Yarin Gal

Contact Details

Department of Computer Science, University of Oxford, Oxford, UK.

Email, *yarin@cs.ox.ac.uk*.

Web, *http://yarin.co/*.

Group website, *http://oatml.cs.ox.ac.uk/*.

Principal Appointments

2017–present **Associate Professor of Machine Learning**, *University of Oxford Department of Computer Science*, Oxford, UK.

2018–present **Group Lead**, *Oxford Applied and Theoretical Machine Learning Group (OATML)*, Department of Computer Science, Oxford, UK, http://oatml.cs.ox.ac.uk/.

2017–present **Tutorial Fellow**, *Christ Church College*, Oxford, UK.

2017–present **Turing Fellow**, *Alan Turing Institute for Data Science*, London, UK.

Previous Appointments

2017–2018 **Visiting Researcher**, *Machine Learning Group*, University of Cambridge, UK.

2016–2017 **Research Fellow**, *Alan Turing Institute for Data Science*, London, UK.

2016–2017 **Research Fellow in Computer Science (JRF)**, *St Catharine's College, University of Cambridge*, Cambridge, UK.

Education

2012–2016 **PhD, Information Engineering, Machine Learning Group**, *University of Cambridge*, Cambridge, UK, supervised by Prof Zoubin Ghahramani FRS.
Supported by the Google European Doctoral Fellowship; Qualcomm Innovation Fellowship; Cambridge trusts honorary scholar.

2011–2012 **MSc, Computer Science with focus on Machine Learning**, *University of Oxford*, Oxford, UK, supervised by Prof Phil Blunsom.
Graduated with distinction.

2004–2009 **BSc, double degree in Mathematics and Computer Science**, *The Open University of Israel*, Israel, *Graduated with distinction*.
Ranked in the top 10% of graduates in 2009 (90.8 percentile); Dean's List for the years 2007-2009; Graduated at 18 years old.

Research Interests

Bayesian deep learning • deep learning • approximate Bayesian inference • Gaussian processes • Bayesian modelling • Bayesian non-parametrics • scalable MCMC • generative modelling; Applications including AI safety • ML interpretability • reinforcement learning • active learning • natural language processing • computer vision • medical analysis.

Conferences and Peer Reviewing Activities

Lead Workshop Organiser:

2018 **Third NIPS Workshop on "Bayesian Deep Learning"**.

2017 **Second NIPS Workshop on "Bayesian Deep Learning"**, *(second largest workshop at NIPS with >2000 attendees, sponsorships from Google, Uber, Qualcomm, Microsoft Ventures)*.

2016 **First NIPS Workshop on "Bayesian Deep Learning"**, *(second largest workshop at NIPS with >2000 attendees)*.

Workshops Chair for:

2018 **Uncertainty in Artificial Intelligence (UAI)**.

Area Chair for:

2018 **International Conference on Machine Learning (ICML)**.

2018 **International Conference for Learning Representations (ICLR)**.

2018 **Artificial Intelligence and Statistics (AISTATS, Senior PC)**.

2017 **Artificial Intelligence and Statistics (AISTATS, Senior PC)**.

Grant Reviewing for:

2018 **European Research Council (ERC, Advanced Grant)**.

2017 **Israeli Science Foundation (ISF)**.

Program Committee Member:

2017 **Workshop on Human Interpretability in Machine Learning (ICML workshop)**.

2017 **Workshop on Principled Approaches to Deep Learning (ICML workshop)**.

2016 **The 54th Annual Meeting of the Association for Computational Linguistics (ACL conference, for the area Machine Learning)**.

2015 **Advances in Approximate Bayesian Inference (NIPS workshop)**.

2015 **Bayesian Nonparametrics: The Next Generation (NIPS workshop)**.

2014 **Advances in Variational Inference (NIPS workshop)**.

Journal Articles Reviewing for:

2017 **American Astronomical Society, The Astrophysical Journal, Letters**.

2017 **Nature**.

2016 **Journal of the Royal Statistical Society (RSS)**.

2016 **Journal of Machine Learning Research (JMLR)**.

2015 **IEEE Transactions on Neural Networks and Learning Systems (IEEE TNNLS)**.

Conference Papers Reviewing for:

2018 **International Conference on Machine Learning (ICML)**.

2017 **Neural Information Processing Systems (NIPS)**.

2017 **International Conference on Machine Learning (ICML)**.
2017 **International Conference on Learning Representations (ICLR, conference)**.
2017 **International Conference on Learning Representations (ICLR, workshop)**.
2016 **Neural Information Processing Systems (NIPS)**.
2016 **International Conference on Machine Learning (ICML)**.
2016 **International Conference on Learning Representations (ICLR, conference)**.
2016 **International Conference on Learning Representations (ICLR, workshop)**.
2016 **Association for Computational Linguistics (ACL)**.
2015 **Artificial Intelligence and Statistics (AISTATS)**.
2015 **Neural Information Processing Systems (NIPS)**.
2015 **International Conference on Machine Learning (ICML)**.

Invited Participant:

2018 **UK–Japan AI Research delegation and workshop**, *British Embassy, Tokyo*.
2017 **UK–Canada AI Research delegation**, *British Embassy, Montreal*.
2017 **UK–Japan AI Research delegation and workshop**, *British Embassy, Tokyo*.
2017 **Google Machine Learning Summit**, *Zurich*.
2016 **GCHQ round-table discussion leader on machine learning**, *Government Communications Headquarters, UK*.
2016 **NASA–SETI machine learning think-tank**, *NASA's Ames Research Center / SETI Institute*.
2016 **NVIDIA GPU machine learning tech summit**, *Santa Clara*.
2015 **First Deep Learning Symposium at NIPS 2015**, *Montreal*.
2015 **Alan Turing Institute Scoping Workshop on Deep Learning**, *Edinburgh*.
2015 **Google NLP PhD Summit**, *Zurich*.
2015 **"Bayesian Nonparametrics in the North" workshop**, *Ecole Centrale de Lille*.
2015 **Google Doctoral Fellowship Forum**, *Zurich*.
2013 **Google Doctoral Summit**, *Zurich*.

Prizes and Scholarships

2016–2019 **The Michael and Morven Heller Research Fellowship in Computer Science**.
2015 **Alan Turing Institute Travel Award**.
2015–2016 **Qualcomm Innovation Fellowship**, *press release, media coverage*.
2015 **BNP 2015 Travel Award**.
2014 **Google DeepMind 2014 Travel Award**.
2014 **Art of Engineering photo competition**.
2014 **NIPS 2014 Travel Award**.
2014 **ISBA 2014 Travel Award**.
2013 **Tübingen MLSS grant**, *press release (German)*.
2012–2015 **Google European Doctoral Fellowship – full PhD scholarship**, *press release*.
2012 **Cambridge overseas trusts – offer of PhD scholarship**.

2012 **Oxford-MAN Institute – offer of PhD scholarship**.

2012 **Karten Scholarship – an offer of a £2,000 prize**.

2004–2009 **Merit based scholarship for high-school students studying for a BSc**.

Recent Invited Talks

2018 **Robotics Vision Summer School**, *Australia*.

2018 **ISM workshop**, *Tokyo, Japan*.

2018 **CMS**, *Cambridge, UK*.

2017 **Preferred Networks**, *Tokyo, Japan*.

2017 **Riken**, *Tokyo, Japan*.

2017 **34th International Conference on Machine Learning**, *Sydney, Australia*.

2017 **Robotics: Science and Systems (RSS) Conference**, *New Frontiers for Deep Learning in Robotics workshop and panel discussion*, Massachusetts, US.

2017 **NASA AMES**, *Mountain View*.

2017 **O'Reilly Artificial Intelligence**, *New York, US*.

2017 **British Embassy**, *Tokyo, Japan*.

2017 **SoftBank**, *Tokyo, Japan*.

2017 **Preferred Networks**, *Tokyo, Japan*.

2017 **Fujitsu**, *Tokyo, Japan*.

2017 **Department of International Trade event**, *Nagoya, Japan*.

2016 **NASA AMES**, *Mountain View*.

2016 **Alan Turing Institute Deep Generative Models Workshop**, *Royal Society, London*.

2016 **Adaptive Brain Lab, Department of Psychology**, *Cambridge*.

2016 **MRC Cognition and Brain Science Unit**, *Cambridge*.

2016 **London Machine Learning Meetup**, *London*.

2016 **OpenAI**, *San Francisco*.

2016 **Google**, *Mountain View*.

2016 **33rd International Conference on Machine Learning**, *New York City, NY*.

2016 **Natural Language and Information Processing seminar series**, *University of Cambridge*, Cambridge.

2015 **Microsoft Research**, *Cambridge*.

2015 **Alan Turing Institute Deep Learning Open Workshop**, *Edinburgh University*, Edinburgh.

2015 **ATI Scoping Workshop**, *Edinburgh University*, Edinburgh.

2015 **ML Seminar series**, *ETH, Zurich*.

2015 **Computational Statistics and Machine Learning seminar series**, *UCL, London*.

2015 **Bayesian Nonparametrics in the North meeting**, *Ecole Centrale de Lille, Lille*.

2015 **Trinity College Mathematical Society**, *University of Cambridge*, Cambridge.

2015 **Gonville and Caius College**, *University of Cambridge*, Cambridge.

2015 **32nd International Conference on Machine Learning**, *Lille*.

2015 **NTT Labs**, *Kyoto, Japan*.

2015 **Microsoft Research**, *Cambridge*.

2015 **32nd International Conference on Machine Learning**, *Lille*.

2015 **10th Conference on Bayesian Nonparametrics**, *Raleigh, NC*.

2014 **NTT Labs**, *Kyoto, Japan*.

2014 **Workshop on New Learning Models and Frameworks for Big Data, ICML**, *Beijing, China*.

2013 **Workshop on Big Learning, NIPS**, *Lake Tahoe*.

2013 **Association for Computational Linguistics (NA-ACL)**, *Atlanta*.

Seminar Talks and Reading Groups

2016 **"Differentiable Data Structures (and POMDPs)"**, *MLG Seminar*.

2014 **"Symbolic Differentiation for Rapid Model Prototyping in Machine Learning and Data Analysis – a Hands-on Tutorial"**, *MLG Seminar*.

2014 **"Rapid Prototyping of Probabilistic Models using Stochastic Variational Inference"**, *Short talk*.

2014 **"Emergent Communication for Collaborative Reinforcement Learning"**, *MLG Seminar*.

2014 **"The Borel–Kolmogorov paradox"**, *Short talk*.

2013 **"Bayesian Nonparametrics in Real-World Applications: Statistical Machine Translation and Language Modelling on Big Datasets"**, *MLG Seminar*.

Academic Supervision

2018–2019 **Zac Kenton**, *Postdoc supervisor*, **funded by the Centre for Effective Altruism**, University of Oxford.

2018– **Aidan Gomez**, *PhD supervisor*, **Clarendon Scholar**, University of Oxford.

2018– **Joost Van Amersfoort**, *PhD supervisor*, **DeepMind Scholar**, University of Oxford.

2018– **Angelos Filos**, *PhD supervisor*, **funded by JP Morgan**, University of Oxford.

2018– **Andreas Kirsch**, *PhD supervisor*, **Clarendon Scholar**, Autonomous Intelligent Machines and Systems Centre for Doctoral Training, University of Oxford.

2018– **Tim Rudner**, *PhD supervisor*, **Rhodes Scholar**, Autonomous Intelligent Machines and Systems Centre for Doctoral Training, University of Oxford.

2018– **Clare Lyle**, *PhD co-supervisor*, **Rhodes Scholar**, University of Oxford.

2017– **Milad Alizadeh**, *PhD co-supervisor*, University of Oxford.

2017– **Sebastian Farquhar**, *PhD supervisor*, Cyber Security Centre for Doctoral Training, University of Oxford.

2017– **Lewis Smith**, *PhD supervisor*, Autonomous Intelligent Machines and Systems Centre for Doctoral Training, University of Oxford.

2017–2018 **Jean-Francois Ton**, *CDT project supervisor*, Oxford-Warwick Statistics Programme Centre for Doctoral Training, University of Oxford.

2017–2018 **Mark Bromley**, *MSc supervisor*, Computer Science department, University of Oxford.

2017–2018 **Arnoud De Kroon**, *MSc supervisor*, Computer Science department, University of Oxford.
(Went on to do a PhD at Amsterdam)

2017–2018 **Jishnu Mukhoti**, *MSc supervisor*, Computer Science department, University of Oxford.

2016–2017 **Piotr Dabkowski**, *Primary MPhil Thesis Supervision*, Computer Laboratory, University of Cambridge.
(Went on to work at Google)

2016–2017 **Jiří Hron**, *Research Assistant Supervision*, Department of Engineering, University of Cambridge.

2015–2016 **Riashat Islam**, *Primary MPhil Thesis Supervision*, Department of Engineering, University of Cambridge.
(Went on to do a PhD at Montreal (MILA))

2015–2016 **Jiří Hron**, *Primary MSc Thesis Supervision*, Department of Computer Science, University College London (UCL).
(Went on to do a PhD at Cambridge)

2015–2016 **Ambrish Rawat**, *Primary MPhil Thesis Supervision*, Department of Engineering, University of Cambridge.
(Went on to work at IBM)

Select Publications (more on Google Scholar)

[1] Alex Kendall, Yarin Gal, and Roberto Cipolla. Multi-Task Learning Using Uncertainty to Weigh Losses for Scene Geometry and Semantics. In *CVPR*, 2018.

[2] Piotr Dabkowski and Yarin Gal. Real Time Image Saliency for Black Box Classifiers. In *NIPS*, 2017.

[3] Yarin Gal, Jiri Hron, and Alex Kendall. Concrete Dropout. In *NIPS*, 2017.

[4] Alex Kendall and Yarin Gal. What Uncertainties Do We Need in Bayesian Deep Learning for Computer Vision? In *NIPS*, 2017.

[5] Yarin Gal, Riashat Islam, and Zoubin Ghahramani. Deep Bayesian Active Learning with Image Data. In *Proceedings of the 34th International Conference on Machine Learning (ICML-17)*, 2017.

[6] Yingzhen Li and Yarin Gal. Dropout Inference in Bayesian Neural Networks with Alpha-divergences. In *Proceedings of the 34th International Conference on Machine Learning (ICML-17)*, 2017.

[7] Rowan McAllister, Yarin Gal, Alex Kendall, Mark van der Wilk, Amar Shah, Roberto Cipolla, and Adrian Vivian Weller. Concrete problems for autonomous vehicle safety: Advantages of Bayesian deep learning. In *IJCAI*, 2017.

[8] Yarin Gal. *Uncertainty in Deep Learning*. PhD thesis, Cambridge University, 2016.

[9] Yarin Gal and Zoubin Ghahramani. A theoretically grounded application of dropout in recurrent neural networks. In *Advances in Neural Information Processing Systems 29 (NIPS)*, 2016.

[10] Yarin Gal, Rowan McAllister, and Carl E. Rasmussen. Improving PILCO with Bayesian neural network dynamics models. In *Data-Efficient Machine Learning workshop, ICML*, April 2016.

[11] Yarin Gal and Zoubin Ghahramani. Dropout as a Bayesian approximation: Representing model uncertainty in deep learning. In *Proceedings of the 33rd International Conference on Machine Learning (ICML-16)*, 2016.

[12] Yarin Gal and Zoubin Ghahramani. On modern deep learning and variational inference. In *Advances in Approximate Bayesian Inference workshop, NIPS*, 2015.

[13] Yarin Gal. Rapid prototyping of probabilistic models: Emerging challenges in variational inference. In *Advances in Approximate Bayesian Inference workshop, NIPS*, 2015.

[14] Yarin Gal and Zoubin Ghahramani. Bayesian convolutional neural networks with Bernoulli approximate variational inference. In *4th International Conference on Learning Representations (ICLR) workshop track*, 2016.

[15] Yarin Gal and Zoubin Ghahramani. Dropout as a Bayesian approximation: Insights and applications. In *Deep Learning Workshop, ICML*, 2015.

[16] Yarin Gal and Richard Turner. Improving the Gaussian process sparse spectrum approximation by representing uncertainty in frequency inputs. In *Proceedings of the 32nd International Conference on Machine Learning (ICML-15)*, 2015.

[17] Yarin Gal, Yutian Chen, and Zoubin Ghahramani. Latent Gaussian processes for distribution estimation of multivariate categorical data. In *Proceedings of the 32nd International Conference on Machine Learning (ICML-15)*, 2015.

[18] Hong Ge, Yarin Gal, and Zoubin Ghahramani. Dirichlet fragmentation processes. In *arXiv:1509.04781*, 2015.

[19] Yarin Gal, Tomoharu Iwata, and Zoubin Ghahramani. An infinite product of sparse Chinese restaurant processes. In *10th Conference on Bayesian Nonparametrics (BNP)*, 2015.

[20] Yarin Gal, Yutian Chen, and Zoubin Ghahramani. Latent Gaussian processes for distribution estimation of multivariate categorical data. In *Workshop on Advances in Variational Inference, NIPS*, 2014.

[21] Yarin Gal, Mark van der Wilk, and Carl Rasmussen. Distributed variational inference in sparse Gaussian process regression and latent variable models. In *Advances in Neural Information Processing Systems 27 (NIPS)*. 2014.

[22] Yarin Gal, Mark van der Wilk, and Carl E. Rasmussen. Distributed variational inference in sparse Gaussian process regression and latent variable models. In *Workshop on New Learning Models and Frameworks for Big Data, ICML*, 2014.

[23] Yarin Gal and Zoubin Ghahramani. Feature partitions and multi-view clusterings. International Society for Bayesian Analysis (ISBA), 2014.

[24] Yarin Gal and Zoubin Ghahramani. Pitfalls in the use of parallel inference for the Dirichlet process. In *Proceedings of the 31th International Conference on Machine Learning (ICML-14)*, 2014.

[25] Yarin Gal and Zoubin Ghahramani. Pitfalls in the use of parallel inference for the Dirichlet process. In *Workshop on Big Learning, NIPS*, 2013.

[26] Yarin Gal and Mark van der Wilk. Variational inference in the Gaussian process latent variable model and sparse GP regression – a gentle tutorial. *arXiv:1402.1412*, 2014.

[27] Yarin Gal. Semantics, modelling, and the problem of representation of meaning – a brief survey of recent literature. Technical report, University of Cambridge, 2013.

[28] Yarin Gal and Phil Blunsom. A systematic Bayesian treatment of the IBM alignment models. In *Proceedings of the 2013 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies*, Atlanta, Georgia, June 2013. Association for Computational Linguistics.

[29] Yarin Gal. Relaxing HMM alignment model assumptions for machine translation using a Bayesian approach. Master's thesis, University of Oxford, 2012.

[30] Yarin Gal and Mireille Avigal. Overcoming Alpha-Beta limitations using evolved artificial neural networks. In *Ninth International Conference on Machine Learning and Applications (ICMLA)*. IEEE, 2010.

Open Source Activities

GitHub, `https://github.com/yaringal`.

Contributor:

2015–2016 **Keras**, *Deep learning package*, Contributions including: Transposed convolutions, RNN dropout, Deconvolutional VAE example.

Industrial Experience

Committees:

2018 **NASA Frontier Development Lab Technical Committee**, *Co-chair*.

2017-2018 **NASA Frontier Development Lab Steering Committee**, *Machine learning incubator for space mission projects*.

Consultancies:

2018– **ESA**, *Data Science Coach*, Frontier Development Lab Europe.

2016– **NASA**, *Data Science Coach*, NASA Frontier Development Lab.

2017 **blank.ai**, *Machine learning advisory*.

Vocational

2015 **Google Zurich**, *Research Engineer Intern*, Natural Language Processing group, 08/2015 to 01/2016.

2008–2011 **Software Engineer, head of Mobile Platforms development**, *IDesia Biometrics*, Caesarea, Israel.

A software company developing ECG based biometrics and consumer healthcare solutions.
Projects:

+ UX and UI logic design;
+ SDK development and code porting for mobile platforms:
  - MTK (Nucleus based embedded OS), Linux (Android, Maemo), Symbian, Windows mobile;
+ QA tools development, offline simulation tools for the National Physical Laboratory (NPL).

2006–2007 **Web development**, *The TAO Centre*.
Commercial ASP web programming.

Volunteer work

2014-2016 **Member of Gonville and Caius College MCR committee**, *Computing officer*, Designed and deployed MCR website.

2013-2014 **Member of Gonville and Caius College MCR committee**, *Dining officer*, Initiated MCR dinners at Caius.

2007 **Teaching computer skills to the elderly**.

Interests

computing Computational aspects of pretty proofs, reverse engineering (windows platforms).

cool projects extrapolated art – winner of the Art of Engineering photo competition (2nd prize; media coverage: IFLScience, The Telegraph, Daily Mail, Wolfram blog, Hacker News, Kottke, Boing Boing (by Cory Doctorow), Gigazine, Habrahabr).

Origami model design, autonomous game playing (2009), automated arbitrage search (2007), Java based database system (2006), web controlled robotic camera (2004).

Languages

English Excellent

Hebrew Native

Japanese Studying