MEL BECKERLEG

DPhil candidate in Mathematics, University of Oxford

@ melbeckerleg@gmail.com 07503171862 Oxford, UK
in linkedin.com/in/mel-beckerleg web: www.maths.ox.ac.uk/people/melanie.beckerleg

I research algorithm design for recommender systems, in particular through predictive clustering (Binary Matrix Completion). This has involved feature design for machine learning approaches, developing algorithms that make use of both convex and non-convex optimisation techniques, and theoretical analysis of the likelihood of recovering existing structure and patterns within a database. Involvement with hackathons and European Study Group with Industry events has allowed me to apply Artificial Intelligence approaches to industrial problems.

EDUCATION

DPhil Industrially Focused Mathematical Modelling

University of Oxford

September 2016 – September 2020 Oxford, UK

Thesis
Binary Matrix Completion for Recommender systems, with Applications to Drug Discovery

Supervisors: Andrew Thompson, Raphael Hauser (University of Oxford), Jonny Wray (e-Therapeutics plc)
Industrial academic collaboration. Algorithm Design. Data Analysis. Machine Learning. Clustering.

Masters in Mathematics (First Class Honours)

University of Durham

September 2011 – 2015 Durham, UK

Thesis
Modelling the sound of a xylophone, B. Piette

University of Fribourg (ERASMUS)

Academic Year 2012-2013 Fribourg, Switzerland

REPORTS AND PUBLICATIONS

Journal Articles

- Melanie Beckerleg and Andrew Thompson (2020). "A divide-and-conquer algorithm for binary matrix completion". In: *Linear Algebra and its Applications*.

Conference Proceedings

- "Binary Matrix Completion for Drug Discovery" (2018). In: *3rd IMA Conference on the Mathematical Challenges of Big Data*.

Reports

- J Wray, M Beckerleg and A Thompson (2017). *Machine Learning for Drug Discovery*. `https://tinyurl.com/yxlk2azu`.
- S Kabir, M Green M Beckerleg L Georgieva and J Grant-Peters (2017). *Robust-utility analysis: making decisions with probabilistic projections*. `https://tinyurl.com/y5m4s69r`.
- S Waters, M Beckerleg M Ellis K Leutchford H Byrne (2017). *Modelling Oxygen Uptake for an Organoid Bioreactor*. `https://tinyurl.com/y2yphaa4`.

HONOURS AND AWARDS

SIAM Travel Award
Mathematics of Data Science Conference 2020

STEM for Britain Finalist
Poster presentation of research to UK Members of Parliament

IMA TakeAIM Prize Winner
Communication of research evidencing impactful industrial collaboration

InFoMM Studentship Award
(2016-2020)

SIAM Oxford Student Chapter President
(2018-2019)

CONFERENCES & EVENTS

International Conference for Industrially Applied Mathematics (ICIAM 2019)
Presenter. *Binary Matrix Completion for Recommender Systems*

European Study Group with Industry (2019)
Participant. *Hotel Advert Recommendations*; *Gamification systems for heating usage*

IMA Conference on Big Data (2018)
Poster Presentation. *Binary Matrix Completion for Drug Discovery*

European Conference on Machine Learning (ECML 2018)
Presenter. *Binary Matrix Completion for Drug Discovery*

UK Study Group with Industry, Bath (2018)
Participant. *Dialogue Classification for Mental Health Services*

Environmental Modelling in Industry Study Group (Cambridge 2017)
Participant. *Making decisions using uncertain forecasts with user preferences*

PROGRAMMING SKILLS

Python
Matlab
R
Mathematica

EXPERIENCE

Research Student
e-Therapeutics plc

Autumn 2017 - Summer 2020 | Oxford, UK

Collaboration with Prof Raphael Hauser (University of Oxford), Dr Andrew Thompson (University of Oxford) and Dr Jonny Wray (e-Therapeutics)

- Design and analysis of algorithms for recommender systems in the context of predictions of drug-target interactions.
- Compared convex optimisation methods for predictive clustering in terms of theoretical and numerical performance on real world datasets.
- Feature analysis for recommender systems on ChEMBL and in-house dataset.

Tutor and Teaching Assistant
University of Oxford

Summer 2016 | Oxford, UK

Taught the following courses:

- Mathematics for Computer Scientists (covering fundamentals of Machine learning)
- Graph Theory
- Scientific Computing (MATLAB)
- Numerical Solutions of ODEs
- Maths for Energy
- Mathematical Mechanical Biology

Research Student
Cellesce plc

Summer 2017 | Oxford, UK

Collaboration with Prof Helen Byrne (University of Oxford), Dr. Sarah Waters (University of Oxford), Dr. Marianne Ellis (Cellesce) and Dr. Kim Leutchford (Cellesce).

- Developed an in-silico model for nutrient uptake in an organ bio-reactor.
- The resulting model was compared against numerical simulations and validated findings against real-world data.
- The model has capacity for incorporating fluid flow within the bio-reactor geometry in order answer questions of how best to control for uniformity of samples.

Junior Events Manager
Green Economics Institute

Summer 2016 | Reading, UK

Event organiser for economic think-tank. Worked adaptively within a team on editing and promotion task and workshop facilitation.

Youth engagement Intern
Christian Aid

Sept 2015 – June 2016 | Bristol, UK

Ran workshops and talks on international development campaigning for young people and students.

Strategy Intern
Thompson Reuters, Legal Business Unit

Summer 2012 | London, UK

- Researched trends in the legal market. Compiled and presented findings in Excel and Powerpoint, worked flexibly, met deadlines and balanced multiple projects.

STRENGTHS

Hard-working | Communication | Presentation skills | Team work and collaboration | Leadership

Data Analytics | Algorithm Design | Scientific Computing | Machine Learning & AI | Mathematical Modelling

LANGUAGES

English
French