Nov. 2023

Contingent Worker

Facebook Reality Labs, FRL Research Pittsburgh

- Part-time internship extension.

Remote

Sep. 2021 - Dec 2021

Research Intern

Facebook Reality Labs, FRL Research Pittsburgh

- 3D human pose estimation, working with Weipeng Xu (remote due to COVID-19).

Remote

Jun. 2021 - Sep. 2021

Software Engineer

BMW Group

- Feature development for autonomous driving and advanced driver assistance systems.

Munich, Germany

Aug. 2018

MSc Thesis Student

Zenuity

- 3D detection of vehicles in LiDAR and/or image data, using deep learning.

Gothenburg, Sweden

Jan. 2018 - Jun. 2018

Summer Intern

Zenuity

- Developed a deep learning demo/test platform based on a standard 1/10 scale RC car.

Gothenburg, Sweden

Jun. 2017 - Aug. 2017

Summer Intern

T Engineering

- Developed a web tool for visualization of car engine sensor data for a fleet of test vehicles.

Trollhättan, Sweden

Jun. 2016 - Aug. 2016

Teaching Assistant

Linköping University, Department of Mathematics

Linköping, Sweden

Aug. 2014 - Dec. 2015

Publications

PREPRINTS

- [P5] **Multi-Stain Modelling of Histopathology Slides for Breast Cancer Prognosis Prediction**
Abhinav Sharma, [Fredrik K. Gustafsson](#), Johan Hartman, Mattias Rantalainen
Preprint, 2024
- [P4] **Automated Segmentation of Synchrotron-Scanned Fossils**
Melanie A.D. During, Jordan K. Matelsky, [Fredrik K. Gustafsson](#), Dennis F.A.E. Voeten, Donglei Chen, Brock A. Wester, Konrad P. Körding, Per E. Ahlberg, Thomas B. Schön
Preprint, 2024
- [P3] **Evaluating Computational Pathology Foundation Models for Prostate Cancer Grading under Distribution Shifts**
[Fredrik K. Gustafsson](#), Mattias Rantalainen
Preprint, 2024
- [P2] **Evaluating Deep Regression Models for WSI-Based Gene-Expression Prediction**
[Fredrik K. Gustafsson](#), Mattias Rantalainen
Preprint, 2024
- [P1] **Taming Diffusion Models for Image Restoration: A Review**
Ziwei Luo, [Fredrik K. Gustafsson](#), Zheng Zhao, Jens Sjölund, Thomas B. Schön
Preprint, 2024

JOURNAL PAPERS

- [J3] **Evaluating Regression and Probabilistic Methods for ECG-Based Electrolyte Prediction**
Philipp Von Bachmann, Daniel Gedon, [Fredrik K. Gustafsson](#), Antônio H. Ribeiro, Erik Lampa, Stefan Gustafsson, Johan Sundström, Thomas B. Schön
Scientific Reports, 2024
- [J2] **How Reliable is Your Regression Model's Uncertainty Under Real-World Distribution Shifts?**
[Fredrik K. Gustafsson](#), Martin Danelljan, Thomas B. Schön
Transactions on Machine Learning Research (TMLR), 2023
- [J1] **Uncertainty-Aware Body Composition Analysis with Deep Regression Ensembles on UK Biobank MRI**
Taro Langner, [Fredrik K. Gustafsson](#), Benny Avelin, Robin Strand, Håkan Ahlström, Joel Kullberg
Computerized Medical Imaging and Graphics, 2021

CONFERENCE PAPERS

- [C6] **Controlling Vision-Language Models for Multi-Task Image Restoration** [\[Cited by 70\]](#)
Ziwei Luo, [Fredrik K. Gustafsson](#), Zheng Zhao, Jens Sjölund, Thomas B. Schön
International Conference on Learning Representations (ICLR), 2024
- [C5] **Image Restoration with Mean-Reverting Stochastic Differential Equations** [\[Cited by 150\]](#)
Ziwei Luo, [Fredrik K. Gustafsson](#), Zheng Zhao, Jens Sjölund, Thomas B. Schön
The International Conference on Machine Learning (ICML), 2023
- [C4] **Learning Proposals for Practical Energy-Based Regression**
[Fredrik K. Gustafsson](#), Martin Danelljan, Thomas B. Schön
The International Conference on Artificial Intelligence and Statistics (AISTATS), 2022
- [C3] **Deep Energy-Based NARX Models**
Johannes Hendriks, [Fredrik K. Gustafsson](#), Antônio Ribeiro, Adrian Wills, Thomas B. Schön
The 19th IFAC Symposium on System Identification (SYSID), 2021
- [C2] **How to Train Your Energy-Based Model for Regression** [\[Cited by 40\]](#)
[Fredrik K. Gustafsson](#), Martin Danelljan, Radu Timofte, Thomas B. Schön
The British Machine Vision Conference (BMVC), 2020
- [C1] **Energy-Based Models for Deep Probabilistic Regression** [\[Cited by 70\]](#)
[Fredrik K. Gustafsson](#), Martin Danelljan, Goutam Bhat, Thomas B. Schön
The European Conference on Computer Vision (ECCV), 2020

CONFERENCE WORKSHOP PAPERS

- [W4] **Photo-Realistic Image Restoration in the Wild with Controlled Vision-Language Models**
Ziwei Luo, Fredrik K. Gustafsson, Zheng Zhao, Jens Sjölund, Thomas B. Schön
The IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPR Workshops), 2024
- [W3] **Refusion: Enabling Large-Size Realistic Image Restoration with Latent-Space Diffusion Models** [Cited by 90]
Ziwei Luo, Fredrik K. Gustafsson, Zheng Zhao, Jens Sjölund, Thomas B. Schön
The IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPR Workshops), 2023
- [W2] **Accurate 3D Object Detection using Energy-Based Models**
Fredrik K. Gustafsson, Martin Danelljan, Thomas B. Schön
The IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPR Workshops), 2021
- [W1] **Evaluating Scalable Bayesian Deep Learning Methods for Robust Computer Vision** [Cited by 360]
Fredrik K. Gustafsson, Martin Danelljan, Thomas B. Schön
The IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPR Workshops), 2020

THESES

- [T2] **Towards Accurate and Reliable Deep Regression Models**
Fredrik K. Gustafsson
PhD Thesis in Machine Learning, Uppsala University, 2023
- [T1] **Automotive 3D Object Detection Without Target Domain Annotations**
Fredrik K. Gustafsson, Erik Linder-Norén
MSc Thesis in Electrical Engineering, Linköping University, 2018

Supervision Experience

Ziwei Luo, PhD student at Uppsala University

Co-supervisor, since Feb 2024
Main supervisor: Thomas Schön, other co-supervisor: Jens Sjölund

Erik Thiringer, MSc Thesis student at Karolinska Institutet

Co-supervisor, since Sep 2024
Main supervisor: Mattias Rantalainen

Teaching Experience

UPPSALA UNIVERSITY

- Spr. 2023 **1RT495 Automatic Control II (MSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Aut. 2022 **1RT700 Statistical Machine Learning (MSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Aut. 2022 **1RT890 Empirical Modelling (MSc)**, Teaching Assistant (*problem-solving sessions, labs, grading*)
- Spr. 2022 **1RT700 Statistical Machine Learning (MSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Aut. 2021 **1RT890 Empirical Modelling (MSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Spr. 2021 **1RT495 Automatic Control II (MSc)**, Teaching Assistant (*computer labs, labs*)
- Spr. 2021 **1RT490 Automatic Control I (BSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Aut. 2020 **1RT890 Empirical Modelling (MSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Spr. 2020 **1RT700 Statistical Machine Learning (MSc)**, Lab Assistant
- Spr. 2020 **1RT490 Automatic Control I (BSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Aut. 2019 **1RT490 Automatic Control I (BSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Spr. 2019 **Deep Learning (PhD)**, Teaching Assistant (*help desks, grading*)
- Spr. 2019 **1RT700 Statistical Machine Learning (MSc)**, Lab Assistant
- Spr. 2019 **1RT490 Automatic Control I (BSc)**, Teaching Assistant (*problem-solving sessions, grading*)

LINKÖPING UNIVERSITY

- Aut. 2015 **TATA24 Linear Algebra (BSc)**, Teaching Assistant (*mentor sessions*)
- Aut. 2015 **TATM79 Found. Course in Mathematics (BSc)**, Teaching Assistant (*supervisor sessions, grading*)
- Aut. 2014 **TATA24 Linear Algebra (BSc)**, Teaching Assistant (*mentor sessions*)
- Aut. 2014 **TAIU10 Calculus One Variable, Prep. Course (BSc)**, Teaching Assistant (*problem-solving sessions*)

Academic Service

REVIEWING

MIDL 2025 (Upcoming)

ICML

2025 (Upcoming), 2024 (6 Papers)

AISTATS

2025 (2 Papers), 2024 (5 Papers), 2023 (3 Papers), 2022 (3 Papers)

TMLR, 2024, 3 Papers

NeurIPS

2024 (6 Papers), 2023 (6 Papers, *recognized as one of the top reviewers*)

ICLR 2024, 5 Papers

BRAVO Workshop at ICCV 2023, 1 Paper

BMVC

2023 (5 Papers), 2022 (6 Papers), 2021 (6 Papers), 2020 (1 Paper)

ICCV 2023, 4 Papers

AAAI

2023 (3 + 4 Papers), 2022 (4 + 2 Papers)

ECCV 2022, 8 Papers

CVPR 2022, 2 Papers

EBM Workshop at ICLR 2021, 3 Papers

ICRA 2021, 1 Paper

IFAC World Congress 2020, 2 Papers

Talks

INVITED TALKS

How Reliable is Your Regression Model's Uncertainty Under Real-World Distribution Shifts?

RISE Learning Machines Seminars, *Online*, Mar 2024 [slides] [video]

How Reliable is Your Regression Model's Uncertainty Under Real-World Distribution Shifts?

DFKI Augmented Vision Workshop, *Online*, Oct 2023 [slides]

Accurate 3D Object Detection using Energy-Based Models

Zenseact, *Online*, Jan 2021 [slides]

Evaluating Scalable Bayesian Deep Learning Methods for Robust Computer Vision

Zenuity, *Gothenburg, Sweden*, Jun 2019 [slides]

CONTRIBUTED TALKS

On the Use and Evaluation of Computational Pathology Foundation Models for WSI-Based Prediction Tasks

The Scandinavian Seminar on Translational Pathology (ScanPath), *Uppsala, Sweden*, Nov 2024 [slides]

Evaluating Computational Pathology Foundation Models for Prostate Cancer Grading under Distribution Shifts

The 30th Mayo-KI Annual Scientific Research Meeting, Stockholm, Sweden, Oct 2024 [slides]

Awards

The Tryggve Holm medal for “*outstanding student achievements*” at Linköping University, 2018.

Open Source Contributions

github.com/fregu856/deeplabv3, 770 Stars

github.com/fregu856/papers, 400 Stars

github.com/fregu856/3D0D_thesis, 280 Stars

github.com/fregu856/segmentation, 240 Stars

github.com/fregu856/evaluating_bdl, 130 Stars

github.com/fregu856/2D_detection, 130 Stars

github.com/fregu856/ebms_regression, 90 Stars

github.com/fregu856/CS224n_project, 60 Stars

github.com/fregu856/ebms_3dod, 50 Stars

Academic Network

CO-AUTHORS

Thomas Schön, Professor at Uppsala University

14 papers. Years with papers: 2024 - 2020

Martin Danelljan, Senior Research Engineer at Apple

6 papers. Years with papers: 2023 - 2020

Ziwei Luo, PhD student at Uppsala University

5 papers. Years with papers: 2024, 2023

Zheng Zhao, Assistant professor at Linköping University

5 papers. Years with papers: 2024, 2023

Jens Sjölund, Assistant professor at Uppsala University

5 papers. Years with papers: 2024, 2023

Mattias Rantalainen, Associate professor at Karolinska Institutet

3 papers. Years with papers: 2024

Antônio H. Ribeiro, Assistant professor at Uppsala University

2 papers. Years with papers: 2024, 2021

Languages

Swedish (native), English (fluent).