RYUTARO TANNO

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21 Station Road, Cambridge, UK, CB1 2FB
Holds the indefinite leave to remain in the UK

RESEARCH INTERESTS

Machine Learning Safety, Deep Learning, Probabilistic Models, Medical Image Analysis, Healthcare Applications

PROFESSIONAL EXPERIENCE

Microsoft Research — Cambridge, UK
Senior Researcher — Dec 2019 -
Health Intelligence Group

- Responsibilities: develop high-impact research agenda in machine learning; collaborate with researchers and partners to develop new AI products; supervise post-doc researchers, interns and AI residents; write research/ production-level code and publish research papers at top-tier conferences and journals

Butterfly Network — New York, USA
Research Intern — March 2018 - August 2018
Deep Learning Team

- Mentored by Dr. Nathan Silberman
- Research topic: learning from labels from multiple annotators of varying skills levels and biases
- Published a **paper** in CVPR 2019

Microsoft Research — Cambridge, UK
Research Intern — Oct 2017 - March 2018
Team Inner Eye

- Mentored by Dr. Aditya Nori
- Research topic: synergise neural networks and decision trees for more effective architecture search.
- Published a **paper** to ICML 2019 & obtained a **patent**

ThinkSono — London, UK
One of 4 starting members — Dec 2016 - May 2018

- Co-lead the product development with Antonis Makropoulos (the present CSO) in the first year. Lead the problem formulation, data collection and implementation of the core deep learning algorithms for real-time diagnosis of deep-vein thrombosis with a mobile ultra-sound scanner.
- Won € **50,000** through the Grants4Apps accelerator programme. Selected by Bayer as one of the top 4 digital health start-ups out of >450 applications across the globe.
- Published a **paper** in MICCAI 2018 & obtained a **patent**.

MRC Cognition and Brain Sciences Unit — Cambridge, UK
Research Intern — July 2014 - Sep 2014

- Recipient of the **PMC scholarship** from Mathematics Dept., Cambridge University.

ACADEMIC HISTORY

University College London — London, UK
PhD in Machine Learning and Medical Imaging — Oct 2015 - Dec 2020
Department of Computing

- Supervised by Daniel C. Alexander & Antonio Criminisi
- Thesis: *Reasoning with Uncertainty in Deep Learning for Safer Medical Image Computing*
  Committee: Julia Schnabel & Simon Arridge
- Recipient of **Microsoft Scholarship**

University of Cambridge — Cambridge, UK
MPhil in Computational Neuroscience & Machine Learning — Oct 2014 - Oct 2015
Computational and Biological Learning Lab, Information Engineering

- Supervised by Mate Lengyel

- Recipient of **Newton Trust Award**
- Thesis: *Probabilistic Network Models of Auto-associative Memory with MCMC-based Retrieval Mechanism*
  Committee: Richard E. Turner
- Achieved a grade A* in all modules.

University of Cambridge — Cambridge, UK
Master of Advanced Study in Mathematics — Oct 2013 - July 2014

- Supervised by Philip Dawid
- Thesis: *Information Geometry and its Applications in Asymptotic Statistics*
- Achieved a Distinction grade

Imperial College London — London, UK
BSc in Pure Mathematics — Oct 2010 - June 2013

- Achieved First Class in all three years
- Recipient of **Winton Capital Prize** for the best penultimate year thesis.

MENTORSHIP

- **MSR AI residents**: Tatiana Matejovikova (March 2021 - Sep 2021, currently at DeepMind), Marie Hoffman (March 2021 - Sep 2021, currently at Freie Universität Berlin)
- **MSR Intern (co-)supervision**: Agnieszak Slowik (University of Cambridge, Sep 2021 - Dec 2021), Sahra Ghalebikesabi (University of Oxford, June 2021 - Oct 2021), Max Ilse (University of Amsterdam, March 2021 - July 2021), Kerem Tezkan (ETH Zürich, Oct 2020 - Dec 2020)
- **Student (co-)supervision & collaboration**: Thomas Henn (Osaka U., 2020-), Riccardo Barbano (UCL, 2021-), Haoting Zhang (UCL MSc project, Jan 2020-Oct 2020), Kang Lei, MSc (UCL MSc project, Jan 2020 - Oct 2020), Prachi Agawal, MBBS (UCL MSc project, Jan 2019-Oct 2019), X. Wang, MSc (UCL MSc project, Jan 2018-Oct 2018), Ahmed. Azhar, MSc (UCL MSc project, Jan 2018-Oct 2018)
- **Technical Advisor** at Synthetic Gestalt, Tokyo, Japan (February 2019 - Dec 2019)
- **Technical Advisor** at R&D AI Development Unit, Terumo, Tokyo (Nov 2019 -)

PATENTS

Aditya Nori, Antonio Criminisi, and **Ryutaro Tanno**, "Neural Trees", US Patent Application 16043131, 2020, Microsoft

Fouad Al Noor, Sven Mischkewitz, Antonios Makropoulos, **Ryutaro Tanno**, Bernhard Kainz, Ozan Oktay, "Blood vessel obstruction diagnosis method, apparatus & system" Patent No.EP3592242A1, 2020

PUBLICATIONS

❖ = representative papers, * = equal contributions

❖ **Ryutaro Tanno**, Melanie Pradier, Aditya Nori and Yingzhen Li, "Repairing Neural Networks by Leaving the Right Past Behind", Preprint, Under Review at ICML 2022

Chen Jin, **Ryutaro Tanno**, Thomy Mertzanidou, Laura Panagiotaki, Daniel C Alexander, "Learning to Downsample for Segmentation of Ultra-High Resolution Images", ICLR 2022

Riccardo Barbano, Simon Arridge, Bangti Jin, **Ryutaro Tanno**, "Uncertainty Quantification in Medical Image Synthesis", Book Chapter in Biomedical Image Synthesis and Simulation, Elsevier 2022

Melanie Bernhardt*, Daniel C Castro*, **Ryutaro Tanno***, ..., Ben Glocker, Javier Alvarez-Valle, Ozan Oktay, "Active Label Cleaning: Improving Dataset Quality under Resource Constraints", Nature Communications 2021

Thomas Henn, Yasukazu Sakamoto, ..., Yingzhen Li, **Ryutaro Tanno,** "A Principled Approach to Failure Analysis and Model Repairment: Demonstration in Medical Imaging", MICCAI 2021

❖ Le Zhang*, **Ryutaro Tanno***, Moucheng Xu, Chen Jin, Joseph Jacob, Olga Ciccarelli, Frederik Barkhof, Daniel C Alexander, "Disentangling Human Error from the Ground Truth in Segmentation of Medical Images", NeurIPS 2020

Chen Jin, **Ryutaro Tanno**, Moucheng Xu, Thomy Mertzanidou, Daniel C Alexander, "Foveation for segmentation of mega-pixel histology images", MICCAI 2020

Le Zhang, **Ryutaro Tanno**, Moucheng Xu, Chen Jin, Joseph Jacob, Olga Ciccarelli, Frederik Barkhof, Daniel C Alexander, "Learning to Segment When Experts Disagree", MICCAI 2020

❖ **Ryutaro Tanno**, D. Worrall, E. Kaden, A. Ghosh, ..., A. Criminisi, and D. C. Alexander, "Uncertainty Quantification in Deep Learning for Safer Neuroimage Enhancement". Neuroimage 2020

Ozan Oktay, Jay Nanavati, Anton Schwaighofer, David Carter, Melissa Bristow, **Ryutaro Tanno**, Rajesh Jena, Gill Barnett, David Noble, Yvonne Rimmer, Ben Glocker, Kenton O'Hara, Christopher Bishop, Javier Alvarez-Valle,

Aditya Nori, “Evaluation of deep learning to augment image-guided radiotherapy for head and neck and prostate cancers”, JAMA network open, 2020

❖ Felix J.S. Bragman*, **Ryutaro Tanno***, ..., M. Jorge Cardoso, “Stochastic Filter Groups for Multi-Task CNNs: Learning Specialist and Generalist Convolution Kernels”. ICCV 2019 (Oral top ~4%)

❖ **Ryutaro Tanno**, Ardavan Saheedi, Swami Sankaranarayanan, Daniel C. Alexander, Nathan Silberman, “Learning From Noisy Labels By Regularized Estimation Of Annotator Confusion”. CVPR 2019

❖ **Ryutaro Tanno**, Kailash Arulkumaran, Antonio Criminisi and Aditya Nori, “Adaptive Neural Trees”, ICML 2019

Stefano B Blumberg, Marco Palombo, Can Son Khoo, Chantal MW Tax, **Ryutaro Tanno**, Daniel C Alexander, “Multi-Stage Prediction Networks for Data Harmonization”, MICCAI 2019

Felix JS Bragman, **Ryutaro Tanno**, Sebastien Ourselin, Daniel C Alexander, M Jorge Cardoso, “Learning task-specific and shared representations in medical imaging”, MICCAI 2019

Konstantinos Kamnitsas, Daniel Castro, Loic Folgoc, **Ryutaro Tanno**, Daniel Rueckert, Ben Glocker, Antonio Criminisi, Aditya Nori. “Semi-Supervised Learning via Compact Latent Space Clustering”. ICML 2018 (Long Oral)

Ryutaro Tanno, Antonio Makropoulos, Salim Arslan, Ozan Oktay, Sven Mischkewitz, Fouad Al-Noor1, Jonas Oppenheimer, Ramin Mandegaran, Bernard Kainz, Mattias Heinrich. “AutoDVT: Joint Real-time Classification for Vein Compressibility Analysis in Deep Vein Thrombosis Ultrasound Diagnostics”, MICCAI 2018

Felix Bragman, **Ryutaro Tanno**, Zach Eaton-Rosen, Wenqi Li, David J. Hawkes, Sebastien Ourselin, Daniel C. Alexander, Jamie R. McClelland, M. Jorge Cardoso, “Uncertainty in multitask learning: joint representations for probabilistic MR-only radiotherapy planning”, MICCAI 2018 (Spotlight < 5%)

Stefano Blumberg, **Ryutaro Tanno**, Iasonas Kokkinos, Daniel C Alexander. “Deeper Image Quality Transfer: Training Low-Memory Neural Networks for 3D Images”, MICCAI 2018

❖ **Ryutaro Tanno**, Daniel Worrall, Aurobrata Ghosh, Enrico Kaden, Stamatio N. Sotiropoulos, Antonio Criminisi and Daniel C. Alexander, . "Bayesian Image Quality Transfer with CNNs: Exploring Uncertainty in dMRI Super-Resolution", MICCAI 2017 (Oral + Beet Paper Award, top <0.5%)

Ryutaro Tanno, Aurobrata Ghosh, Francesco Grussu, Enrico Kaden, Antonio Criminisi and Daniel C. Alexander. "Bayesian Image Quality Transfer". MICCAI 2016

ACADEMIC SERVICES

- **Lead organiser** of MICCAI UNSURE workshop (100+ attendees) on safety of medical AI in 2019 & Co-organiser (2020, 2021, 2022)
- **Associate Editor** in the special issue of MELBA journal on uncertainty quantification and safety
- **Journal Reviewing:** TMI, MIA, Neuroimage, MRM, MELBA
- **Area Chair/Senior PC:** MIDL (2022)
- **PC member:** MICCAI (2018, 2019, 2020), MIDL (2019), ICCV (2019), CVPR (2020, 2021), ICML (2018, 2019, 2020, 2021, 2022), NeurIPS (2019, 2020, 2021)

AWARDS AND SCHOLARSHIPS

2019 - ICML Travel Award, Long Beach, CA, USA
2018 - MICCAI Travel Award (top 5% of all submissions)
2017 - Grants4Apps Grant, Bayer (ThinkSono selected as one of top 4 start-ups out of >450 applications)
2017 - MICCAI Young Scientist Award (best paper award for student first authors, top <1%)
2017 - MICCAI Travel Award (top 5% of all submissions)
2015 - Microsoft Research Scholarship, Cambridge, UK
2014 - Newton Trust Award (awarded to top ranked MPhil students across all subjects), Cambridge, UK
2014 - PMC Scholarship, Dept. of Mathematics, Cambridge
2012 - Imperial College UROP Studentship, London
2012 - Winton Capital Prize (awarded to the best penultimate year thesis), Imperial College, London
2012, 2013 - Honourable invitation to Imperial College departmental meal (top 5% of 200+ students are invited)
2009 - British Mathematical Olympiad, Silver Award (26th in the UK)

SKILLS

- Software: Python (pytorch/tensorflow), Matlab, C
- Languages: native/fluent in both Japanese and English