Alexis Bellot

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RESEARCH INTERESTS

My research spans algorithms, theory, and applications of machine learning and causal inference.

I am interested in better understanding how to guarantee valid and robust predictions in the context of heterogeneous data from multiple different environments, for applications in reinforcement learning, treatment effect estimation, and the safety of AI algorithms.

EDUCATION

Ph.D. Applied Mathematics at the **University of Cambridge**

- Research on varied machine learning topics for healthcare applications including hypothesis testing, survival analysis, causal inference, and causal discovery.
- Ph.D. Scholarship from the Alan Turing Institute in London.
- Thesis Advisor: Prof. Mihaela van der Schaar.

M.Sc. Applied Statistics at the **University of Oxford**

- Grade: Distinction, completed courses in Graphical Models, Applied Statistics, Foundations of Statistical Inference, Bayes Methods, and Computational Statistics.

B.Sc. Mathematics at **Imperial College London**

- Grade: First Class Honours, completed foundational courses in all areas of Mathematics with a specialization in Statistics.

EMPLOYMENT

Research Scientist at **Google DeepMind** from May 2022.

- Research on Causality, Safety, and Alignment of AI systems.
- Visiting Researcher at Imperial College London (May 2023 - May 2024) giving occasional lectures and courses.

Postdoctoral Research Scientist at **Columbia University** from June 2021 to May 2022.

- Research on the Foundations of Causal Inference with Prof. Elias Bareinboim.

PUBLICATIONS

* stands for "equal contribution".

31. **A. Bellot**, S. Chiappa
    Towards Bounding the Effect of Policies under Unobserved Confounding
    NeurIPS, 2024

30. Y. Jung*, **A. Bellot***
    Efficient Policy Evaluation Across Multiple Different Experimental Datasets
    NeurIPS, 2024

29. K. Jalaldoust*, **A. Bellot***, E. Bareinboim
    Partial Transportability for Domain Generalization
    NeurIPS, 2024

28. J. Schrouff, **A. Bellot**, A. Rannen-Triki, A. Malek, I. Albuquerque, A. Gretton, A. D'Amour, S. Chiappa
    Mind the Graph When Balancing Data for Fairness or Robustness
    NeurIPS, 2024

27. V. Aglietti, I. Ktena, J. Schrouff, E. Sgouritsa, F. J. R. Ruiz, A. Malek, **A. Bellot**, S. Chiappa
    FunBO: Discovering Acquisition Functions for Bayesian Optimization with FunSearch
    arxiv, 2024

26. **A. Bellot**
Towards Bounding Causal Effects under Markov Equivalence
UAI, 2024

25. **A. Bellot**, M. van der Schaar
Scoring DAGs with Dense Unobserved Confounding
IEEE Transactions on Neural Networks and Learning Systems, 2024

24. **A. Bellot**, J. Zhang, E. Bareinboim
Scores for Learning Discrete Causal Graphs with Unobserved Confounders
AAAI, 2024

23. **A. Bellot**, A. Malek, S. Chiappa
Tranportability for Bandits with Data from Multiple Environments
NeurIPS, 2023

22. L. Gultchin, V. Aglietti, **A. Bellot**, S Chiappa
Functional Causal Bayesian Optimization
UAI, 2023

21. **A Bellot***, A Dhir*, G Prando
Generalization Bounds and Algorithms for Estimating Conditional Average Treatment Effect of Dosage
arxiv, 2022

20. N. Seedat, F. Imrie, **A. Bellot**, Z. Qian, M. van der Schaar
Continuous-time modelling of counterfactual outcomes using neural controlled differential equations
ICML, 2022

19. **A. Bellot**, M. van der Schaar
Consistency of mechanistic causality in continuous-time using Neural ODEs
ICLR, 2022

18. **A. Bellot**, M. van der Schaar
Accounting for Unobserved Confounding in Domain Generalization
arxiv, 2022

17. T. Kyono, Y. Zhang, **A. Bellot**, M. van der Schaar
MIRACLE: Causal Structure Learning and Exploitation for Imputing Missing Data
NeurIPS, 2021

16. **A. Bellot**, M. van der Schaar
Policy Analysis using Synthetic Controls in Continuous-time
ICML, 2021

15. **A. Bellot**, M. van der Schaar
Application of Kernel Hypothesis Testing on Set-valued Data
UAI, 2021

14. **A. Bellot**, M. van der Schaar
A Kernel Two-Sample Test with Selection Bias
UAI, 2021

13. **A. Bellot**, R. A. Floto, M. van der Schaar
AI-based Hypothesis Testing in Individuals with CF
Pediatric Pulmonology (Abstract), 2020

12. Y. Zhang, **A. Bellot**, M. van der Schaar
Learning Overlapping Representations for the Estimation of Individualized Treatment Effects
AISTATS, 2020

11. Z. Qian, A. Alaa, **A. Bellot**, M. van der Schaar
Learning Dynamic and Personalized Comorbidity Networks from Event Data using Deep Diffusion Processes
AISTATS, 2020

10. T. Cowling, D. Cromwell, **A. Bellot**, L. D. Sharples, J. van der Meulen
    Logistic regression and machine learning predicted patient mortality from large sets of diagnosis codes comparably
    Journal of Clinical Epidemiology, 2020

9. T. Cowling, **A. Bellot**, J. Boyle, K. Walker, A. Kuryba, S. Galbraith, A. Aggarwal, M. Braun, L. D. Sharples, J. van der Meulen
    One-year mortality of colorectal cancer patients: development and validation of a prediction model using linked national electronic data
    British Journal of Cancer, 2020

8. Y. Ruan, **A. Bellot**, Z. Moysova, G. D Tan, A. Lumb, J. Davies, M. van der Schaar, R. Rea
    Predicting the Risk of Inpatient Hypoglycemia With Machine Learning Using Electronic Health Records
    Diabetes Care, 2020

7. **A. Bellot**, M. van der Schaar
    A Bayesian Approach to Modelling Longitudinal data
    ACM Computing for Healthcare, 2020

6. **A. Bellot**, M. van der Schaar
    Conditional Independence Testing using Generative Adversarial Networks
    NeurIPS, 2019

5. **A. Bellot**, M. van der Schaar
    Boosting Transfer Learning with Survival Data from Heterogenous Domains
    AISTATS, 2019

4. **A. Bellot**, M. van der Schaar
    Multitask Boosting for Survival Analysis with Competing Risks
    NeurIPS, 2018

3. **A. Bellot**, M. van der Schaar
    Boosted Trees for Risk Prognosis
    Machine Learning for Healthcare Conference, 2018

2. **A. Bellot**, M. van der Schaar
    Tree-based Bayesian Mixture Model for Competing Risks
    AISTATS, 2018

1. **A. Bellot**, M. van der Schaar
    A Hierarchical Bayesian Model for Personalized Survival Predictions
    IEEE J. BHI, 2018

TUTORIALS AND SHORT COURSES

- 2024 Tutorial (4h) on Causal Discovery at Imperial College London (MSc Health Data Analytics and Machine Learning)
- 2023 Course (10h) on Foundations of Causal Inference and Modern Topics at Imperial College London

LECTURES, SEMINARS, AND TALKS

- 2024 Online Causal Inference Seminar, forthcoming
- 2024 Seoul National University, forthcoming
- 2024 CCAIM summer school, Cambridge University
- 2024 UCL Symposium on Causality
- 2023 Imperial College London (The Mathematics of Machine Learning)
- 2022 Imperial College London (Msc Mathematical Finance)
- 2022 CCAIM summer school, Cambridge University
- 2022 DataSig, Imperial College London
- 2022 Rice ECE Speaker Series Seminar, Rice University
- 2021 Inspiration exchange, Cambridge University
- 2019 Ellis Health Foundation

- 2019 Microsoft Research
- 2018 GlaxoSmithKline

WORKSHOP ORGANISATION

- Co-organizer of the AAAI 2023 Bridge Program on Continual Causality
- Co-organizer of the NeurIPS 2022 Workshop "A Causal View on Dynamical Systems"
- Member of the logistics committee of the NeurIPS 2021 Workshop "Causal Inference & Machine Learning: Why now?" (WHY-21)

ADDITIONAL TEACHING EXPERIENCE

- Teaching Assistant, Causal Inference I, Columbia University, Fall 2021
- Teaching Assistant, Causal Inference II, Columbia University, Spring 2022