

# Theodore Papamarkou

## Curriculum vitae

- 🇬🇷 Greek and British citizenship
- 📍 Manchester, United Kingdom
- ✉ Email address available upon request
- ☎ Phone number available upon request
- 🌐 [www.theopapamarkou.com](http://www.theopapamarkou.com)
- 🌐 [linkedin.com/in/papamarkou](https://linkedin.com/in/papamarkou)
- 🌐 [github.com/papamarkou](https://github.com/papamarkou)

### Work experience

#### Reader in the mathematics of data science

The University of Manchester

Department of Mathematics

📅 October 2020 – Present

📍 Manchester, UK

Research on approximate inference, complexity theory and mathematics of deep learning. Teaching topics associated with data science. Teaching 'longitudinal data analysis' course.

#### Adjunct professor

University of Tennessee

Department of Mathematics

📅 March 2021 – Present

📍 Knoxville, USA

#### Research scientist

Oak Ridge National Laboratory

Computer Science and Engineering Division

📅 April 2019 – September 2020

📍 Oak Ridge, USA

Strategic hire in artificial intelligence. Principal investigator of two-year laboratory directed research and development (LDRD) project 'Scalable Bayesian uncertainty quantification for neural networks'. Conducted research on Bayesian inference for artificial neural networks.

#### Assistant professor in statistics

University of Glasgow

School of Mathematics and Statistics

📅 September 2015 – March 2019

📍 Glasgow, UK

Conducted research on Markov chain Monte Carlo methodology. Taught three courses, namely 'big data analytics', 'data analysis' and 'statistical methods'. Supervised ten MSc students. Advisor of studies of twenty-one undergraduate students. Head of taught postgraduate programme in statistics and data analytics.

#### Research fellow in statistics

University of Warwick

Department of Statistics

📅 July 2014 – August 2015

📍 Coventry, UK

Conducted research on two projects. One project was related to Bayesian modelling of single-cell RNA sequencing data. The other project was related to Bayesian inference for rough differential equations.

#### Research associate in statistics (80% of time) Administrator of NCSML (20% of time)

University of Warwick

Department of Statistics

📅 January 2014 – June 2014

📍 Coventry, UK

For 80% of work time, conducted research on Bayesian model selection via population Markov chain Monte Carlo for a biochemical pathway of Ewing sarcoma. For the remaining 20% of work time, administrated the UK-wide network on computational statistics and machine learning (NCSML).

#### Research associate in statistics

UCL

Department of Statistical Science

📅 December 2011 – December 2013

📍 London, UK

Conducted research on variance reduction for differential geometric Markov chain Monte Carlo methods.

#### Research associate in statistics

University of Cambridge

Department of Public Health and Primary Care

📅 February 2010 – November 2011

📍 Cambridge, UK

Performed statistical analysis of big genomic data sets to identify genetic determinants of blood lipid levels. Provided support for data filtering, bioinformatics and computing tasks.

#### Research statistician

Queen Mary University of London

Barts and The London School of Medicine and Dentistry

📅 July 2009 – October 2009

📍 London, UK

Researched epidemiological associations between alcohol abstinence and personality disorders.

### Education

#### PhD in statistics

University of Warwick

Department of Statistics

📅 September 2005 – June 2009

📍 Coventry, UK

Thesis title: 'Statistical developments in chaos communications'.

#### MSc in statistics

University of Warwick

**Department of Statistics**
 September 2004 – August 2005

 Coventry, UK

Graduated with distinction. Dissertation title: ‘Aspects of chaos and chaos communications’.

**BSc in mathematics**

University of Ioannina

Department of Mathematics

 September 2000 – August 2004

 Ioannina, Greece

Graduated with the second highest mark of 72.3%. Completed the concentration ‘Statistics and operations research’.

**Selected publications**

- T. Papamarkou, A. Lindo, and E. B. Ford. “Geometric adaptive Monte Carlo in random environment”. In: *Foundations of Data Science* 3.2 (2021), pp. 201–224.
- D. Agrawal, T. Papamarkou, and J. Hinkle. “Wide neural networks with bottlenecks are deep Gaussian processes”. In: *Journal of Machine Learning Research* 21.175 (2020), pp. 1–66.
- T. Papamarkou, J. Hinkle, M. T. Young, and D. Womble. “Challenges in Markov chain Monte Carlo for Bayesian neural networks”. In: *arXiv* (2019).
- A. Lazarus, D. Husmeier, and T. Papamarkou. “Multiphase MCMC sampling for parameter inference in nonlinear ordinary differential equations”. In: *AISTATS*. Vol. 84. PMLR, 2018, pp. 1252–1260.
- D. Harjanto, T. Papamarkou, C. J. Oates, V. Rayon-Estrada, F. N. Papavasiliou, and A. Papavasiliou. “RNA editing generates cellular subsets with diverse sequence within populations”. In: *Nature Communications* 7 (2016), p. 12145.
- C. J. Oates, T. Papamarkou, and M. Girolami. “The controlled thermodynamic integral for Bayesian model evidence evaluation”. In: *Journal of the American Statistical Association* 111 (2016), pp. 634–645.
- T. Papamarkou, A. Mira, and M. Girolami. “Zero variance differential geometric Markov chain Monte Carlo algorithms”. In: *Bayesian Analysis* 9 (2014), pp. 97–128.

**Grants****LDRD grant**

Oak Ridge National Laboratory

Computer Science and Engineering Division

 April 2019 – March 2021

 Oak Ridge, USA

Funding body: laboratory directed research and development (LDRD) program of Oak Ridge National Laboratory. Duration: 24 months. Budget: \$466,300. Role: principal investigator. Title: ‘Scalable Bayesian uncertainty quantification for neural networks’.

**Scholarships****PhD scholarship**

University of Warwick

Department of Statistics

 September 2005 – June 2009

 Coventry, UK

Funding body: Centre for Research in Statistical Methodology (CRISM) of the Department of Statistics, University of Warwick. Duration: 45 months. Scholarship amount: £45,000.

**BSc scholarship for studies at the third year**

University of Ioannina

Department of Mathematics

 September 2002 – August 2003

 Ioannina, Greece

Funding body: Greek Institute of State Scholarships. Scholarship amount: €600. Awarded due to highest third year mark of 78.2%.

**Teaching experience****Big data analytics**

University of Glasgow

School of Mathematics and Statistics

 January 2017 – March 2019

 Glasgow, UK

Developed and taught this module to fourth year undergraduate and postgraduate students.

**Data analysis**

University of Glasgow

School of Mathematics and Statistics

 January 2016 – March 2018

 Glasgow, UK

Taught this module to third year undergraduate and postgraduate students.

**Statistical methods**

University of Glasgow

School of Mathematics and Statistics

 September 2015 – December 2015

 Glasgow, UK

Taught this module to first year undergraduate students.

**Supervisory experience****MSc by research students**

Alan Lazarus.

**PhD students**

Dimitra Eleftheriou.

**Administrative experience****Head of taught postgraduate programme**

University of Glasgow

School of Mathematics and Statistics

 August 2018 – March 2019

 Glasgow, UK

Managed the on-campus programme in statistics and data analytics consisting of five postgraduate taught degrees, namely the MSc in statistics, MSc in data analytics, MSc in biostatistics, MSc in environmental statistics and MRes in advanced statistics.

**Organizer of statistics seminar series**

University of Glasgow  
School of Mathematics and Statistics

📅 September 2016 – July 2018

📍 Glasgow, UK

### Administrator of NCSML

University of Warwick

Department of Statistics

📅 January 2014 – June 2014

📍 Coventry, UK

Administered the UK-wide network on computational statistics and machine learning (NCSML). Coordinated mailing lists and social media to disseminate NCSML activities. Maintained a website for NCSML using Django, HTML and CSS.

### Chair of staff student liaison committee

University of Warwick

Department of Statistics

📅 September 2006 – August 2007

📍 Coventry, UK

## Reviewer experience

### Reviewer for journal articles

Neurocomputing.

### Reviewer for conference articles

AAAI 2020, NeurIPS 2018, AISTATS 2018.

## Editorial experience

### Associate editor for RSS Series C

John Wiley and Sons

📅 January 2020 – Present

### Associate editor for Foundations of Data Science

American Institute of Mathematical Sciences

📅 November 2019 – Present

### Associate editor for Neurocomputing

Elsevier

📅 January 2019 – September 2020

## Software development

### Python packages

Developed `eyore` package using PyTorch to implement Markov chain Monte Carlo methods for Bayesian neural networks.

### Julia packages

Developed `DualNumbers` package. Codeveloped `ForwardDiff` package. Contributed to the development of `Distributions` and `StatsBase` packages.

### C++ libraries

Developed `csk` library using Boost C++ libraries to simulate the chaos shift keying communication system.

## Languages

**Greek** Native and first language

**English** Primary language

## Selected talks

“Challenges in Markov chain Monte Carlo for Bayesian neural networks”. In: Glasgow, UK: ICMS, Apr. 23, 2021.

“Monte Carlo methods in random environment”. In: School of Mathematics, Statistics and Physics, Newcastle University, UK: i-like workshop, June 20, 2018.

“Approximate likelihood inference for discretely observed rough differential equations”. In: School of Mathematics, Statistics and Physics, Newcastle University, UK, Dec. 1, 2017.

## Research visits

### PhD visitor

Electronic and Information Engineering Department

Polytechnic University, Hong Kong

📅 July 2008 - August 2008

📍 Hong Kong, China

## Honors and awards

### Honorary research fellow

University of Glasgow

School of Mathematics and Statistics

📅 April 2019 – Present

📍 Glasgow, UK

### Among 30% highest scoring reviewers

NeurIPS

📅 2018

Evaluated by the area chairs as one of the top 30% highest scoring reviewers for NeurIPS 2018.

## All publications

M. Besançon, T. Papamarkou, D. Anthoff, A. Arslan, S. Byrne, D. Lin, and J. Pearson. “Distributions.jl: definition and modeling of probability distributions in the JuliaStats ecosystem”. In: *Journal of Statistical Software* 98 (16 2021).

T. Papamarkou, H. Guy, B. Kroencke, J. Miller, P. Robinette, D. Schultz, J. Hinkle, L. Pullum, C. Schuman, J. Renshaw, and S. Chatzidakis. “Automated detection of corrosion in used nuclear fuel dry storage canisters using residual neural networks”. In: *Nuclear Engineering and Technology* 53 (2021), pp. 657–665.

T. Papamarkou, A. Lindo, and E. B. Ford. “Geometric adaptive Monte Carlo in random environment”. In: *Foundations of Data Science* 3.2 (2021), pp. 201–224.

D. Agrawal, T. Papamarkou, and J. Hinkle. “Wide neural networks with bottlenecks are deep Gaussian processes”. In: *Journal of Machine Learning Research* 21.175 (2020), pp. 1–66.

M. Baucum, A. Khojandi, and T. Papamarkou. “Hidden Markov models as recurrent neural networks: application to Alzheimer’s disease”. In: *arXiv* (2020).

D. Sen, T. Papamarkou, and D. Dunson. “Bayesian neural networks and dimensionality reduction”. In: *arXiv* (2020).

- A. Spannaus, T. Papamarkou, S. Erwin, and J. B. Christian. “Bayesian state space modelling for COVID-19: with Tennessee and New York case studies”. In: *arXiv* (2020).
- T. Papamarkou, J. Hinkle, M. T. Young, and D. Womble. “Challenges in Markov chain Monte Carlo for Bayesian neural networks”. In: *arXiv* (2019).
- N. W. Tuchow, E. B. Ford, T. Papamarkou, and A. Lindo. “The efficiency of geometric samplers for exoplanet transit timing variation models”. In: *Monthly Notices of the Royal Astronomical Society* 484 (2019), pp. 3772–3784.
- A. Lazarus, D. Husmeier, and T. Papamarkou. “Multiphase MCMC sampling for parameter inference in nonlinear ordinary differential equations”. In: *AISTATS*. Vol. 84. PMLR, 2018, pp. 1252–1260.
- E.-A. Horvat and T. Papamarkou. “Gender differences in equity crowdfunding”. In: *HCOMP*. AAAI Press, 2017, pp. 51–60.
- A. J. Lawrance, T. Papamarkou, and A. Uchida. “Synchronized laser chaos communication: statistical investigation of an experimental system”. In: *IEEE Journal of Quantum Electronics* 53 (2017), pp. 1–10.
- B. Radic-Sarikas, M. Halasz, K. V. M. Huber, G. E. Winter, K. P. Tsafou, T. Papamarkou, S. Brunak, W. Kolch, and G. Superti-Furga. “Lapatinib potentiates cytotoxicity of YM155 in neuroblastoma via inhibition of the ABCB1 efflux transporter”. In: *Scientific Reports* 7 (2017), p. 3091.
- B. Radic-Sarikas, K. P. Tsafou, K. B. Emdal, T. Papamarkou, K. V. Huber, C. Mutz, J. A. Toretsky, K. L. Bennett, J. V. Olsen, S. Brunak, H. Kovar, and G. Superti-Furga. “Combinatorial drug screening identifies Ewing sarcoma-specific sensitivities”. In: *Molecular Cancer Therapeutics* 16 (2017), pp. 88–101.
- D. Harjanto, T. Papamarkou, C. J. Oates, V. Rayon-Estrada, F. N. Papavasiliou, and A. Papavasiliou. “RNA editing generates cellular subsets with diverse sequence within populations”. In: *Nature Communications* 7 (2016), p. 12145.
- H. Kovar, J. Amatruda, E. Brunet, S. Burdach, F. Cidre-Aranaz, E. de Alava, U. Dirksen, W. van der Ent, P. Grohar, T. G. P. Grünewald, L. Helman, P. Houghton, K. Iljin, E. Korsching, M. Ladanyi, E. Lawlor, S. Lessnick, J. Ludwig, P. Meltzer, M. Metzler, J. Mora, R. Moriggl, T. Nakamura, T. Papamarkou, B. Radic-Sarikas, F. Rédini, G. H. S. Richter, C. Rossig, K. Schadler, B. W. Schäfer, K. Scotlandi, N. C. Sheffield, A. Shelat, E. Snaar-Jagalska, P. Sorensen, K. Stegmaier, E. Stewart, A. Sweet-Cordero, K. Szuhai, O. M. Tirado, F. Tirede, J. Toretsky, K. Tsafou, A. Üren, A. Zinovyev, and O. Delattre. “The second European interdisciplinary Ewing sarcoma research summit - a joint effort to deconstructing the multiple layers of a complex disease”. In: *Oncotarget* 7 (2016), pp. 8613–8624.
- C. J. Oates, T. Papamarkou, and M. Girolami. “The controlled thermodynamic integral for Bayesian model evidence evaluation”. In: *Journal of the American Statistical Association* 111 (2016), pp. 634–645.
- T. Papamarkou, A. Mira, and M. Girolami. “Monte Carlo methods and zero variance principle”. In: *Current trends in Bayesian methodology with applications*. Chapman and Hall/CRC Press, 2015, pp. 457–476.
- R. Schwentner, T. Papamarkou, M. O. Kauer, V. Stathopoulos, F. Yang, S. Bilke, P. S. Meltzer, M. Girolami, and H. Kovar. “EWS-FLI1 employs an E2F switch to drive target gene expression”. In: *Nucleic Acids Research* 43 (2015), pp. 2780–2789.
- F. Achcar, A. Fadda, J. R. Haanstra, E. J. Kerckhoven, D.-H. Kim, A. E. Leroux, T. Papamarkou, F. Rojas, B. M. Bakker, M. P. Barrett, C. Clayton, M. Girolami, R. L. Krauth-Siegel, K. R. Matthews, and R. Breitling. “The silicon trypanosome: a test case of iterative model extension in systems biology”. In: *Advances in microbial systems biology*. Vol. 64. Advances in Microbial Physiology. Academic Press, 2014, pp. 115–143.
- T. Papamarkou and A. J. Lawrance. “Nonlinear dynamics of trajectories generated by fully-stretching piecewise linear maps”. In: *International Journal of Bifurcation and Chaos* 24 (2014), p. 1450071.
- T. Papamarkou, A. Mira, and M. Girolami. “Zero variance differential geometric Markov chain Monte Carlo algorithms”. In: *Bayesian Analysis* 9 (2014), pp. 97–128.
- Global Lipids Genetics Consortium. “Common variants associated with plasma triglycerides and risk for coronary artery disease”. In: *Nature Genetics* 45 (2013), pp. 1345–1352.
- Global Lipids Genetics Consortium. “Discovery and refinement of loci associated with lipid levels”. In: *Nature Genetics* 45 (2013), pp. 1274–1285.
- T. Papamarkou and A. J. Lawrance. “Paired Bernoulli circular spreading: attaining the BER lower bound in a CSK setting”. In: *Circuits, Systems, and Signal Processing* 32 (2013), pp. 143–166.
- E. H. Young, T. Papamarkou, N. W. J. Wainwright, and M. S. Sandhu. “Genetic determinants of lipid homeostasis”. In: *Best Practice and Research Clinical Endocrinology and Metabolism* 26 (2012), pp. 203–209.
- ENGAGE Consortium. “A genome-wide screen for interactions reveals a new locus on 4p15 modifying the effect of waist-to-hip ratio on total cholesterol”. In: *PLOS Genetics* 7 (Oct. 2011), pp. 1–8.
- D. Zabaneh, M. Kumari, M. Sandhu, N. Wareham, N. Wainwright, T. Papamarkou, J. Hopewell, R. Clarke, K. Li, J. Palmen, P. J. Talmud, F. Kronenberg, C. Lamina, M. Summerer, B. Paulweber, J. Price, G. Fowkes, M. Stewart, F. Drenos, S. Shah, T. Shah, J.-P. Casas, M. Kivimaki, J. Whittaker, A. D. Hingorani, and S. E. Humphries. “Meta analysis of candidate gene variants outside the LPA locus with Lp(a) plasma levels in 14,500 participants of six white European cohorts”. In: *Atherosclerosis* 217 (2011), pp. 447–451.
- T. Papamarkou. “Two aspects of optimum CSK communication: spreading and decoding”. In: *Chaotic systems: theory and applications*. World Scientific, 2010, pp. 249–256.
- T. Papamarkou and A. J. Lawrance. “Optimal spreading sequences for chaos-based communication systems”. In: *NOLTA*. 2007, pp. 208–211.
- A. J. Lawrance and T. Papamarkou. “Higher order dependency of chaotic maps”. In: *NOLTA*. 2006, pp. 695–698.

## All talks

- “Challenges in Markov chain Monte Carlo for Bayesian neural networks”. In: Glasgow, UK: ICMS, Apr. 23, 2021.
- “Challenges in Bayesian inference via Markov chain Monte Carlo for neural networks”. In: Philadelphia, USA: JSM, Aug. 6, 2020.
- “Monte Carlo methods in random environment”. In: School of Mathematics, Statistics and Physics, Newcastle University, UK: i-like workshop, June 20, 2018.
- “Approximate likelihood inference for discretely observed rough differential equations”. In: School of Mathematics, Statistics and Physics, Newcastle University, UK, Dec. 1, 2017.

- “Klara: a framework for Monte Carlo methods in Julia”. In: MIT, USA: Julia conference, June 23, 2016.
- “EWS-FLI1 Employs an E2F switch to drive target gene expression”. In: University of Sao Paulo, Brazil: Research links British Council-FAPESP workshop ‘Integrative research: challenges of complex systems for technological applications’, Mar. 11, 2015.
- “Patterns of ethno-linguistic and genomic diversity in Africa”. In: School of Mathematical Sciences, Queen Mary University of London, UK, Feb. 10, 2011.
- “Optimal spreading sequences for chaos-based communications; using CSK as a case study”. In: Department of Engineering, University of Cambridge, UK, Oct. 3, 2007.
- “Statistical aspects of chaos and chaos-based communication systems”. In: School of Mathematics and Statistics, University of Glasgow, UK: Research Students’ Conference in Probability and Statistics, Mar. 21, 2006.