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 — *Stockholm, Sweden*
Karolinska Institutet, Department of Medical Epidemiology and Biostatistics — *Dec. 2023 - present*
- Machine learning and computer vision for computational pathology, in the group of Mattias Rantalainen.

PhD Student — *Uppsala, Sweden*
Uppsala University, Department of Information Technology — *Oct. 2018 - Nov. 2023*
- Thesis: *Towards Accurate and Reliable Deep Regression Models*.
- Supervisors: Thomas Schön & Martin Danelljan.

Contingent Worker — *Remote*
Facebook Reality Labs, FRL Research Pittsburgh — *Sep. 2021 - Dec 2021*
- Part-time internship extension.

Research Intern — *Remote*
Facebook Reality Labs, FRL Research Pittsburgh — *Jun. 2021 - Sep. 2021*
- 3D human pose estimation, working with Weipeng Xu (remote due to COVID-19).

Software Engineer — *Munich, Germany*
BMW Group — *Aug. 2018*
- Feature development for autonomous driving and advanced driver assistance systems.

Master's Thesis Student — *Gothenburg, Sweden*
Zenuity — *Jan. 2018 - Jun. 2018*
- 3D detection of vehicles in LiDAR and/or image data, using deep learning.

Summer Intern — *Gothenburg, Sweden*
Zenuity — *Jun. 2017 - Aug. 2017*
- Developed a deep learning demo/test platform based on a standard 1/10 scale RC car.

Summer Intern — *Trollhättan, Sweden*
T Engineering — *Jun. 2016 - Aug. 2016*
- Developed a web tool for visualization of car engine sensor data for a fleet of test vehicles.

Teaching Assistant — *Linköping, Sweden*
Linköping University, Department of Mathematics — *Aug. 2014 - Dec. 2015*

Publications

Preprints

[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 40]
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 120]
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 70]
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 330]
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

AISTATS
2025 (Upcoming), 2024 (5 Papers), 2023 (3 Papers), 2022 (3 Papers)

ICLR
2025 (Upcoming), 2024 (5 Papers)

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

ICML 2024, 6 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 (Upcoming)

Evaluating Computational Pathology Foundation Models for Prostate Cancer Grading under Distribution Shifts
The 30th Mayo-KI Annual Scientific Research Meeting, *Stockholm, Sweden*, Oct 2024 (Upcoming)

Awards

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

Open Source Contributions

`github.com/fregu856/deeplabv3`, 760 Stars

`github.com/fregu856/papers`, 400 Stars

`github.com/fregu856/3DOD_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
13 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
2 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).