

Siddharth Swaroop

Curriculum Vitae

Machine Learning Group,
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Education

- 2017– **PhD in Engineering**, *Churchill College, University of Cambridge*.
Supervised by Prof Richard E Turner.
Funding: EPSRC Doctoral Training Partnership, Microsoft Research EMEA PhD Award.
- 2013–2017 **BA and MEng**, *Churchill College, University of Cambridge*.
Graduated with BA and MEng (Honours pass with Distinction)
Awarded Charles Lamb Prize (one candidate in electrical or information engineering)
Achieved a 1st Class with Distinction in Third Year Examinations (Ranked 1st out of ~250 students)
Achieved a 1st Class Result in Second Year Examinations (1st percentile of ~250 students)
Achieved a 1st Class Result in First Year Examinations (3rd percentile of ~300 students)
- 2008–2013 **International Baccalaureate**, *King's College School, Wimbledon*.

Awards and Funding

- 2020 Microsoft Research EMEA PhD Award (\$15k)
- 2017-2021 Honorary Vice-Chancellor's Award, Cambridge Trust (length of PhD)
- 2020 Instrumental in obtaining £100k unrestricted gift from ARM to group for work on BNNs
- 2017 Charles Lamb Prize (awarded to the candidate who shows the greatest proficiency in electrical/information engineering in the Cambridge Part IIB Tripos, out of ~250 students)
- 2016 The Institution of Civil Engineers Baker prize (awarded to the two highest performing students in the Cambridge Part IIA Tripos, out of ~250 students)
- 2014–2017 Bill Browne Engineering Prize and Scholar of Churchill College (awarded every year)
- 2014–2017 Scholar of Churchill College (every year)

Publications

I am interested in designing algorithms that are both uncertainty-aware and are private over user data. My research has focussed on applying, characterising and improving approximate Bayesian inference techniques, usually variational inference, on deep models for the continual learning and federated learning problems. Link to [Google Scholar](#) profile.

- 2021 **Generalized Variational Continual Learning**.
Noel Loo, **Siddharth Swaroop**, Richard E Turner.
International Conference on Learning Representations, 2021.
- 2020 **Continual Deep Learning by Functional Regularisation of Memorable Past**.
Pingbo Pan*, **Siddharth Swaroop***, Alexander Immer, Runa Eschenhagen, Richard E Turner, Mohammad Emtiyaz Khan.
Oral presentation at *Neural Information Processing Systems, 2020* (top 1% of submissions).
Oral presentation at *LifeLongML workshop, ICML 2020. Continual Learning workshop, ICML 2020*.
- Efficient Low Rank Gaussian Variational Inference for Neural Networks**.
Marcin B Tomczak, **Siddharth Swaroop**, Richard E Turner.
Neural Information Processing Systems, 2020.
- Combining Variational Continual Learning with FiLM Layers**.
Noel Loo, **Siddharth Swaroop**, Richard E Turner.
Oral presentation at *LifeLongML workshop, ICML 2020. Continual Learning workshop, ICML 2020*.
- 2019 **Practical Deep Learning with Bayesian Principles**.
Kazuki Osawa, **Siddharth Swaroop***, Anirudh Jain*, Runa Eschenhagen, Richard E Turner, Rio Yokota, Mohammad Emtiyaz Khan.
Neural Information Processing Systems, 2019.

- Differentially Private Federated Variational Inference.**
Mrinank Sharma, Michael Hutchinson, **Siddharth Swaroop**, Antti Honkela, Richard E Turner.
Privacy in Machine Learning Workshop, NeurIPS 2019.
- 2018 **Improving and Understanding Variational Continual Learning.**
Siddharth Swaroop, Thang D Bui, Cuong V Nguyen, Richard E Turner.
Oral presentation at *Continual Learning Workshop, NeurIPS 2018.*
- Partitioned Variational Inference: A unified framework encompassing federated and continual learning.**
Thang D Bui, Cuong V Nguyen, **Siddharth Swaroop**, Richard E Turner.
arXiv preprint: 1811.11206, Spotlight at *Bayesian Deep Learning Workshop, NeurIPS 2018.*
- Neural network ensembles and variational inference revisited.**
Marcin B Tomczak, **Siddharth Swaroop**, Richard E Turner.
Advances in Approximate Bayesian Inference Symposium 2018.
- 2017 **Understanding Expectation Propagation.**
Siddharth Swaroop and Richard E Turner.
Advances in Approximate Bayesian Inference workshop, NIPS 2017.

Talks

- Dec 2020 **Continual Deep Learning by Functional Regularisation of Memorable Past.**
NeurIPS 2020 (Oral presentation)
- July 2020 **Continual Deep Learning by Functional Regularisation of Memorable Past.**
LifeLongML workshop, ICML 2020 (Oral presentation)
- May 2020 **Natural-gradient variational inference for Bayesian Neural Networks.**
Gatsby Machine Learning MLJC, University College London, UK
- March 2020 (COVID-19) **Applying Bayesian Principles to Deep Learning: Scaling, Uncertainty Calibration, and Continual Learning.**
SIAM Conference on Uncertainty Quantification 2020, Munich, Germany, Mini-Symposium on “Uncertainty Quantification in Deep Learning” (invited talk) (Cancelled due to COVID-19)
- Nov 2019 **Variational inference: scaling Bayesian neural networks, distributed inference, and continual learning.**
ARM, Cambridge, UK
- April 2019 **Improving Variational Continual Learning.**
RIKEN Center for Advanced Intelligence Project, Tokyo, Japan
- Dec 2018 **Improving and Understanding Variational Continual Learning.**
Continual Learning Workshop, NeurIPS 2018, Montréal, Canada (Oral presentation)

Visits, Work Experience and Teaching

- Feb 2020 **Visiting the RIKEN Center for Advanced Intelligence Project, Tokyo, Japan.**
Invited to visit Mohammad Emtiyaz Khan and the Approximate Bayesian Inference team (3 weeks).
- April 2019 **Visiting the RIKEN Center for Advanced Intelligence Project, Tokyo, Japan.**
Invited to visit Mohammad Emtiyaz Khan and the Approximate Bayesian Inference team (3 weeks).
- Summer 2018 **Internship at Microsoft Research, Cambridge, UK.**
Working on improvements to a large-scale knowledge base construction system. The system uses a probabilistic program to define how to convert knowledge base facts into unstructured text, and uses probabilistic inference to invert the program. Worked with Martin Kukla and John Winn.
- 2018–Present **Co-supervising Master’s thesis projects.**
Noel Loo, *Probabilistic modelling and inference for continual learning* (2019-2020)
Tatiana Matejovicova, *Bayesian Neural Networks for Multi-Modal Data* (2019)
Michael Hutchinson, *Automated Architecture Search for Bayesian Neural Networks* (2018-19)
Mrinank Sharma, *Differential Privacy and Approximate Bayesian Inference* (2018-19)

2017–Present **Supervising small groups of undergraduate students**, *University of Cambridge*.
Engineering Tripos IIA 3F8 (Inference), 2018, 2019, 2021
Engineering Tripos IIA 3F3 (Signal and pattern processing), 2018
Engineering Tripos IB Paper 7 (Mathematical methods), 2017

Reviewing

International Conference on Artificial Intelligence and Statistics, 2021
Neural Information Processing Systems, 2020
International Conference on Machine Learning, 2020 (top reviewer) & 2021 (expert reviewer)
International Conference on Learning Representations, 2020 & 2021 (top reviewer)
I Can't Believe It's Not Better! Workshop, NeurIPS 2021
Workshop on Continual Learning, ICML 2020
Uncertainty & Robustness in Deep Learning, ICML 2020
Advances in Approximate Bayesian Inference Symposium, 2018 & 2019 & 2020-21
Bayesian Deep Learning Workshop, NeurIPS 2019
Asian Conference on Machine Learning, 2019

Interests and Activities

Programming experience in: Python (PyTorch, tensorflow), MATLAB, C++.
Participated in many hackathons (incl. Hack the Brain, SpaceApps, hackcambridge).
Selected for and attended *Churchill Students – Future Leaders* (2015–2016).
Languages: Mandarin (7 years), French (12 years), Russian (1 year), Hindi.
Badminton (previously college captain), squash and cricket for Churchill College 1st teams.