Danielle C. M. Belgrave

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Profile

The core of my research focuses on probabilistic graphical modelling to understand heterogeneous phenomena using big data to understand causality mechanisms. I have extensive experience both in leading projects and teams and hands-on implementations of end-to-end solutions in statistical machine learning for healthcare. I also implement and develop a broad spectrum of supervised and unsupervised machine learning methods. I have a wide range of hands-on experience with several ML algorithms implemented C#, Python, STATA, R, SAS, SPSS.

PUBLICATIONS AND ACADEMIC CONTRIBUTIONS

Over 80 Academic publications including 2 patents; h-index>25
https://scholar.google.co.uk/citations?user=bGDCgpUAAAAJ&hl=en

I have given over 50 invited keynotes at top ML venues including NeurIPS, ML for Healthcare, Harvard, Berkley, University of Melbourne, UCL, LSE, University of Oxford, University of Cambridge

EDUCATION

PhD (Subject Area: Machine Learning for Healthcare)   **2010 – 2013**
The University of Manchester
Thesis: Probabilistic causal models for asthma and allergies developing in childhood
MSc Statistics - University College London
BSc Business Mathematics and Statistics - London School of Economics

PROFESSIONAL CAREER

Visiting Researcher (Contractor)   **July 2017 – August 2017**
Principal Researcher Manager   **October 2017 – Present**
Microsoft Research Cambridge
Team Lead for AI for Mental Health (Project Talia)
Member of the Healthcare Intelligence Leadership Team

- Created and drove a research agenda and collaborations for building trustworthy end-to-end machine learning pipelines for improving mental health
- Built and manage my own interdisciplinary team of HCI researchers (x2), Machine Learning Researchers (x2) and Engineers (x2), Clinical Collaborators (x3)
- Broad, hands-on implementation and development of ML and statistical solutions using probabilistic graphical models, deep learning, causality and other techniques
- Delivered multiple MVPs and shipped models for real world evaluation on a digital health platform
- Co-supervise 2 PhD students: at University of Cambridge (with Prof Mihaela Van der Schaar) and University of Amsterdam (with Prof Joris Mooij)

Visiting Research Fellow   **September 2016 – January 2017**
University of Melbourne
Project: Dimensionality reduction of 'omics data to understand longitudinal disease profiles

Tenured Research Fellow - Equivalent Assistant Professor   **2015 – 2019**
Imperial College London   **Award: MRC Career Development Award in Biostatistics**
Project Title: Unified probabilistic latent variable modelling strategies to accelerate endotype discovery in longitudinal studies

- Lead research strategy around machine learning for asthma and allergic diseases. Led a team of 3 postdoctoral research associates and a clinical research fellow
- Support strategic decision making with regard to various science problems
- Promote collaborative research with interdisciplinary research team
- Research, design and implement novel, highly scalable machine learning models with a focus on longitudinal, high-dimensional data
- Develop probabilistic and graphical machine learning models and in the context of disease development
- Develop latent variable modelling strategies for distinguishing subtypes of disease using deep learning
- Develop predictive modelling strategies for understanding distinct biomarkers and environmental characteristics to develop personalised healthcare strategies

Principal Statistician   **2014 – 2015**
Consultant   **2015 – 2016**
GlaxoSmithKline
Respiratory Medicine

- Developing statistical models to better understand the mechanisms of COPD, especially using Bayesian networks
- Influencing and providing statistical contributions and relevant analyses to support clinical development plans, regulatory and commercial strategies
- Developing and implementing longitudinal causal models to investigate drug efficacy and safety in patients with COPD
- **Awarded the GSK Exceptional Science Award** for Excellence in Statistical Methodology work

Honorary Research Fellow in Machine Learning   **2014 – 2017**
Postdoctoral Research Associate in Statistics   **2013 – 2014**
Research Assistant in Statistics   **2008 – 2013**
University of Manchester
Department of Respiratory Medicine and Centre for Health Informatics

- Successfully conceived and developed statistical machine learning models to determine the relationship between genotype and phenotype in asthma and allergies and how it is modulated by risk factors and predictors
- Implemented and published probabilistic models for analysing the timing and occurrence of events and modelling change over time for longitudinal data
- Successfully collaborated with clinicians and scientific researchers to provide optimal modelling strategies for research questions

SELECTED ACADEMIC SERVICE

- Tutorial Chair of NeurIPS 2019, 2020
- Diversity and Inclusion Chair WiML 2020
- Diversity and Inclusion Chair AISTATS 2020
- Diversity and Inclusion Chair NeurIPS WiML 2020
- Co-organiser NeurIPS 2020 workshop "Causal Discovery & Causality-Inspired Machine Learning"
- Founder and Co-Organiser 1st ICML Workshop on Machine Learning for Global Health 2020
- Organiser Machine Learning for Healthcare: Key to better patient-practitioner-system partnerships - DALI Workshop 2019
- Board Member Women in Machine Learning 2019-2020
- Co-opted Member of the Data Science Section of the Royal Statistical Society
- Area Chair: NeurIPS 2018, 2019; ICML 2020
- Co-Organiser of the 1st Khipu 2019 (Increasing participation of Latin America in Machine Learning)
- Advisory Board Deep Learning Indaba 2018-present
- Organiser AI in Healthcare: Key to better patient-practitioner-system partnerships - DALI Workshop 2018
- Scientific Committee Microsoft Research AI Summer School 2018
- Organiser (Senior Program and Meeting Chair) Women in Machine Learning 2017
- Program Committee Member Special Session on Machine Learning Applications in Psychiatric Research at The 17th IEEE International Conference on Machine Learning and Applications 2017
- Area Chair for Women in Machine Learning 2016

SELECTED INVITED KEYNOTES AND TUTORIALS

- Invited Lecture NYU Department of Electrical and Computer Engineering special seminar series, 2021
- Keynote: NeurIPS 2020 Workshop "I Can't Believe it's not Better"
- Invited Lectures at Stanford, University of Michigan, Columbia University, LSE 2020
- Keynote and Panel on AI for Social Good, Khipu 2019
- Tutorial: Data Science Summer School, L'Ecole Politechnique 2019
- Keynote: Machine Learning for Healthcare Conference, Stanford 2018
- Tutorial: Machine Learning for Personalised Health at ICML, Sweden 2018 (ICML is the 2nd largest Machine Learning Conference. The tutorial attracted >3000 attendees)
- Keynote: Advances in Data Science, Manchester 2018
- Keynote: Women in Data Science Conference, Zurich 2018
- Invited Speaker: Columbia University, 2018
- Keynote: Big Challenges of Big Data – Spanish Allergy Society, Valencia 2018
- Tutorial: Machine Learning Strategies in Healthcare Research. Deep Learning Indaba, Johannesburg 2017
- A Bayesian Predictive Modelling Framework for Endotype Discovery. University of Manchester 2017
- Course Instructor at Health Informatics Conference: Machine Learning in Healthcare (Teaching with Prof Magnus Rattray) 2017
- Statistical Learning Approaches to Latent Variable Modelling to Accelerate Endotype Discovery. Systems Genomics Group, University of Melbourne, Australia 2016
- A Bayesian Approach to Compensating for Missing Data. Missing Data Methods Group, Murdoch Children's Research Institute, Australia 2016

- Centre for Epidemiology and Biostatistics, University of Melbourne, Australia 2016
- Invited Speaker at the 1st UK Prediction Modelling in Psychiatric Research Workshop, King's College London 2016
- Machine Learning to Understand Subtypes of Childhood Wheezing. International Congress on Pediatric Pulmonology, Naples 2016
- Workshop: Statistics for the Respiratory Pediatrician. International Congress on Pediatric Pulmonology, Naples 2016
- The Asthma E-Lab: Discovering Subtypes of Disease with Model-based Machine Learning. Royal Statistical Society Lancashire and East Cumbria, University of Lancaster 2016
- GlaxoSmithKline Biostatistics Annual Conference, London 2015
- Machine Learning and Perception Group, Microsoft Research Cambridge 2012
- Teaching Assistant:Generalized Linear Latent and Mixed Models. University of Oxford Spring School, Oxford 2010
- Course Assistant: Generalized Linear Latent and Mixed Models. 39th GESIS Spring Seminar: Testing and Modeling with Latent Variables, Cologne 2010

AWARDS

- MRC Strategic Skills Fellowship – Career Development Award in Biostatistics (2015 – 2018)
- Sysbio2016 Young Investigator's Award (February 2016)
- GSK Exceptional Science Award for Statistical Methodology work in Respiratory Medicine (August 2015)
- GSK Bronze Medal Award of Recognition (February 2015)
- GSK Silver Medal Award of Recognition (July 2015)
- Microsoft Research PhD Scholarship Program - Dorothy Hodgkin Postgraduate Award (October 2010 – October 2013).
- Selected to attend the 61st Nobel Laureates in Physiology and Medicine Meeting in Lindau. (sponsored by Microsoft and Boehringer-Ingelheim) (June 2010).
  Included being selected with 20 other researchers to present research to Bill Gates
- Prize for Best Poster presentation for the European Academy of Allergy and Clinical Immunology (June 2013)
- Barry Kay Award from the British Society of Allergy and Clinical Immunology for best research presentation (July 2012)
- Prize for Best Oral abstract presentation for the Chiesi Respiration Forum (November 2010)
- Prize for Best Oral abstract presentation for the European Academy of Allergy and Clinical Immunology (June 2010)