Marvin Schmitt

PhD Researcher · Bayesian Statistics & Deep Learning

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Work Experience

since 2021 · **Research Associate**
SimTech Cluster of Excellence, University of Stuttgart
- Supervised by Dr. Paul-Christian Bürkner.
- Cyber Valley project *Meta-Uncertainty in Bayesian Model Comparison*.
- Researching methods to improve current Bayesian model comparison workflows through extensive simulations.

2017 – 2019 · **Workshop Assistant and Business Consultant**
Freelance
- Assisted with conception and realization of business workshops on communication, leadership development, group coaching, conflict, change, and personality.
- Developed a manuscript generation software to create custom training material with Python, Flask and LaTeX.

2017 – 2019 · **Network Officer**
Marsilius-Kolleg Center for Advanced Study
- Organized and coordinated IT-tasks and due diligence.
- Implemented a live streaming solution for live events based on UDP multicast (internal) and RTMP (external).
- Established a network-wide media center based on Samba.
- Maintained the center's website and digital knowledge base in Imperia CMS with HTML, CSS, PHP, JavaScript.
- Assisted in organizing and hosting symposia, conferences, and talks.

2018 · **Research Intern**
Quantitative Research Methods, Institute for Psychology
- Supervised by Dr. Veronika Lerche
- Developed an algorithm to derive expectation measures from eye-tracking data.
- Gained first on-hands experience with Machine Learning techniques in R.

2017 · **Consultant Intern**
MC Hische Unternehmensberatung
- Assisted in the preparation and realization of business workshops.
- Facilitated a book publication with focus on content, style guidelines, and typesetting.

Education

since 2021 · **PhD in Computer Science**
Cluster of Excellence SimTech, University of Stuttgart
- Junior Research Group for Bayesian Statistics, supervised by Dr. Paul-Christian Bürkner
- Focus: Bayesian model comparison, probabilistic machine learning, simulation-based inference
- Tools: R, Python, Stan

2022 · **M.Sc. in Data and Computer Science**
Heidelberg University
- grade 1.0 / 4.0 (best: 1.0)
- Master thesis: *Visualization of Distribution and Uncertainty of Posterior Model Probabilities*
- Tools: Python, C++, Java, OpenGL

2018 – 2021 · **M.Sc. in Psychology**
Heidelberg University
- grade 1.0 / 4.0 (best: 1.0)
- Master thesis: *Did you Miss Me? Model Misspecification in Bayesian Parameter Estimation Tasks with Invertible Neural Networks*
- Tools: R, Python

2014 – 2018 · **B.Sc. in Psychology**
Heidelberg University
- grade 1.2 / 4.0 (best: 1.0)
- Bachelor thesis: *Influence of suggestive questions on usability tests*
- Tools: R, SPSS

2006 – 2014 · **Abitur (A-levels)**
Auguste-Viktoria-Gymnasium, Trier
- grade 1.1 / 4.0 (best: 1.0)
- Stayed in southern India to foster the school's humanitarian UNESCO project with local representatives.
- Stayed in Illinois, US, for a CertiLingua research project on the impact of the religious education system in the US.

Teaching

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

Extracurricular Activities & Awards

2019 – 2021	**Scholarship holder,** German Academic Scholarship Foundation (Studienstiftung d. dt. Volkes)
2018	**Didactic certificate for tutors,** Heidelberg University
2016 – 2021	**Elected representative,** Examination board M.Sc. & Diploma Psychology (break 10/2016 – 09/2017)
2016 – 2021	**Elected representative,** Institute Council (Fachrat) Psychology
2016 – 2020	**Member,** Student Council (Fachschaft) Psychology
2014	**Award for remarkable social commitment,** Auguste-Viktoria-Gymnasium Trier

Selected Involvement

Consultant	Academic consultant in industry for Axem Neurotechnology (since 2022)
Reviewer	Reviewer for international scientific conferences (since 2022): ICML, AISTATS

Skills

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

Events

2023	**Talk (invited),** Bayes Comp conference, Levi, Finland
2023	**Poster (contributed),** Bayes Comp conference, Levi, Finland
2022	**Talk (invited),** Cyber Valley: Writing workshop, consulting on students' AI short stories
2022	**Poster (invited),** ELLIS Unit Stuttgart Kickoff: *Model misspecification in simulation-based inference*
2022	**Talk (invited),** Cyber Valley: Office hours, *Where does AI begin?*
2022	**Talk (invited),** Blue Yonder Group Inc.: *Validating synthetic training data in probabilistic machine learning*
2022	**Participant,** 1st SimTech summer school: Knowledge-driven machine learning and its applications

Publications

[1] F. Ewendt, **M. Schmitt**, A. Kluttig, J. Kühn, F. Hirche, F. B. Kraus, B. Ludwig-Kraus, R. Mikolajczyk, W. Wätjen, P.-C. Bürkner, M. Föller, and G. I. Stangl. Association between vitamin d status and eryptosis – results from the german national cohort study. *Annals of Hematology*, accepted.

[2] S. T. Radev, **M. Schmitt**, V. Pratz, U. Picchini, U. Köthe, and P.-C. Bürkner. JANA: Jointly amortized neural approximation of complex Bayesian models. 2023. arXiv:2302.09125.

[3] **M. Schmitt**, S. T. Radev, and P.-C. Bürkner. Meta-uncertainty in Bayesian model comparison. 2023. Artificial Intelligence and Statistics (AISTATS) conference proceedings.

[4] **M. Schmitt**, P.-C. Bürkner, U. Köthe, and S. T. Radev. Detecting model misspecification in amortized Bayesian inference with neural networks. 2021. arXiv:2112.08866.