



## Rui Li

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## Skills

### Machine Learning

- Trustworthy AI  
(Uncertainty Quantification)
- Transfer Learning
- Deep Learning
- Bayesian Methods

### Programming

- Python
- Pytorch
- Numpy, Pandas, Sklearn
- Matlab

### Tools

- Git

## Education

2022 – **Ph.D. in Machine Learning**

Present Aalto University, supervised by  
[Prof. Arno Solin](#). Published in  
ICML, ICLR, WACV.

2020 – **M.Sc. in Machine Learning**

2021 University College London  
Distinction (84%), Dean's List

2015 – **B.Sc. in Physics**

2019 Sun Yat-sen University  
GPA: 3.8 / 4.0

## Summary

- Experienced doctoral researcher with top-tier conference publications.
- Proficient in Machine Learning, Deep Learning, Python, and Pytorch.
- Strong mathematical skills in linear algebra, calculus and probability.

## Selected Projects

- Streamlining Prediction in Bayesian Deep Learning. *ICLR 2025*

Collaborator: Arno Solin, Martin Trapp, and Marcus Klasson.

Summary: While estimating posterior is being actively researched in Bayesian deep learning, making predictions with posterior has been being largely overlooked. We propose an efficient method for making prediction through a single forward pass without sampling by local liberalization and Gaussian approximation. We showcase our approach for both MLP and transformers.

- Post-hoc Probabilistic Vision-Language Models. *Under Review*

Collaborator: Arno Solin, Martin Trapp, Marcus Klasson, Anton Baumann, Santeri Mentu, Shyamgopal Karthik and Zeynep Akata.

Summary: While Vision-Language models have shown remarkable performance in various tasks, they lack uncertainty over predictions, which limits their reliability in high-stakes applications. We propose a post-hoc uncertainty quantification method based on Laplace approximation, which provides useful predictive uncertainties and better calibration.

- Flatness Improves Backbone Generalisation in Few-shot Classification.

*WACV 2025 (Oral)*

Collaborator: Arno Solin, Martin Trapp, and Marcus Klasson.

Summary: In few-shot classification most efforts focus on adapting the backbone to the target domain without considering the importance of backbone training. We show flatness-aware backbone training can lead to better generalization through theoretical and empirical results.

- Improving Hyperparameter Learning under Approximate Inference  
in Gaussian Process Models. *ICML 2023*

Collaborator: Arno Solin and ST John.

Summary: Variational inference and expectation propagation are two commonly used approximate inferences in Gaussian process models with complementary advantages. We developed a hybrid training procedure to bring the best of both worlds.

## Awards

- Dean's list at University College London, 2021  
The Dean's List is awarded to the top 5% of graduating students.
- First, third, and second price scholarship at Sun Yat-sen University, 2019, 2018, 2017
- Meritorious Winner of Interdisciplinary Contest in Modeling, 2017

## Full Publications

- [Rui Li](#), Marcus Klasson, Arno Solin, Martin Trapp. [Streamlining Prediction in Bayesian Deep Learning](#). *International Conference on Learning Representations (ICLR) 2025*
- Anton Baumann, [Rui Li](#), Marcus Klasson, Santeri Mentu, Shyamgopal Karthik, Zeynep Akata, Arno Solin, Martin Trapp. [Post-hoc Probabilistic Vision-Language Models](#). *Under Review*
- [Rui Li](#), Martin Trapp, Marcus Klasson, Arno Solin. [Flatness Improves Backbone Generalisation in Few-shot Classification](#). *Winter Conference on Applications of Computer Vision (WACV) 2025*, Oral Presentation.
- Anton Baumann, Marcus Klasson, [Rui Li](#), Martin Trapp. [Probabilistic Active Few-Shot Learning in Vision-Language Models](#). *NeurIPS Workshop on Bayesian Decision-making and Uncertainty 2024*.
- [Rui Li](#), Marcus Klasson, Arno Solin, Martin Trapp. [Posterior Inferred, Now What? Streamlining Prediction in Bayesian Deep Learning](#). *NeurIPS Workshop on Bayesian Decision-making and Uncertainty 2024*.
- Marlon Tobaben, Marcus Klasson, [Rui Li](#), Arno Solin, Antti Honkela. [Differentially Private Continual Learning using Pre-Trained Models](#). *NeurIPS workshop on Scalable Continual Learning for Lifelong Foundation Models 2024*.
- [Rui Li](#), ST John, Arno Solin. [Improving Hyperparameter Learning under Approximate Inference in Gaussian Process Models](#). *International Conference on Machine Learning (ICML)*, 2023.
- [Rui Li](#), ST John, Arno Solin. [Towards Improved Learning in Gaussian Processes: The Best of Two Worlds](#). *NeurIPS Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems*, 2022.
- Arno Solin, [Rui Li](#), Andrea Pilzer. [A Look at Improving Robustness in Visual-inertial SLAM by Moment Matching](#). *International Conference on Information Fusion (FUSION)*, 2022.
- Chuan Chen, [Rui Li](#), Lin Shu, Zhiyu He, Jining Wang, Chengming Zhang, Huanfei Ma, Kazuyuki Aihara, Luonan Chen. [Predicting Future Dynamics From Short-term Time Series Using an Anticipated Learning Machine](#). *National Science Review*, 2020.
- [Rui Li](#), Fanghua Ye, Shaoan Xie, Chuan Chen and Zibin Zheng. [Digging into It: Community Detection via Hidden Attributes Analysis](#). *Neurocomputing*, 2019.
- [Rui Li](#), Zhengyun You and Yumei Zhang. [Deep Learning for Signal and Background Discrimination in Liquid based Neutrino Experiment](#). *International Workshop on Advanced Computing and Analysis Techniques in Physics Research (ACAT)*, 2018.

## Courses Completed for M.Sc.

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|--|---|
| • Probabilistic and Unsupervised Learning                    | • Introduction to Deep Learning           |
| • Approximate Inference and Learning in Probabilistic Models | • Statistical Natural Language Processing |
| • Machine Learning Seminar                                   | • Reinforcement Learning                  |
| • Supervised Learning  | • Numerical Optimisation                  |