Felix Bragman

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Senior research scientist with expertise in deep learning and computer vision. Interested in building predictive models in healthcare that learn complex, phenotype-specific patterns through representation learning and multi-task learning.

Work Experience

Babylon Health

Senior Research Scientist 2021-present

- Leading research on learning patient representations from electronic health records
- Developing a PyTorch pipeline toolkit to facilitate research on medical time-series

Research Scientist 2019-2021

- Developing tools to learn patient representations from health data for risk stratification
- Researching methods across fair representation learning and modularity in neural networks
- Developed libraries in PyTorch to accelerate computer vision research for prototyping of products

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
- Applied algorithms to a range of applications such as simultaneous MR-CT image synthesis and organ-at-risk segmentation in MR-only radiotherapy planning
- 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
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 2020
Medical Imaging with Deep Learning conference
Awarded to the top 25 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%