

# Marvin Schmitt

MACHINE LEARNING SCIENTIST · PHD RESEARCHER

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## SUMMARY

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Machine learning scientist currently pursuing a PhD in computer science. Specializing in state-of-the-art machine learning algorithms, statistical modeling, and data visualization. 7+ years of hands-on experience in Python and R, with a comprehensive understanding of deep learning tools (TensorFlow and PyTorch). General problem solver with a passion for finding tailored and rigorous solutions to complex problems. Strong analytical skills combined with a talent for effectively communicating advanced concepts.

## EXPERIENCE

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since 2021

### PhD Researcher

CLUSTER OF EXCELLENCE SIMTECH, UNIVERSITY OF STUTTGART, GERMANY

- Cyber Valley project: Meta-Uncertainty in Bayesian Model Comparison
- Researched state-of-the-art methods in deep learning, uncertainty quantification, and robustness
- Published scientific papers in top-tier machine learning venues: AISTATS, UAI
- Developed research software for deep learning, trustworthy machine learning, and data visualization
- Initiated and coordinated scientific collaborations with national and international research groups
- Managed student assistants and supervised student projects on probabilistic machine learning

2017 – 2019

### Business Consultant

FREELANCE

- Instructed business workshops on communication, leadership, coaching, conflict, change, and personality
- Programmed a manuscript generation software to create custom training material with Python, Flask, and LaTeX

2017 – 2019

### Network Officer

MARSILIUS-KOLLEG CENTER FOR ADVANCED STUDY, HEIDELBERG UNIVERSITY, GERMANY

- Implemented a robust live streaming concept based on UDP multicast (internal) and RTMP (external)
- Coordinated a network-wide media center based on Samba
- Maintained the website and digital knowledge base in Imperia CMS with HTML, CSS, PHP, and JavaScript

2018

### Research Intern

QUANTITATIVE RESEARCH METHODS IN PSYCHOLOGY, HEIDELBERG UNIVERSITY, GERMANY

- Developed an algorithm to derive expectation measures from eye-tracking data
- Implemented machine learning methods to improve eye-tracking based usability research

2017

### Consultant Intern

MC HISCHE CONSULTING

- Advised the preparation and realization of business workshops
- Facilitated a book publication with focus on content, style guidelines, and typesetting

2016 – 2021

### Tutor and Teaching Assistant

INSTITUTE OF PSYCHOLOGY, HEIDELBERG UNIVERSITY, GERMANY

- Taught seminars and tutorials about statistical inference, probabilistic modeling, and data science
- Conceptualized and graded student assignments, graded exams

## EDUCATION

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since 2021

### PhD, Computer Science

UNIVERSITY OF STUTTGART, GERMANY

- Advisors: Prof. Dr. Paul-Christian Bürkner (TU Dortmund), Prof. Dr. Andreas Bulling (University of Stuttgart)
- ELLIS PhD program, co-supervised by Prof. Dr. Aki Vehtari (Aalto University, Finland)

2022

### MSc, Data and Computer Science

HEIDELBERG UNIVERSITY, GERMANY

- Grade 1.0 / 4.0 (A+; best: 1.0)
- Master thesis: Visualization of Distribution and Uncertainty of Posterior Model Probabilities

2021

### MSc, Psychology

HEIDELBERG UNIVERSITY, GERMANY

- Grade 1.0 / 4.0 (A+; best: 1.0)
- Master thesis: Model Misspecification in Bayesian Parameter Estimation Tasks with Invertible Neural Networks

2018

### BSc, Psychology

HEIDELBERG UNIVERSITY, GERMANY

- Grade 1.2 / 4.0 (A; best: 1.0)
- Bachelor thesis: Influence of Suggestive Questions on Usability Tests

# TEACHING

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Summer 2022	<b>Workshop</b> , Bayesian statistics with R and brms at FGME conference, Konstanz
Summer 2022	<b>Lecture &amp; Exercise</b> , Statistical Inference at Fresenius UAS, Heidelberg
Summer 2022	<b>Exercise</b> , Bayesian Statistics and Probabilistic Machine Learning at University of Stuttgart
Winter 2021/22	<b>Lecture &amp; Exercise</b> , Statistical Inference at Fresenius UAS, Heidelberg
Winter 2021/22	<b>Seminar</b> , Introduction to Statistics with R for PhD researchers at Heidelberg University
Summer 2021	<b>Exercise</b> , Descriptive Statistics & Probability Theory at Fresenius UAS, Heidelberg
Summer 2021	<b>Lecture &amp; Exercise</b> , Statistical Inference at Fresenius UAS, Heidelberg
Winter 2020/21	<b>Seminar (TA)</b> , Statistics with R at Heidelberg University
Winter 2020/21	<b>Lecture &amp; Exercise</b> , Statistical Inference at Fresenius UAS, Heidelberg
Summer 2020	<b>Seminar (TA)</b> , Programming with R at Heidelberg University
2020	<b>Seminar</b> , Communication Techniques at Fresenius UAS, Wiesbaden
2017	<b>Workshop</b> , Group Coaching at Fresenius UAS, Frankfurt
2016–2019	<b>Tutorial</b> , Descriptive Statistics, Probability Theory & Statistical Inference at Heidelberg University

# EXTRACURRICULAR ACTIVITIES & AWARDS

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2023 –	<b>Associated student</b> , International Max Planck Research School for Intelligent Systems (IMPRS-IS), Germany
2023	<b>Best paper honorable mention</b> , German Conference on Pattern Recognition
2023	<b>Member</b> , Society of SimTech, Germany
2019 – 2021	<b>Scholarship holder</b> , German Academic Scholarship Foundation (Studienstiftung d. dt. Volkes)
2018	<b>Didactic certificate for tutors</b> , Heidelberg University
2016 – 2021	<b>Elected representative</b> , Examination board M.Sc. & Diploma Psychology (break 10/2016 – 09/2017)
2016 – 2021	<b>Elected representative</b> , Institute Council (Fachrat) Psychology
2016 – 2020	<b>Member</b> , Student Council (Fachschaft) Psychology
2014	<b>Award for remarkable social commitment</b> , Auguste-Viktoria-Gymnasium Trier

# SELECTED INVOLVEMENT

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<b>Consultant</b>	Academic consultant in industry for Axem Neurotechnology (since 2022)
<b>Developer</b>	Core contributor to the <a href="#">BayesFlow</a> open source Python package for amortized Bayesian workflows
<b>Reviewer</b>	Reviewer for international scientific conferences (since 2022): ICML, AISTATS, NeurIPS workshops (AABI2022, DGM4H2023, UniReps2023)

# EVENTS

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2023	<b>Talk (oral)</b> , German Conference on Pattern Recognition
2023	<b>Poster (contributed)</b> , SimTech status seminar
2023	<b>Talk</b> , ELLIS Doctoral Symposium, Helsinki, Finland
2023	<b>Journal club (moderator)</b> , ELLIS Doctoral Symposium, Helsinki, Finland
2023	<b>Poster (contributed)</b> , AISTATS 2023, Valencia, Spain
2023	<b>Talk (invited)</b> , Bayes Comp conference, Levi, Finland
2023	<b>Poster (contributed)</b> , Bayes Comp conference, Levi, Finland
2022	<b>Talk (invited)</b> , Cyber Valley: Writing workshop, consulting on students' AI short stories
2022	<b>Poster (invited)</b> , ELLIS Unit Stuttgart Kickoff: <i>Model misspecification in simulation-based inference</i>
2022	<b>Poster (contributed)</b> , SimTech status seminar
2022	<b>Talk (invited)</b> , Cyber Valley: Office hours, <i>Where does AI begin?</i>
2022	<b>Talk (invited)</b> , Blue Yonder Group Inc.: <i>Validating synthetic training data in probabilistic machine learning</i>
2022	<b>Participant</b> , 1 <sup>st</sup> SimTech summer school: Knowledge-driven machine learning and its applications

# SKILLS

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<b>Languages</b>	German (native), English (fluent), French (basic), Latin (basic), Norwegian (basic)
<b>Programming</b>	Python, R, occasionally: C++, Java, JavaScript, HTML, CSS
<b>Data Science</b>	Python (Tensorflow/keras, PyTorch, sklearn, scipy, numpy, pandas, pytest), R (brms, lme4, afex, tidyverse), Stan
<b>Visualization</b>	Python (matplotlib, seaborn), R (ggplot2, plotly, rgl, shiny, gganimate), OpenGL
<b>Documentation</b>	LaTeX (KOMA, tikZ), git, Imperia, Markdown, RMarkdown, Jupyter, sphinx, roxygen, Quarto

# PUBLICATIONS

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Full publication list on [Google Scholar](#).

- [1] **Schmitt, M.**, Radev, S. T., and Bürkner, P.-C., (2023). Fuse it or lose it: Deep fusion for multimodal simulation-based inference. arXiv:2311.10671
- [2] Elsemüller, L., Olischläger, H., **Schmitt, M.**, Bürkner, P.-C., Köthe, U., and Radev, S. T., (2023). Sensitivity-aware amortized Bayesian inference. arXiv:2310.11122
- [3] **Schmitt, M.**, Habermann, D., Bürkner, P.-C., Koethe, U., and Radev, S. T. (2023). Leveraging self-consistency for data-efficient amortized Bayesian inference. In *NeurIPS UniReps: the First Workshop on Unifying Representations in Neural Models*
- [4] **Schmitt, M.**, Bürkner, P.-C., Köthe, U., and Radev, S. T. (2023). Detecting Model Misspecification in Amortized Bayesian Inference with Neural Networks. *45th German Conference on Pattern Recognition (GCPR)*. Awarded with a best paper honorable mention
- [5] Radev\*, S. T., **Schmitt\*, M.**, Schumacher, L., Elsemüller, L., Pratz, V., Schälte, Y., Köthe, U., and Bürkner, P.-C. (2023). BayesFlow: Amortized Bayesian workflows with neural networks. *Journal of Open Source Software*, 8(89):5702
- [6] Radev, S. T., **Schmitt, M.**, Pratz, V., Picchini, U., Köthe, U., and Bürkner, P.-C. (2023). JANA: Jointly Amortized Neural Approximation of Complex Bayesian Models. In Evans, R. J. and Shpitser, I. (eds.), *Proceedings of the 39th Conference on Uncertainty in Artificial Intelligence*, volume 216 of *Proceedings of Machine Learning Research*, pp. 1695–1706. PMLR
- [7] **Schmitt, M.**, Radev, S. T., and Bürkner, P.-C. (2023). Meta-Uncertainty in Bayesian Model Comparison. In *Proceedings of The 26th International Conference on Artificial Intelligence and Statistics (AISTATS)*, volume 206 of PMLR, pp. 11–29
- [8] Ewendt\*, F., **Schmitt\*, M.**, Kluttig, A., Kühn, J., Hirche, F., Kraus, F. B., Ludwig-Kraus, B., Mikolajczyk, R., Wätjen, W., Bürkner, P.-C., Föller<sup>§</sup>, M., and Stangl<sup>§</sup>, G. I. (2023). Association between vitamin D status and eryptosis – results from the German National Cohort Study. *Annals of Hematology*