Ömer Deniz Akyildiz

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Education

2019 **PhD**, *Multimedia Signal Processing and Communications*, Universidad Carlos III de Madrid.
Signal Processing Group, Department of Signal Theory and Communications.
Thesis: Sequential and adaptive Bayesian computation for inference and optimization
Supervisor: Joaquín Míguez.

2012 **MSc**, *Communications Engineering*, Istanbul Technical University.
Thesis: A structured sparse decomposition method for audio signals

2010 **BSc**, *Communications Engineering*, Istanbul Technical University.
Thesis: Anisotropic diffusion in image processing

Work Experience

2021 – **Research Associate**, The Alan Turing Institute, UK.
Working with Mark Girolami, as a part of the Computational Statistics and Machine Learning (CSML) group at University of Cambridge.

2019 – 2021 **Research Fellow**, University of Warwick, UK.
joint appointment between Dept. of Computer Science and Dept. of Statistics, based at The Alan Turing Institute, London, working within the London Air Quality project, led by Theodoros Damoulas.

2015 – 2019 **Research Assistant**, Carlos III University of Madrid, Spain.
within the Signal Processing Group (GTS), Dept. of Signal Theory and Communications.

June - August 2018 **Visiting Researcher**, The Alan Turing Institute, London, UK.
within the programme Data-Centric Engineering, hosted by Chris Oates.

May - June 2018 **Visiting Research Scientist**, Fraunhofer Heinrich-Hertz Institute (HHI), Berlin, Germany.
within the Signal and Information Processing Group, hosted by Zoran Utkovski.

Jan. - March 2018 **Visiting Researcher**, Imperial College London, UK.
under the supervision of Dan Crisan, Department of Mathematics.

August 2017 **Visiting Research Scientist**, Fraunhofer Heinrich-Hertz Institute (HHI), Berlin, Germany.
within the Signal and Information Processing Group, hosted by Zoran Utkovski.

2012 – 2015 **Research Assistant**, Boğaziçi University.
under the supervision of A. Taylan Cemgil with Statistical Inference Group.

2014 – 2015 **Quantitative Researcher**, algosis inc.
worked on algorithmic trading, portfolio optimization, time-series analysis.

2010 – 2012 **Research Assistant**, Istanbul Technical University.
within the Multimedia Signal Processing and Pattern Recognition Group.

Teaching/Supervision Experience

Supervision *Ayman Boustati*, co-supervised with Theodoros Damoulas

Fall 2018 **Teaching Assistant**, Systems and Signals, in Dept. of Signal Theory and Communications, Universidad Carlos III de Madrid.

2013 – 2015 **Teaching Assistant** (Voluntary), Boğaziçi University, Istanbul, Turkey.

Monte Carlo methods (graduate course) × 3
Bayesian statistics and machine learning (graduate course) × 2

Papers

2020 *VarGrad: A Low Variance Gradient Estimator for Variational Inference*, L. Richter, A. Boustati, N. Nuesken, F. J. Ruiz, **Ö. D. Akyildiz**. *NeurIPS* (2020).

2020 *Generalized Bayesian Filtering via Sequential Monte Carlo*, A. Boustati*, **Ö. D. Akyildiz***, T. Damoulas, A. M. Johansen, *NeurIPS* (2020).

2020 *Convergence rates for optimised adaptive importance samplers*, **Ö. D. Akyildiz**, J. Miguez, *Statistics and Computing*, to appear.

2020 *Parallel sequential Monte Carlo for stochastic gradient-free nonconvex optimization*, **Ö. D. Akyıldız**, D. Crisan, J. Miguez, *Statistics and Computing*, to appear.

2020 *Nonasymptotic analysis of Stochastic Gradient Hamiltonian Monte Carlo under local conditions for nonconvex optimization*, **Ö. D. Akyildiz**, S. Sabanis, `arXiv:2002.05465`.

2020 *Nudging the particle filter*, **Ö. D. Akyildiz**, J. Míguez, In *Statistics and Computing*, 30, 305–330.

2019 *Probabilistic sequential matrix factorization*, **Ö. D. Akyildiz**, G. J.J. van den Burg, T. Damoulas, M. J. Steel `arXiv:1910.03906`.

2019 *Nonasymptotic estimates for Stochastic Gradient Langevin Dynamics under local conditions in nonconvex optimization*, Y. Zhang, **Ö. D. Akyildiz**, T. Damoulas, S. Sabanis, `arXiv:1910.02008`.

2019 *A probabilistic incremental proximal gradient method*, **Ö. D. Akyıldız**, É. Chouzenoux, V. Elvira, J. Miguez, In *IEEE Signal Processing Letters*.

2019 *Dictionary filtering: a probabilistic approach to online matrix factorisation*, **Ö. D. Akyıldız**, J. Miguez, Signal, Image and Video Processing, June 2019, 13(4):737-744.

2018 *The Incremental Proximal Method: A Probabilistic Perspective*, **Ö. D. Akyıldız**, V. Elvira, J. Miguez, ICASSP 2018.

2017 *A probabilistic interpretation of replicator-mutator dynamics*, Ö. D. Akyıldız, `arXiv:1712.07879`, 2017.

2017 *Adaptive noisy importance sampling for stochastic optimization*, **Ö. D. Akyıldız**, I. P. Marino, J. Miguez, IEEE CAMSAP 2017.

2016 *On the Relationship between Online Optimizers and Recursive Filters*, **Ö. D. Akyıldız**, V. Elvira, J. Fernandez-Bes, J. Miguez, NeurIPS Workshop on Optimizing the Optimizers, Barcelona, Spain, 2016.

2015 *Matrix Factorisation with Linear Filters*, Ö. D. Akyıldız, `arXiv:1509.02088`.

2015 *Online Matrix Factorization via Broyden Updates*, Ö. D. Akyıldız, Preprint, `arXiv:1506.04389`.

2014 *Primal-Dual Algorithms for Audio Decomposition Using Mixed Norms*, İ. Bayram, Ö. D. Akyıldız, Journal of Signal, Image and Video Processing, 2014.

2012 *An Analysis Prior Based Decomposition Method for Audio Signals*, Ö. D. Akyıldız and İ. Bayram, EUSIPCO 2012.

Talks

Sep. 17, 2020 *Nudging the particle filter*, for the SMC Interest Group at the University of Warwick.

May 20, 2020 *An overview of nonasymptotic analysis for the stochastic gradient Markov chain Monte Carlo*, at the Turing DCE Reading Group.

Oct. 30, 2019 *Proximal methods from a probabilistic perspective*, at *ProbNum 2019* at the Turing.

Sep. 16, 2019 *Convergence rates for optimised adaptive importance samplers* (Invited), U. of Edinburgh.

May 10, 2019 *Probabilistic Incremental Optimization* (Invited), University of Warwick.

Dec. 20, 2018 *Parallel SMC for stochastic optimization* (Invited), Bogazici University.

Sep. 25, 2018 *Nudging the particle filter*, Universidad Carlos III de Madrid.

Feb. 16, 2018 *Nudging the particle filter* (Invited), Imperial College London.

Nov. 28, 2017 *Adaptive noisy importance sampling*, Universidad Carlos III de Madrid.

Professional Activities

Reviewer NeurIPS 2020, ICML 2020, AISTATS 2021, IEEE Transactions on Signal Processing; IEEE Signal Processing Letters; Digital Signal Processing; ECML 2020.

Visits & Workshops

16–19/9/19 School of Mathematics, University of Edinburgh, Edinburgh, UK.

18–23/8/19 School of Mathematics, University of Edinburgh, Edinburgh, UK.

27–31/8/18 Bayesian Computation for High-Dimensional Statistical Models, Singapore.

26–28/3/18 BayesComp 2018, Barcelona, Spain.

29/8-1/9/17 SMC 2017 Workshop, Uppsala, Sweden (Poster).

5–10/12/16 NIPS Conference, Barcelona, Spain.

3-4/12/16 European Workshop on Reinforcement Learning, Barcelona.

26-29/6/16 IEEE Workshop on Statistical Signal Processing, Palma, Spain.

16-20/5/16 School of Mathematical Sciences, Queen Mary University of London, UK.

1-5/2/16 School of Mathematical Sciences, Queen Mary University of London, UK.

14-24/12/15 School of Mathematical Sciences, Queen Mary University of London, UK.

21–23/12/15 Sequential Monte Carlo Workshop, Imperial College London, UK.

Graduate Schools

19-23/6/17 *Dobbiaco Summer School on Probabilistic Numerics*, Dobbiaco, Italy.

4-8/7/16 *Summer School on Uncertainty Quantification for Applied Problems*, Basque Center for Applied Mathematics, Bilbao, Spain.

13-24/7/15 *Machine Learning Summer School*, Max Planck Institute of Intelligent Systems, Tübingen, Germany. (awarded full financial support.)

22-26/6/15 *Foundations and Advances in Stochastic Filtering*, Barcelona, Spain.