Dr. Robin Chan

Born in January, 1993
in Wesel, Germany

Currently living in
Lausanne, Switzerland

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Research Interests

○ Safe Artificial Intelligence
○ Computer Vision
○ Deep Learning
○ Generative Models
○ Trustwothy Artificial Intelligence

Education

at the University of Wuppertal

2022. **Doctor of Natural Sciences**
Mathematics *("summa cum laude")*

2018. **Master of Science**
Mathematics

2017. **Bachelor of Science**
Mathematical Economics

Coding Skills

Python	● ● ● ●	PyTorch	● ● ● ○
R	● ● ○ ○	TensorFlow	● ● ○ ○

Work Experience

Sep. 2023 – Present. **Visiting Postdoctoral Researcher**
École Polytechnique Fédérale de Lausanne
Lausanne, Switzerland – Computer Vision Laboratory

Apr. 2023 – Present. **Postdoctoral Researcher**
Technische Universität Berlin – Berlin, Germany
Mathematical Modeling of Industrial Life Cycles

Aug. 2022 – Present. **Postdoctoral Researcher**
Bielefeld University – Bielefeld, Germany
Faculty of Technology – Machine Learning Group

Nov. 2018 – Jun. 2022. **Research Assistant**
University of Wuppertal – Wuppertal, Germany
IZMD, Stochastics and Applied Computer Science Group

Sep. 2017– Sep. 2018. **Intern**
Volkswagen Group Research – Wolfsburg, Germany
Automated Driving – Architecture and AI Technologies

Apr. 2016– Oct. 2016. **Intern**
Siemens AG Energy Sector – Berlin, Germany
Large Gas Turbines – Probabilistic Design

Own Research Projects

Jul. 2022 – Jun. 2024. **Out-of-Distribution Detection via Generative Modeling of Deep Latent Representations**
funded by the Ministry of Culture and Science of the German State of North Rhine-Westphalia – EUR 164,750.62

Industry Projects

Jul. 2019 – Jun. 2022. **Methods for Safe AI for Automated Driving: Training Meta Classifiers**
funded by the German Federal Ministry for Economic Affairs and Climate Action within the project "KI Absicherung"

Jun. 2019 – Nov. 2019. **Evaluation of Cost-based Decision Rules and Uncertainty-based Meta Segmentation**
funded by Volkswagen Group Research

Nov. 2018 – Jun. 2019. **Application of the Maximum Likelihood Rule in Semantic Segmentation**
funded by Volkswagen Group Research

Last updated: October, 2023.

Publications (Selection)

Youssef Shoeb, <u>Robin Chan</u>, Gesina Schwalbe, Azarm Nowzard, Fatma Güney, and Hanno Gottschalk *"Have We Ever Encountered This Before? Retrieving Out-of-Distribution Road Obstacles from Driving Scenes"*. The IEEE/CVF Winter Conference on Applications of Computer Vision (**WACV**) 2024

<u>Robin Chan</u>, Sarina Penquitt, and Hanno Gottschalk. *"LU-Net: Invertible Neural Networks Based on Matrix Factorization"*. International Joint Conference on Neural Networks (**IJCNN**) 2023

<u>Robin Chan</u>, Radin Dardashti, Meike Osinski , Matthias Rottmann, Dominik Brüggemann, Cilia Rücker, Peter Schlicht, Fabian Hüger, Nikol Rummel, and Hanno Gottschalk. *"What Should AI See? Using the Public's Opinion to Determine the Perception of an AI"*. **AI and Ethics** 2023

Kira Maag, <u>Robin Chan</u>, Svenja Uhlemeyer, Kamil Kowol, and Hanno Gottschalk. *"Two Video Data Sets for Tracking and Retrieval of Out of Distribution Objects"*. Asian Conference on Computer Vision (**ACCV**) 2022

<u>Robin Chan</u>, Svenja Uhlemeyer, Matthias Rottmann, and Hanno Gottschalk. *"Detecting and Learning the Unknown in Semantic Segmentation"*. **Deep Neural Networks and Data for Automated Driving** – Robustness, Uncertainty Quantification, and Insights Towards Safety 2022

<u>Robin Chan</u>, Krzysztof Lis, Svenja Uhlemeyer, Hermann Blum, Sina Honari, Roland Siegwart, Pascal Fua, Mathieu Salzmann, and Matthias Rottmann. *"SegmentMeIfYouCan - A Benchmark for Anomaly Segmentation"*. 35th Conference on Neural Information Processing Systems (**NeurIPS**) Datasets and Benchmarks Track 2021

<u>Robin Chan</u>, Matthias Rottmann, and Hanno Gottschalk. *"Entropy Maximization and Meta Classification for Out-of-Distribution Detection in Semantic Segmentation"*. The IEEE/CVF International Conference on Computer Vision (**ICCV**) 2021

Dominik Brüggemann, <u>Robin Chan</u>, Hanno Gottschalk, and Stefan Bracke. *"Software Architecture for Human-centered Reliability Assessment for Neural Networks in Autonomous Driving"*. 11th IMA International Conference on Modelling in Industrial Maintenance and Reliability (**MIMAR**) 2021

<u>Robin Chan</u>, Matthias Rottmann, Fabian Hüger, Peter Schlicht, and Hanno Gottschalk. *"MetaFusion: Controlled False-Negative Reduction of Minority Classes in Semantic Segmentation"*. The IEEE International Joint Conference on Neural Networks (**IJCNN**) 2020

Matthias Rottmann, Pascal Colling, Thomas-Paul Hack, <u>Robin Chan</u>, Fabian Hüger, Peter Schlicht, and Hanno Gottschalk. *"Prediction Error Meta Classifcation in Semantic Segmentation: Detection via Aggregated Dispersion Measures of Softmax Probabilities"*. The IEEE International Joint Conference on Neural Networks (**IJCNN**) 2020

<u>Robin Chan</u>, Matthias Rottmann, Fabian Hüger, Peter Schlicht, and Hanno Gottschalk. *"Application of Maximum Likelihood Decision Rules for Handling Class Imbalance in Semantic Segmentation"*. The 30th European Safety and Reliability Conference (**ESREL**) 2020

<u>Robin Chan</u>, Matthias Rottmann, Radin Dardashti, Fabian Hüger, Peter Schlicht, and Hanno Gottschalk. *"The Ethical Dilemma when (not) Setting up Cost-based Decision Rules in Semantic Segmentation"*. The IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**) Workshops, Safe Artificial Intelligence for Automated Driving (**SAIAD**) 2019

Dissertation and Theses

Feb. 2022. **Detecting Anything Overlooked in Semantic Segmentation** (for the degree of Dr. rer. nat.)

Abstract: Deep learning models are all driven by data and as such they are ill-equipped to handle data samples from categories that they rarely or even never have previously encountered. The focus of this dissertation lies on detecting objects in images, where the objects initially have been overlooked due to the described data related reason and the use of out-of-the-box deep learning algorithms. In this dissertation, several approaches to extend deep learning models are presented in order to improve the detection and localization of rare as well as unknown objects in the safety critical task of semantic segmentation of street scenes.

Doctoral advisor: Prof. Dr. Hanno Gottschalk

Grade: *"summa cum laude"*

Sep. 2018. **Application of Decision Rules for Uncertainty Quantification in Semantic Segmentation** (in cooperation with Volkswagen Group Research for the degree of M. Sc.)

Abstract: One difficulty that occurs while training neural networks for semantic segmentation is class imbalance of the training data. Various decision rules other than the standard maximum a-posteriori principle but with different sensitivity towards predicting rare classes are evaluated in this thesis. Differences in the obtained prediction masks then indicate the model uncertainty of finding rare class objects.

Supervisors: Prof. Dr. Hanno Gottschalk and Dr. Matthias Rottmann

Grade: 1.0

Jan. 2017. **Stochastische Performance Tests der Dakota Optimierungstoolsuite** (Stochastically Evaluating the Performance of Optimization Algorithms from the Dakota Software Toolkit for the degree of B. Sc.)

Abstract: In practice, there are often multiple algorithms with different parameters for the same kind of optimization problems. In order to choose the right model for a new kind of problem, in this thesis optimization algorithms are evaluated on random fields. From the resulting distribution of solutions and by means of robustness measures, the performance of optimization algorithms is stochastically evaluated.

Supervisors: Prof. Dr. Hanno Gottschalk and Prof. Dr. Kathrin Klamroth

Grade: 1.0

Awards

Verein der Freunde und Alumni der Bergischen Universität e.V. (FABU) (Association Friends and Alumni of the University of Wuppertal) – 1st prize for dissertation in university wide competition in 2022

Verein zur Förderung von Mathematik & Naturwissenschaften e.V. (Association for Promotion of Mathematics and Natural Sciences at the University of Wuppertal) – prize for outstanding achievements during doctoral studies