Sinan Yıldırım

Resume

Faculty of Engineering and Natural Sciences
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Education

2009–2013 **PhD**, *Pure Mathematics and Mathematical Statistics, University of Cambridge*, UK.
2007–2009 **MSc**, *Electrical and Electronics Engineering, Boğaziçi University*, Turkey.
2002–2007 **BSc**, *Electrical and Electronics Engineering, Boğaziçi University*, Turkey.

PhD thesis

title *Maximum Likelihood Parameter Estimation in Time Series Models Using Sequential Monte Carlo*
date May, 2013
advisor Sumeetpal S. Singh, Department of Engineering, University of Cambridge, UK

MSc thesis

title *Bayesian Methods for Deconvolution of Sparse Processes*
date June, 2009
advisor Ayşın B. Ertüzün, Department of Electrical and Electronics Engineering, Boğaziçi University, Turkey
co-advisor A. Taylan Cemgil, Department of Computer Engineering, Boğaziçi University, Turkey

Work experience

2015– **Faculty member**, *Faculty of Engineering and Natural Sciences, Sabancı University*, Turkey, Research and teaching.
From 01 September 2015

2013–2015 **Postdoctoral Research Associate**, *School of Mathematics, University of Bristol*, UK, Member of the EPSRC project "Intractable Likelihood: New Challenges from Modern Applications (i-like)".
01 September 2013 to 31 August 2015

2014–2015 **Teaching**, *School of Mathematics, University of Bristol*, UK, Example classes for courses on Probability, Statistics, and Linear Algebra & Geometry.
January 2014 to June 2015

2012–2013 **Temporary research conductor**, *Department of Engineering, University of Cambridge*, UK, Research on algorithmic development for multi-target tracking model calibration and testing.
4 December 2012 to 28 February 2013

2011–2013 **Teaching**, *University of Cambridge*, UK, (a) Department of Pure Maths and Math Statistics: Supervised 1B Markov Chains, Part III Time Series and Monte Carlo; (b) Department of Engineering: supervised 3M1 Mathematical Methods and gave demonstration in Computing 1B.

2008–2008 **Academic visitor**, *Signal Processing and Telecommunications Laboratory, University of Cambridge*, UK, hosted by Prof. W. Fitzgerald, worked with Dr. A. Taylan Cemgil.
1 August 2008 to 17 September 2008

2007–2009 **Teaching Assistant**, *Boğaziçi University, Department of Electrical and Electronics Engineering*, Turkey, helped teaching courses on Signal Processing and Telecommunications.
December 2007 to June 2009

2007–2009 **Academic researcher**, *in the project "Time Series Modelling for Bayesian Source Separation" funded by the Scientific and Technical Research Council of Turkey*, Boğaziçi University Signal Processing Laboratory, Turkey.
September 2007 to June 2009

Research

Research Interests	Bayesian inference, Markov chain Monte Carlo, sequential Monte-Carlo, online parameter estimation, data privacy
Publications	**Journal papers**

1. **Sinan Yıldırım** (2024) Differentially private online Bayesian estimation with adaptive truncation, *Turkish Journal of Electrical Engineering and Computer Sciences*

2. Ozan Aksoy, **Sinan Yıldırım** (2024) A model of dynamic flows: Explaining Turkey's inter-provincial migration, *Sociological Methodology*

3. **Sinan Yıldırım**, Mohammad Khalafi, Tayyar Güzel, Halil Satık, Murat Yılmaz (2023), Supply Curves in Electricity Markets: A Framework for Dynamic Modeling and Monte Carlo Forecasting, *IEEE Transactions on Power Systems*

4. Vahid Tavakol Aghaei, Arda Ağababaoğlu, Biram Bawo, Peiman Naseradinmousavi, **Sinan Yıldırım**, Serhat Yeşilyurt, Ahmet Onat (2023), Energy optimization of wind turbines via a neural control policy based on reinforcement learning Markov chain Monte Carlo algorithm, *Applied Energy*

5. Barış Alparslan, **Sinan Yıldırım** (2022), Statistic Selection and MCMC for Differentially Private Bayesian Estimation, *Statistics and Computing*

6. Nurdan Kuru, Mert Gürbüzbalaban, Ş. İlker Birbil, **Sinan Yıldırım** (2022), Differentially private acceleration optimization algorithms, *SIAM Optimization*

7. Anes Abdennebi, Anıl Elakaş, Fatih Taşyaran, Erdinç Öztürk, Kamer Kaya, **Sinan Yıldırım** (2022) Machine learning-based load distribution and balancing in heterogeneous database management systems, *Concurrency and Computation Practice and Experience*

8. Vahid Tavakol Aghaei, Arda Ağababaoğlu, **Sinan Yıldırım**, Ahmet Onat (2021), A real-world application of Markov chain Monte Carlo method for Bayesian trajectory control of a robotic manipulator, *ISA Transactions*

9. **Sinan Yıldırım**, M. Burak Kurutmaz, Melih Barsbey, Umut Şimşekli, A. Taylan Cemgil (2021), Bayesian Allocation Model: Marginal Likelihood-based Model Selection for Count Tensors, *IEEE Journal of Selected Topics in Signal Processing*

10. Ertunç Erdil, **Sinan Yıldırım**, Tolga Taşdizen, Müjdat Çetin (2019), Pseudo-marginal MCMC Sampling for Image Segmentation using Nonparametric Shape Priors, *IEEE Transactions on Image Processing*

11. **Sinan Yıldırım**, Beyza Ermiş (2019), Exact MCMC with differentially private moves, *Statistics and Computing*

12. Vahid Tavakol, Ahmet Onat and **Sinan Yıldırım** (2018), A Markov Chain Monte Carlo Algorithm for Bayesian Policy Search, *Systems Science and Control Engineering*

13. Lan Jiang, Sumeetpal S. Singh, **Sinan Yıldırım** (2015), Bayesian tracking and parameter learning for non-linear multiple target tracking models *IEEE Transactions on Signal Processing*

14. **Sinan Yıldırım**, Sumeetpal S. Singh, Thomas Dean, Ajay Jasra (2015), Parameter Estimation in Hidden Markov Models with Intractable Likelihoods Using Sequential Monte Carlo, *Journal of Computational and Graphical Statistics*,

15. **Sinan Yıldırım**, Lan Jiang, Sumeetpal S. Singh, and Thomas Dean (2014), Calibrating the Gaussian Multi-target Tracking Model, *Statistics and Computing*

16. **Sinan Yıldırım**, Sumeetpal S. Singh, and Arnaud Doucet (2013), An Online Expectation-Maximisation Algorithm for Changepoint Models, *Journal of Computational and Graphical Statistics*

17. **Sinan Yıldırım**, A. Taylan Cemgil, Mustafa Aktar, Yaman Özakın, and Ayşın Ertüzün (2010), A Bayesian Deconvolution Approach for Receiver Function Analysis, *IEEE Transactions in Geoscience and Remote Sensing*

18. Deniz Gençağa, Ercan E. Kuruoğlu, Ayşın Ertüzün, and **Sinan Yıldırım** (2008), Estimation of Time Varying AR SαS Processes using Gibbs Sampling, *Signal Processing*

Technical Report or Journal Submissions

1. Soner Aydın, **Sinan Yıldırım** (2024) Adaptive Online Bayesian Estimation of Frequency Distributions with Local Differential Privacy, arXiv:2405.07020

2. Umut Şimşekli, Mert Gürbüzbalaban, Sinan Yıldırım, Lingjiong Zhu (2024) Differential Privacy of Noisy (S)GD under Heavy-Tailed Perturbations, arXiv: 2403.02051v1

3. Ş. İlker Birbil, **Sinan Yıldırım**, Hakan Akyüz, Kaya Gökalp (2022), Learning with Subset Stacking, arXiv:2112.06251

4. Christophe Andrieu, **Sinan Yıldırım**, Arnaud Doucet, Nicolas Chopin (2021), Metropolis-Hastings with averaged acceptance ratio, arXiv:2101.01253

5. Christophe Andrieu, Arnaud Doucet, **Sinan Yıldırım**, Nicolas Chopin (2018), On the utility of Metropolis-Hastings with asymmetric acceptance ratio, arXiv:1803.09527

6. **Sinan Yıldırım**, Christophe Andrieu, Arnaud Doucet (2018), Scalable Monte Carlo inference in state-space models, arXiv:1809.02527

7. M. Burak Kurutmaz, A. Taylan Cemgil, **Sinan Yıldırım**, Melih Barsbey, Umut Şimşekli (2018), Bayesian Allocation Model: Inference by Sequential Monte Carlo for Nonnegative Tensor Factorizations and Topic Models using Polya Urns, arXiv:1903.04478

Conference and refereed workshop papers

1. Barış Alparslan, **Sinan Yıldırım**, Ilker Birbil (2023), Differentially Private Distributed Bayesian Linear Regression with MCMC, *ICML 2023*

2. **Sinan Yıldırım**, Kamer Kaya, Soner Aydın, Hakan Buğra Erentuğ (2020) Differentially Private Frequency Sketches for Intermittent Queries on Large Data Streams, *IEEE International Conference on Big Data (Big Data)*

3. Mehmet Burak Kurutmaz, Melih Barsbey, Ali Taylan Cemgil, **Sinan Yıldırım**, Umut Şimşekli (2019) Bayesian Model Selection for Identifying Markov Equivalent Causal Graphs, *2nd Symposium on Advances in Approximate Bayesian Inference*

4. Nurdan Kuru, **Sinan Yıldırım**, İlker Birbil (2017), A Differentially Private Stochastic Gradient Descent Algorithm with Smoothing, *FAIM 2018 Workshop on Privacy in Machine Learning and Artificial Intelligence*

5. Ertunç Erdil, **Sinan Yıldırım**, Tolga Taşdizen, Müjdat Çetin (2017) Image Segmentation with Pseudo-marginal MCMC Sampling and Nonparametric Shape Priors, *NIPS 2017 Workshop on Advances in Approximate Bayesian Inference*

6. M. Burak Kurutmaz, A. Taylan Cemgil, Umut Şimşekli, **Sinan Yıldırım** (2017), Bayesian Nonnegative Matrix Factorization as an Allocation Model, *NIPS 2017 Workshop on Advances in Approximate Bayesian Inference*

7. Ertunç Erdil, **Sinan Yıldırım**, Tolga Taşdizen, Müjdat Çetin (2016), MCMC Shape Sampling for Image Segmentation with Nonparametric Shape Priors, *Computer Vision and Pattern Recognition (CVPR)*

8. Lan Jiang, Sumeetpal S. Singh, **Sinan Yıldırım** (2014), A New Particle Filtering algorithm for Multiple Target Tracking with Non-linear Observations, *17'th International Conference on Information Fusion*

9. **Sinan Yıldırım**, Lan Jiang, Sumeetpal S. Singh, Thomas Dean (2012), A Monte Carlo Expectation Maximisation Algorithm for Parameter Estimation in Multiple Target Tracking, *15'th International Conference on Information Fusion 2012*

10. **Sinan Yıldırım**, A. Taylan Cemgil, Sumeetpal S. Singh (2012), An Online Expectation-Maximisation Algorithm for Nonnegative Matrix Factorisation Models, *SYSID 2012*

11. **Sinan Yıldırım**, A. Taylan Cemgil (2011), Forward smoothing and online expectation-maximisation in Gaussian linear state-space models, *IEEE SIU 2011*

12. **Sinan Yıldırım**, A. Taylan Cemgil, Ayşın Ertüzün (2009), A Hybrid Method for Deconvolution of Bernoulli-Gaussian Processes, *IEEE ICASSP 2009*

13. **Sinan Yıldırım**, Murat Saraçlar (2009), Single channel music and speech separation using nonnegative matrix factorization, *IEEE SIU 2009*

Scientific Projects

July 2021 **TÜBİTAK 3501**, *Monte Carlo Methods for Data Privacy Applications*, 18 months.

Sept 2019 **TÜBİTAK 1003**, *High Performance Probabilistic Database Management Systems*, 27 months.

Theses supervised

Completed

June. 2023 **Barış Alparslan**, *Monte Carlo methods for data privacy applications*, MSc.

Dec. 2021 **Ezgi Genç**, *Mathematical and Statistical Analysis of Excitement Score in Penalty Shootouts*, MSc.

June 2021 **Mohammad Khalafi**, *Predicting Supply Curve of Electricity in an Intra-day Market Using State-Space Models and Sequential Markov Chain Monte Carlo*, MSc.

Sept. 2019 **Nurdan Kuru**, *Novel Gradient-Based Methods For Data Distribution And Privacy In Data Science*, PhD, Main supervisor: İlker Birbil.

June 2019 **Vahid Tavakol**, *Markov Chain Monte Carlo Algorithm for Bayesian Policy Search*, PhD, Main supervisor: Ahmet Onat.

Aug. 2018 **Hilal Tüysüz**, *Changepoint Model for Bayesian Online Fraud Detection in Call Data*, MSc.

Aug. 2018 **Didem Koçhan**, *Scalable Monte Carlo Inference In Regression Models With Missing Data*, MSc, Co-supervisor: İlker Birbil.

Jan. 2018 **Alara Güler**, *Applications of Bayesian Inference for the Origin-Destination Matrix Problem*, MSc, Co-supervisor: İlker Birbil.

In progress:

Soner Aydın, *TBA*, PhD.

Courses taught

IE 305 **Simulation**, *Undergraduate level*.

MATH 306 **Statistical modeling**, *Undergraduate level*.

ENS 505 **Methods for statistical inference**, *Graduate level*.

IE 58001 **Simulation methods for Statistical Inference**, *Graduate level*.

Honours

2012 Travel grant awarded by the conference Fusion 2012

2011 Smith-Knight & Rayleigh-Knight Prize (Grade 2)

2009 PhD scholarship awarded by Cambridge Statistics Initiative for three years

2009 MAN Group PhD award for three years

2002 Ranked 10th in the National University Entrance Exam (among 1,600,000 candidates)

Computer skills

Coding MATLAB, Arena, C, Python, R

Talks & presentations

July 2023 **TeSA, Toulouse, France**, *Hidden Markov Models and Bayesian Inference*, talk.

June 2023 **IRIT, Toulouse, France**, *Markov Chain Monte Carlo for Bayesian Inference and its Applications*, talk.

May 2023 **Workshop, The mathematical and statistical aspects of security and cybersecurity, UK**, *Statistic Selection and MCMC for Differentially Private Bayesian Estimation*, talk.

October 2022 **CIRM Workshop, Computational methods for unifying multiple statistical analyses (Fusion), France**, *Statistic Selection and MCMC for Differentially Private Bayesian Estimation*, talk.

September 2021 **Rutgers Business School MSIS Department Seminar Series, US**, *Metropolis-Hastings with averaged acceptance ratios*, talk.

November 2020 **QM-Stats-CS Research Meetings, Erasmus University Rotterdam, Netherlands**, *Differentially Private Accelerated Optimization Algorithms*, talk.

February 2020 **Department of Industrial Engineering, Boğaziçi Üniversitesi, İstanbul, Turkey**, *Differential Privacy, Inference, and Optimisation*, talk.

September 2018 **Bayesian Computation for High-Dimensional Statistical Models (workshop), Singapore**, *Utilising inference in state-space models with multiple paths from conditional sequential Monte Carlo*, talk.

July 2018 **IMS Workshop, Vilnius, Lithuania**, *Inference in state-space models with multiple paths from conditional SMC*, talk.

May 2018 **IMBM Probability Days, Boğaziçi University, Turkey**, *Tutorial on Bayesian statistics and Monte Carlo*, talk.

March 2018 **Bayes Comp 2018 (workshop), Universtat Pompeu Fabra, Barcelona**, *Utilising inference in state-space models with multiple paths from conditional sequential Monte Carlo*, talk.

November 2017 **Math Seminars, Mimar Sinan Guzel Sanatlar Üniversitesi, İstanbul, Turkey**, *On the Use of Penalty MCMC for Differential Privacy*, talk.

July 2017 **Scalable Statistical Inference (workshop), Isaac Newton Institute, Cambridge, UK**, *Scalable Monte Carlo inference for state-space models*, talk.

June 2016 **3rd Ankara-İstanbul Workshop on Stochastic Processes, Ankara, Turkey**, *On the use of penalty MCMC for differential privacy*, talk.

June 2016 **i-Like Workshop in Lancaster, UK**, *On the use of penalty MCMC for differential privacy*, talk.

August 2015 **SMC Conference in Paris, ENSAE, Paris, France**, *AIS MCMC for parameter estimation in HMMs*, poster.

June 2015 **Workshop on Bayesian Inference for Big Data (BIBiD 2015), University of Oxford, UK**, *Facilitating the penalty method for MCMC with large data*, talk.

May 2015 **i-like Workshop, University of Bristol, UK**, *On an alternative class of exact-approximate MCMC algorithms*, talk.

February 2015 **Department of Statistics, University of Oxford, UK**, *On an alternative class of exact-approximate MCMC algorithms*, talk.

February 2015 **Department of Statistics, University College London, UK**, *On an alternative class of exact-approximate MCMC algorithms*, talk.

December 2014 **Department of Mathematics, University College London, UK**, *On the usefulness of asymmetric acceptance ratio Metropolis-Hastings updates*, talk.

July 2013 **Department of Electrical and Electronics Engineering, Boğaziçi University, İstanbul, Turkey**, *Parameter estimation in Hidden Markov Models*, talk.

March 2013 **Department of Statistical Science, University College London, UK**, *Approximate Bayesian Computation for Maximum Likelihood Estimation in Hidden Markov Models*, talk.

Sept 2012 **Workshop on Recent Advances in Sequential Monte Carlo, Warwick, UK**, *Approximate Bayesian Computation for Maximum Likelihood Estimation in Hidden Markov Models*, talk.

April 2012 **SuSTaIn 2012, Bristol, UK**, *ABC Maximum Likelihood Estimation for Hidden Markov Models with intractable likelihoods*, poster.

June 2010 **ISBA 2010 World Meeting, Valencia, Spain**, *Offline and online expectation-maximisation via forward smoothing in changepoint systems*, poster.