

# Felix Bragman

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Machine learning researcher and engineer with expertise in deep learning, computer vision and medical image computing. Passionate about developing fundamental and applied models for visual reasoning from images and videos.

## Work Experience

### Medtronic, Digital Surgery

Principal AI Engineer 2021-present

- Researching machine learning algorithms for visual reasoning from surgical videos for robotic surgery
- Topics include: semi-supervised multi-task learning and spatio-temporal modelling

### Babylon Health

Senior Research Scientist 2019-2021

- Lead research on learning patient representations from electronic health records
- Researched methods across fair representation learning and modularity in neural networks
- Developed a PyTorch toolkit for research on medical time-series
- Developed a PyTorch libraries for computer vision research

### University College London

Research Associate in Machine Learning and Medical Image Computing 2017-2019

Supervisor: Dr. M. Jorge Cardoso

- Developed methods in multi-task learning across computer vision and medical image computing
- Work published at MICCAI 2018 (oral) and ICCV 2019 (oral)
- Contributed to NiftyNet: an open-source TensorFlow library for deep learning in medical image analysis

## Education

### University College London

Ph.D. in Biomedical and Medical Imaging 2012-2017

Quantitative lung CT analysis for the study & diagnosis of COPD

Supervisors: Prof. David Hawkes and Prof. John Hurst

- Developed automated quantitative tools using machine learning and image processing for the analysis of lung disease from Computed Tomography
- Published at top technical venues (MICCAI and IEEE Transactions on Medical Imaging) and high ranking medical journals (American Journal of Respiratory & Critical Care Medicine, 11% acceptance rate)

### 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 2007-2011

## Skills

### Experienced

Python (PyTorch, Tensorflow, Keras) and MATLAB

### Knowledgeable

C++, Bash, Git and Docker

## Activities

### Reviewer

NeurIPS, ICML, ICLR, MICCAI, 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 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) - 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 of 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

Medical Imaging with Deep Learning conference  
Awarded to the top reviewers at the conference

2020, 2021

### MICCAI Reviewer Award

Medical Image Computing and Computer Assisted Interventions conference  
Awarded to top reviewers at the conference

2019

### MICCAI Travel Award

Medical Image Computing and Computer Assisted Interventions conference  
Awarded to 50 researchers

2018

### British Lung Foundation Travel Award

European Respiratory Society conference  
Awarded to early-career clinical/non-clinical researchers in the respiratory field

2014

### The Professor Sir Michael Brady Prize

University of Oxford, Department of Engineering Science  
Awarded for overall best performance in the M.Sc. in Biomedical Engineering

2012

### University College London Dean's List

University College London  
Awarded for achieving a degree average of at least 75%

2011