Ioanna Manolopoulou

Contact Information

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Research Interests

Bayesian statistics, non-parametric modelling, mixture modelling, state-space models, biased sampling, modular models, heterogeneous treatment effects, movement ecology, diffusion models, phylogeography, retail analytics, electronic health records.

Academic Appointments

Professor of Statistical Science, Department of Statistical Science, UCL **2022-**

Associate Director, HDRUK-Turing PhD programme in Health Data Science **2022-**

Associate Professor, Department of Statistical Science, University College London **2018-2022**

Turing Fellow, Alan Turing Institute **2016-2021**

Lecturer, Department of Statistical Science, University College London **2012-2018**
(maternity career breaks 09/2015 - 03/2016 and 04/2018 - 01/2019)

Visiting Assistant Professor, Department of Statistical Science, Duke University **2010-2012**

Postdoctoral Associate with Prof. Sayan Mukherjee, Duke University **2011-2012**

Postdoctoral Associate with Prof. Mike West, Duke University **2008-2010**

Postdoctoral Fellow, Statistical and Applied Mathematical Sciences Institute, Sequential Monte Carlo workshop **2008-2009**

Education

University of Cambridge, United Kingdom

Doctor of Philosophy with Prof. S. P. Brooks and Prof. S. Tavaré **2004-2008**
"A Bayesian Approach to Nested Clade Analysis"

Masters in Mathematics (Part III) **2003-2004**

BA Hons Mathematics **2000-2003**

Selected Publications

M. Vega, M. Musolesi, J. O'Sullivan, R. Prior, I. Manolopoulou, "Spatial modelling of British Grocery Retail Data using Topic Models", *submitted*.

A. Caron, G. Baio and I. Manolopoulou, "Sparse Bayesian Causal Forests for Heterogeneous Treatment Effects Estimation", *accepted at Journal of Computational and Graphical Statistics*.

A. Caron, G. Baio and I. Manolopoulou, "Estimating Individual Treatment Effects using Non-Parametric Regression Models: a Review", *accepted at Journal of the Royal Statistical Society, Series A*.

M. Vega, J. O'Sullivan, R. Prior, I. Manolopoulou and M. Musolesi, "Posterior Summaries of Grocery Retail Topic Models: Evaluation, Interpretability and Credibility", *accepted at Journal of the Royal Statistical Society, Series C*.

J. Pitkin, G. Ross and I. Manolopoulou "Bayesian Hierarchical Modelling of Sparse Count Processes in Retail Analytics", *in revision at Annals of Applied Statistics*.

A. Heath, I. Manolopoulou and G. Baio (2019) "Estimating the Expected Value of Sample Information across Different Sample Sizes using Moment Matching and Non-Linear Regression", *Medical Decision Making*.

I. Manolopoulou, A. Hille and B. C. Emerson (2019) "BPEC: An R package for Bayesian Phylogeographic and Ecological Clustering", *Journal of Statistical Software*.

J. Pitkin, G. Ross and I. Manolopoulou (2018) "Dirichlet Process Mixture of Order Statistic Sequences with applications to Retail Analytics", *Journal of Statistical Society, Series C*.

A. Heath, I. Manolopoulou and G. Baio (2017) "Efficient Monte Carlo Estimation of the Expected Value of Sample Information Using Moment Matching", *Medical Decision Making*.

A. Heath, I. Manolopoulou and G. Baio (2016) "A Review of Methods for the Analysis of the Expected Value of Information", *Medical Decision Making*.

E. Kotti, I. Manolopoulou and T. Fearn (2016) "Hierarchical Bayesian variable selection in the probit model with mixture of nominal and ordinal responses", *Proceedings of the 2016 IEEE Statistical Signal Processing Workshop (SSP)*.

A. Heath, I. Manolopoulou and G. Baio (2016) "Efficient High-Dimensional Gaussian Process Regression to calculate the Expected Value of Partial Perfect Information in Health Economic Evaluations", *Statistics in Medicine*.

P.R. Hahn, J. Murray and I. Manolopoulou (2016) "Flexible prior specification for partially identified nonlinear regressions with binary responses", *Journal of the American Statistical Association*.

I. Manolopoulou, T. B. Kepler and D. M. Merl (2012) "Mixtures of Gaussian Wells: Theory, Computation and Application", *Computational Statistics and Data Analysis*.

I. Manolopoulou, M. P. Matheu, M. D. Cahalan, M. West and T. B. Kepler (2012) "Bayesian Spatio-Dynamic Modelling in Cell Motility Studies: Learning Nonlinear Taxic Fields Guiding the Immune Response", *Journal of the American Statistical Association*, with discussion. Selected as the 2012 JASA Applications & Case Studies presentation at JSM 2012 out of all articles published in JASA, A&CS that year.

I. Manolopoulou and B. C. Emerson (2012) "Phylogeographic Ancestral Inference Using the Coalescent Model on Haplotype Trees", *Journal of Computational Biology*.

I. Manolopoulou, L. Legarreta, B. C. Emerson, S. P. Brooks and S. Tavaré (2011) "A Bayesian Approach to Phylogeographic Clustering", *Journal of the Royal Society Interface Focus*.

I. Manolopoulou, C. Chan and M. West (2010) "Selection Sampling from Large Datasets for Targeted Inference in Mixture Modeling", *Bayesian Analysis*, with discussion.

S. P. Brooks, I. Manolopoulou, B. C. Emerson (2007) "Assessing the Effect of Genetic Mutation - A Bayesian Framework for Determining Population History from DNA Sequence Data", *Bayesian Statistics 8*.

M. Kelbert, I. Manolopoulou, I. Sazonov and Y. M. Suhov (2006) "Large Deviations for a Model of Excess of Loss Re-insurance", *Markov Processes and Related Fields*.

Software

R-package `BPEC`, Bayesian Phylogeographic and Ecological Clustering.

Selected Presentations

CMStatistics 2020, invited talk, *Topic Modelling for Grocery Retail Baskets*.

EBEB 2019, keynote speaker, *Computationally effcient methods for Value of Information measures*.

CMStatistics 2019, invited talk, *Nonparametric Bayesian Inference and Goodness of Fit Testing for Stochastic Differential Equations Applied to Animal Movement Modelling*.

ISBIS 2018, invited talk, *Bayesian hierarchical modelling of sparse count processes with applications in retail analytics*.

ERCIM 2017, invited talk, *Bayesian hierarchical modelling of sparse count processes with applications in retail analytics*.

IoT2SUSTAIN, 2017, invited presentation, *Bayesian modelling for modern data sources*.

JSM 2017, invited talk (declined).

Alan Turing Institute Fellow Talk, 2016, *Dirichlet process mixtures of order-sparse data in retail analytics*.

UCL Research festival 2016, invited talk, *Big observational data: reconciling non-random samples of binary outcomes*.

Fisher centre meeting 2016, invited talk, *Bayesian modelling of motion trajectories using diffusion processes*.

dunnhumby 2015, invited talk, *Modular priors for partially identified models in biased sampling*.

ERCIM 2016, invited talk (declined).

UCLID (Understanding Complex and Large Industrial Data) 2014, invited talk, *Nonlinear regression models with partially identified parameters: computation and efficient sensitivity analysis*.

ERCIM 2014, invited talk, *Flexible modelling of turbulent in-flows using radial basis functions*.

ISBA 2014, contributed talk, *Modular priors for partially identified models in biased sampling*.

JSM 2012, JASA Applications & Case Studies invited talk, *Bayesian spatio-dynamic modeling in cell motility studies: learning nonlinear taxic fields guiding immune response*.

ISBA 2012, invited talk, *Semi-parametric dynamic Bayesian modeling in nonlinear state-space*

processes.

BISP 2011, invited talk, *Semi-parametric Bayesian modelling of inhomogeneous tactic fields*.

JSM 2011, invited talk, *Selection sampling from large datasets for targeted inference in mixture modeling*.

ISBA 2010, invited talk, *Dynamic spatial modeling in inhomogeneous force fields*.

Roundtable discussions

Invited participant in "AI in Health and Care" (2019) organised by the Academy for Medical Sciences and the Royal Society.

Invited participant in digital ethics summit (2017).

Invited discussant in roundtable on machine learning and the financial sector organised the Bank of England and the Royal Society (2017).

Invited discussant in roundtable on algorithmic accountability, Royal Statistical Society (2017).

Funding

(Co-I) BHF-Turing funding call, "Machine learning in myocardial infarction to improve risk prediction and inform treatment decisions".

(Fellowship) Alan Turing Institute Fellowship (2016-2019).

(PhD supervisor) Fully funded Turing PhD studentship (2017-2020).

(Collaborator) Co-funded dunnhumby studentship (2017-2020).

(PhD supervisor) Co-funded dunnhumby studentship (2014-2017).

Awards

Higher Education Academy Fellowship, 2015.

ISBA Mitchell Prize, 2012.

SAMSI Research Highlight, 2009.

Smith/Knight Essay Prize, 2006.

Fellow of the Cambridge European Society, 2005.

Trinity College Internal Graduate Studentship, 2004.

Cambridge European Trusts Honorary Scholar, 2004.

Trinity College Senior Scholarship, 2002.

Professional service

Associate Editor, Journal of the Royal Statistical Society, Series C (2021-present).

Associate Editor, Bayesian Analysis (2019-present).

UCL co-lead, HDRUK-Turing Health Data Science PhD programme. (2019-present)

Board of Directors, International Society for Bayesian Analysis (2019-present).

Department of Statistical Science Graduate Admissions Tutor (2016-present).

The industrialisation and professionalisation of Data Science, joint workshop by Alan Turing Institute and the Royal Statistical Society, 2018 (lead organiser).

International Society for Business and Industrial Statistics meeting, 2018 (scientific committee).

BayesComp, 2018 (scientific committee).

Theory of Big Data conference, 2016, 2017 (scientific committee).

Data Science Section committee, Royal Statistical Society (2017-2019).

Network of Computational Statistics and Machine Learning Management Group (2013-2016).

Women in Mathematical Sciences events organiser (2016-present).

Department of Statistical Science Graduate Committee (2014-2019).

UCL Computational Statistics and Machine Learning Management Group (2012-2016).

Teaching

UCL, STAT0023: Computing for Practical Statistics, 2020, 2021, 2022.

UCL, STAT0030/STATG003: Introduction to Statistical Computing, 2017, 2020, 2021.

UCL, STAT1005: Further Probability and Statistics, 2012-2015, 2017.

UCL, STAT1006: Introduction to Practical Statistics, 2013-2014.

UCL, STAT6102: Introductory Statistical Methods, 2013-2014.

Duke University, STA10: Statistics and Quantitative Literacy, 2010-2012.

Duke University, STA213: Introduction to Statistical Methods, 2010-2012.

Student Supervision

PhD student supervision

Ross Dobson (2021-present, 2nd supervisor)

Ilina Yozova (2021-present, 1st supervisor)

Marta Grzeskiewicz (2020-present, 2nd supervisor)

Alberto Caron (2019-present, 1st supervisor)

Istvan Papp (2016-present, 1st supervisor)

Zhenzheng (Helen) Hu (2017-2021, 1st supervisor), *Dirichlet process probit misclassification mixtures model for misclassified binary data.*

Damien De Mijolla (2017-present, co-supervisor with Department of Physics and Astronomy)

Mariflor Vega (2017-2021, co-supervisor), *Modelling Customer Behaviour with Topic Models for Retail Analytics.*

Marta Tallarita (2016-present, 2nd supervisor)

Fatima Batool (2015-2019, 2nd supervisor), *Optimum Average Silhouette Width Clustering Methods.*

James Pitkin (2014-2018, 1st supervisor, winner of departmental James Nelson prize), *Applications of Bayesian mixture models and self-exciting processes to retail analytics.*

Anna Heath (2014-2018, co-supervisor, winner of departmental Costas Goutis prize), *Bayesian computations for Value of Information measures using Gaussian processes, INLA and Moment Matching.*

Eleftheria Kotti (2014-2017, co-supervisor), *Bayesian variable selection for probit models with an application to clinical diagnosis.*

Xiaoyu Liu (2013-2016, 2nd supervisor, winner of departmental Costas Goutis prize), *Spatial uncertainties in tsunami modelling: from bathymetry to run-ups.*