Felix Bragman

+44 (0) 7738226693
felixbragman@gmail.com
felixbragman.com

Work Experience

Medtronic, Surgical Robotics
Principal AI Scientist/Engineer — 2021-present

- AI Tech Lead in a team 6 for the development of an intra-operative surgical guidance model
- Research and development of computer vision algorithms for surgical video processing products:
  - Developing a video instance segmentation model with an external memory compression model to improve real-time tracking for various surgical guidance products
  - Developed a multi-task learning algorithm for video processing using temporal multi-task prompt learning for real-time processing (patent filed)
  - Developed a generic backbone for video processing using temporal prompt learning and Mixture of Experts to improve model robustness and efficiency (patent filed)
  - Developed a multi-task transformer using Mixture of Experts and Gumbel-Softmax task-expert routing (patent filed)
- Supervision of PhD and MSc interns across topics such as video self-supervision with memory and multi-task learning on videos

Babylon
Senior Research Scientist — 2019-2021

- Research on representation learning from electronic health records (EHR) for AI-assisted products
  - Conducted research on RNNs, graph neural networks and transformers for learning representations from EHRs
  - Deployed for internal product prototyping an attention-based RNN for risk factor interpretability and a BERT model for EHR disease progression modelling
- Developed a PyTorch library for medical time-series used throughout the company for internal R&D

University College London
Research Associate in Machine Learning and Medical Image Computing — 2017-2019

- Conducted fundamental research in deep learning with a focus on multi-task learning:
  - Created Stochastic Filter Groups (SFG); a novel mechanism for probabilistic architecture search in multi-task learning (ICCV oral, top 4% of 4,303 submissions)
  - Developed a novel multi-task objective function using Bayesian deep learning for spatially adaptive weighting of task losses (MICCAI oral, top 5%, travel award)

Education

University College London
Ph.D. in Medical Image Computing — 2012-2017
Quantitative lung CT analysis for the study & diagnosis of COPD
Supervisors: Prof. David J. Hawkes and Prof. John Hurst

- Developed supervised and unsupervised learning methods for the study and diagnosis of lung disease from 3D Computed Tomography scans
- Published at top technical (MICCAI and IEEE Transactions on Medical Imaging) and high ranking medical (American Journal of Respiratory & Critical Care Medicine, 11% acceptance rate) journals

University of Oxford
M.Sc. with distinction in Biomedical Engineering (ranked 1st in class) — 2011-2012

University College London
B.Eng. first class honours in Mechanical Engineering (Dean's List) — 2007-2011

Academic Activities

Reviewer
NeurIPS, ICML, ICLR, MICCAI, AISTATS, MIDL and IEEE Transactions on Medical Imaging

Program Committee
UNSURE workshop on Uncertainty and Safety in Medical Imaging at MICCAI 2019, 2020, 2021
DART workshop on Domain Adaptation and Representation Transfer at MICCAI 2019

Selected First Author Publications

ICCV - 2019 (oral) - top 4.3% of 4,303 submissions

Stochastic filter groups for multi-task CNNs: learning specialist and generalist convolution kernels
https://arxiv.org/abs/1908.09597

- Novel method that learns task-specific and shared representations for multi-task learning
- Developed Stochastic Filter Groups modules; a probabilistic grouping of kernels that help learn the CNN architecture
- Optimisation enabled through variational inference to learn the posterior distribution over possible groupings of kernels and network parameters

MICCAI - 2018 (spotlight oral & travel award) - top 5% of submissions

Uncertainty in multitask learning: joint representations for probabilistic MR-only radiotherapy planning
https://arxiv.org/abs/1806.06595

- Developed a multi-task learning method that learns to dynamically weight the loss function using heteroscedastic uncertainty
- Method is based on Bayesian deep-learning to estimate uncertainty in the neural network
- Applied method to simultaneous MR to CT synthesis and organ-at-risk segmentation

IEEE Transactions on Medical Imaging - 2017

Pulmonary lobe segmentation with probabilistic segmentation of the fissures and a groupwise fissure prior
https://ieeexplore.ieee.org/document/7903649

- Lung segmentation from three-dimensional Computed Tomography (CT) scans
- Developed an unsupervised lung fissure segmentation method based on Gaussian Mixture Modelling and Markov Random Field regularisation
- Lobe segmentation was performed using the fissure segmentation and a population model of the fissures

MICCAI - 2017

Manifold Learning of COPD
https://discovery.ucl.ac.uk/id/eprint/10042862/1/paper332.pdf

- Developed a novel method to analyse disease progression of COPD from CT scans
- Created a novel descriptor of disease severity to quantify patterns of tissue classification
- Performed manifold fusion of separate manifolds of COPD phenotypes learnt using Isomap
- Kernel regression to identify trajectories of disease progression to better monitor disease progression

Selected Awards

MIDL Honorable Mention Reviewer Award 2020, 2021
Medical Imaging with Deep Learning conference
Awarded to the top reviewers at the conference

MICCAI Reviewer Award 2019
Medical Image Computing and Computer Assisted Interventions conference
Awarded to top reviewers at the conference

MICCAI Travel Award 2018
Medical Image Computing and Computer Assisted Interventions conference
Awarded to 50 researchers

British Lung Foundation Travel Award 2014
European Respiratory Society conference
Awarded to early-career clinical/non-clinical researchers in the respiratory field

The Professor Sir Michael Brady Prize 2012
University of Oxford, Department of Engineering Science
Awarded for overall best performance in the M.Sc. in Biomedical Engineering

University College London Dean's List 2011
University College London
Awarded for achieving a degree average of at least 75%