Zoltán Szabó

Zoltán Szabó
Professor of Data Science

Contact Information

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Research Interest

∘ Theory: statistical machine learning; information theory[1], kernel methods, scalable computation.
∘ Applications:
- shape-constrained prediction, hypothesis testing, safety-critical learning, style transfer, distribution regression, dictionary learning, structured sparsity, independent subspace analysis, bioinformatics, Bayesian inference, computer vision,
- finance, economics, analysis of climate data, criminal data analysis, collaborative filtering, emotion recognition, face tracking, remote sensing, natural language processing, gene analysis.

Employment

London School of Economics, United Kingdom
   Department of Statistics

Professor of Data Science	2021–

École Polytechnique, France
   Center of Applied Mathematics

Senior Researcher (1st class, HDR)	2019–2021
Senior Researcher (1st class)	2016–2019

University College London, United Kingdom
   Gatsby Unit

Research Associate (with Prof. Arthur Gretton)	2013–2016

Eötvös Loránd University, Hungary
   School of Computer Science

Research Fellow	2009–2013
Assistant Research Fellow	2008–2009
Assistant Professor	2007–2008

Education and Habilitation

Paris-Sud University, France

HDR (with distinction)	2019

   Title: Contributions to Kernel Techniques.

Eötvös Loránd University, Hungary
   School of Computer Science

Ph.D. (summa cum laude)	2004–2007

   Title: Separation Principles in Independent Process Analysis.
   Faculty of Natural Sciences, Applied Mathematics

Ph.D. (summa cum laude)	2003–2006

   Title: Group-Structured and Independent Subspace Based Dictionary Learning.

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[1]Information Theoretical Estimators (ITE) Toolbox: https://bitbucket.org/szzoli/ite-in-python/.

M.Sc. (with distinction)	1998–2003

Title: Retina Based Sampling in Face Component Recognition.
Specialization in Systems Theory, Signal and Image Processing,
Financial and Actuarial Mathematics.

Professional Activities (Global)

Moderator of
Statistical Machine Learning (stat.ML) on arXiv   2018–

Reviewing Grant Applications
Israel Science Foundation (ISF)   2021–
European Research Council (ERC)   2018–
Swiss National Science Foundation (SNSF)   2017–

Senior Area Chair (SAC)
International Conference on Artificial Intelligence and Statistics (AISTATS-2023)   2022
Advances in Neural Information Processing Systems (NeurIPS)   2019

Area Chair (AC)
International Conference on Machine Learning (ICML)   2023
Conference on Uncertainty in Artificial Intelligence (UAI)   2023
Conference on Learning Theory (COLT)   2023
International Conference on Learning Representations (ICLR-2023)   2022
Advances in Neural Information Processing Systems (NeurIPS)   2022
International Conference on Machine Learning (ICML)   2022
Conference on Uncertainty in Artificial Intelligence (UAI)   2022
Conference on Learning Theory (COLT)   2022
International Conference on Artificial Intelligence and Statistics (AISTATS-2022)   2021
International Conference on Learning Representations (ICLR-2022)   2021
Advances in Neural Information Processing Systems (NeurIPS)   2021
International Conference on Machine Learning (ICML)   2021
Conference on Learning Theory (COLT)   2021
Conference on Uncertainty in Artificial Intelligence (UAI)   2021
International Joint Conference on Artificial Intelligence (IJCAI)   2021
International Conference on Artificial Intelligence and Statistics (AISTATS-2021)   2020
International Conference on Learning Representations (ICLR-2021)   2020
Advances in Neural Information Processing Systems (NeurIPS)   2020
Conference on Uncertainty in Artificial Intelligence (UAI)   2020
International Conference on Machine Learning (ICML)   2020
International Joint Conference on Artificial Intelligence (IJCAI)   2020
International Conference on Artificial Intelligence and Statistics (AISTATS-2020)   2019
International Joint Conference on Artificial Intelligence (IJCAI)   2019
International Conference on Machine Learning (ICML)   2019
International Conference on Artificial Intelligence and Statistics (AISTATS-2019)   2018
Advances in Neural Information Processing Systems (NeurIPS)   2018
International Conference on Machine Learning (ICML)   2018
International Conference on Artificial Intelligence and Statistics (AISTATS-2018)   2017
Conference on Uncertainty in Artificial Intelligence (UAI)   2017
International Conference on Machine Learning (ICML)   2017
International Conference on Artificial Intelligence and Statistics (AISTATS-2017)   2016
Conference on Uncertainty in Artificial Intelligence (UAI)   2016

Advisory Committee
arXiv Statistics Advisory Committee Member   2019–

Editorial Board Member
Journal of Machine Learning Research   2020–

Associate Editor
Mathematical Foundations of Computing   2019–

Reviewing for Journals
Latin American Journal of Probability and Mathematical Statistics   2022–
Applied and Computational Harmonic Analysis   2022–
Journal of Complexity   2022–
Annals of Applied Probability   2021–
Journal of the American Statistical Association   2021–
Information and Inference: A Journal of the IMA   2020–
Nature Machine Intelligence   2020–
Transactions on Knowledge and Data Engineering   2020–
Foundations of Data Science   2019–
Foundations of Computational Mathematics   2019–
Electronic Journal of Statistics   2019–
Journal of Multivariate Analysis   2017–
Annals of Statistics   2016–
Machine Learning   2016–
Statistics and Computing   2015–
IEEE Signal Processing Letters   2015–
Statistical Analysis and Data Mining   2014–
IET Computer Vision   2014–
International Journal of Computer Vision   2014–
IEEE Transactions on Information Theory   2013–
Journal of Machine Learning Research   2013–2019
IEEE Transactions on Pattern Analysis and Machine Intelligence   2013–
Progress in Artificial Intelligence   2013–
Entropy   2012–
IEEE Transactions on Neural Networks and Learning Systems   2012–
Signal, Image and Video Processing   2012–
IEEE Transactions on Signal Processing   2009–
Neurocomputing   2009–
IEEE Transactions on Neural Networks   2007–2011

Reviewing Books
Cambridge University Press   2018–

Reviewing for Conferences
IEEE International Symposium on Information Theory (ISIT)   2021
International Conference on Artificial Neural Networks (ICANN)   2019
International Conference on Learning Representations (ICLR-2019)   2018
Conference on Learning Theory (COLT)   2018
International Conference on Learning Representations (ICLR-2018)   2017
Conference on Learning Theory (COLT)   2017
Advances in Neural Information Processing Systems (NIPS)   2017
Advances in Neural Information Processing Systems (NIPS)   2016
International Conference on Machine Learning (ICML)   2016
Advances in Neural Information Processing Systems (NIPS)   2015
Advances in Neural Information Processing Systems (NIPS)   2014
International Conference on Machine Learning (ICML)   2012

International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA)	2012
International Joint Conference on Artificial Intelligence (IJCAI)	2011
International Joint Conference on Neural Networks (IJCNN)	2011
European Conference on Complex Systems (ECCS)	2011
European Signal Processing Conference (EUSIPCO)	2011
European Conference on Complex Systems (ECCS)	2009

Reviewing Workshop Proposals

International Conference on Machine Learning (ICML) Workshops	2019

Reviewing for Workshops

Signal Processing with Adaptive Sparse Structured Representations (SPARS)	2019
Challenges in Machine Learning (CiML) @ N(eur)IPS:	
Machine Learning Competitions "in the Wild": Playing in the Real World or in Real Time	2018
Gaming and Education	2016

Organizing (workshop, conference)

Kernel Methods for Structured Data and Distributions @ DALI	2023
– co-organizer: Alessandro Rudi	
NIPS: 'Learning on Distributions, Functions, Graphs and Groups'	2017
– co-organizers: Bharath K. Sriperumbudur, Florence d'Alché-Buc,	
Krikamol Muandet.	
NIPS: 'Adaptive and Scalable Nonparametric Methods in Machine Learning'	2016
– co-organizers: Aaditya Ramdas, Bharath K. Sriperumbudur, Han Liu,	
John Lafferty, Mladen Kolar, Samory Kpotufe.	
NIPS: 'Modern Nonparametrics 3: Automating the Learning Pipeline'	2014
– co-organizers: Andrew G. Wilson, Arthur Gretton, Eric Xing, Han Liu,	
Le Song, Mladen Kolar, Samory Kpotufe.	
Conference (Workflow Chair)	
International Conference on Artificial Intelligence and Statistics (AISTATS)	2016
– co-workflow chair: Rodolphe Jenatton.	

Session Chair (conference)

International Conference on Artificial Intelligence and Statistics (AISTATS)	2022
Session: Learning Theory / Kernels.	
International Conference on Machine Learning (ICML)	2021
Sessions: Kernel Methods, Learning Theory.	
Conference on Uncertainty in Artificial Intelligence (UAI)	2020
Session: Optimization.	
International Conference on Mathematics of Data Science (MathoDS 3)	2019
International Conference on Machine Learning (ICML)	2018
Session: Statistical Learning Theory.	
Paris Summit on Big Data (ParisBD)	2017

Mentoring Newcomers

3 Newcomers @ ICML	2020

Mentoring Oral Presentations

Rahul Singh (MIT Economics) @ NeurIPS	2019

Reviewing Scientific Competitions

National Scientific Student Competition and Conference	2005, 2013
Scientific Student Competition and Conference	2012

Professional Activities (London School of Economics)

Programme Director
MSc Data Science   2022–

Management Committee
DSI Management Committee   2021–

Organizing (seminar)
Data Science Seminars @ Department of Statistics   2021–
  co-organizer: Francesca Panero.   Sept., 2022–

Organizing (research showcase)
LSE Statistics Research Showcase
  co-organizers: Yunxiao Chen, Tengyao Wang, Erik Baurdoux,   June, 2023
        Penny Montague.
  co-organizers: Fiona Steele, Clifford Lam, Kostas Kardaras,   June 14–15, 2022
        Penny Montague.

Session Chair
Session 3 @ PhD Presentation Event (Dept. of Statistics)   May 13, 2022

Professional Activities (École Polytechnique)

Program Chair @ Data Science Summer School[2]
  co-organizers: Aldjia Mazari, Bertrand Thirion, Emmanuel Gobet, Erwan Le Pennec,   2020
        Jasmyn Scaramella.
  co-organizers: Aldjia Mazari, Anastasiia Nitavskyi, Aurélie Coen, Bertrand Thirion,   2019
        Charlotte Renauld, Elena Carvajal, Emmanuel Bacry.
  co-organizers: Aldjia Mazari, Charlotte Renauld, Emmanuel Bacry, Erwan Scornet,   2018
        Maud Cadiz-Pena, Nozha Boujemaa, Viviane Hoang.
  co-organizers: Aldjia Mazari, Emmanuel Bacry, Éric Moulines, Erwan Scornet.   2017

Organizing (seminar)
Statistics Seminars (CREST-CMAP)   2020–2021
  co-organizers: Cristina Butucea, Alexandre Tsybakov, Karim Lounici.
Machine Learning External Seminars @ CMAP   2017–2021

Organizing (workshop)
StressTest-2020 workshop   Nov. 30–Dec. 1, 2020
  – co-organizers: Stefano De Marco, Emmanuel Gobet.
  – topics: financial stress-testing, uncertainty quantification, risk and
        dependence modelling.

Organizing (journal club, group meeting)
SIMPAS Group Meeting @ CMAP   2020–2021
  – co-organizers: Aymeric Dieuleveut, Emmanuel Gobet, Erwan Le Pennec.
Machine Learning Journal Club @ CMAP   2017–2021

Professional Activities (University College London)

Organizing (seminar)
Machine Learning External Seminars @ Gatsby Unit   2014–2016

Publications

Preprints

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[2]Web: `http://www.ds3-datascience-polytechnique.fr/`.

[1] Linda Chamakh and Zoltán Szabó. Kernel minimum divergence portfolios. Technical report, 2021. (https://arxiv.org/abs/2110.09516).

[2] Alex Lambert[†], Sanjeel Parekh[†], Zoltán Szabó, and Florence d'Alché-Buc. Emotion transfer using vector-valued infinite task learning. Technical report, 2021. ([†]contributed equally; https://arxiv.org/abs/2102.05075).

Referred Journal Articles & Conference Papers

[1] Pierre-Cyril Aubin-Frankowski and Zoltán Szabó. Handling hard affine SDP shape constraints in RKHSs. *Journal of Machine Learning Research*, 23(297):1–54, 2022.

[2] Antonin Schrab, Wittawat Jitkrittum, Zoltán Szabó, Dino Sejdinovic, and Arthur Gretton. Discussion on multiscale Fisher's independence test for multivariate dependence. *Biometrika*, 109(3):597—-603, 2022.

[3] Alex Lambert, Dimitri Bouche, Zoltán Szabó, and Florence d'Alché-Buc. Functional output regression with infimal convolution: Exploring the Huber and ϵ-insensitive losses. In *International Conference on Machine Learning (ICML)*, pages 11844–11867, 2022. (poster presentation; 21.94% acceptance rate).

[4] Pierre-Cyril Aubin-Frankowski and Zoltán Szabó. Hard shape-constrained kernel machines. In *Advances in Neural Information Processing Systems (NeurIPS)*, pages 384–395, Vancouver, Canada, 8-10 December 2020. (poster presentation; 20.1% acceptance rate).

[5] Pierre-Cyril Aubin-Frankowski, Nicolas Petit, and Zoltán Szabó. Kernel regression for vehicle trajectory reconstruction under speed and inter-vehicular distance constraints. In *IFAC World Congress (IFAC WC)*, volume 53, pages 15084–15089, Berlin, Germany, 11-17 July 2020.

[6] Linda Chamakh, Emmanuel Gobet, and Zoltán Szabó. Orlicz random Fourier features. *Journal of Machine Learning Research*, 21(145):1–37, 2020.

[7] Matthieu Lerasle, Zoltán Szabó, Timothée Mathieu, and Guillaume Lecué. MONK – outlier-robust mean embedding estimation by median-of-means. In Kamalika Chaudhuri and Ruslan Salakhutdinov, editors, *International Conference on Machine Learning (ICML)*, pages 3782–3793, Long Beach, California, USA, 9-15 June 2019. PMLR. (full oral presentation; 4.56% acceptance rate).

[8] Zoltán Szabó and Bharath K. Sriperumbudur. On kernel derivative approximation with random Fourier features. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, volume 89, pages 827–836, Naha, Okinawa, Japan, 16-18 April 2019. PMLR. (poster presentation; 32.4% acceptance rate).

[9] Romain Brault[†], Alex Lambert[†], Zoltán Szabó, Maxime Sangnier, and Florence d'Alché-Buc. Infinite-task learning with RKHSs. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, volume 89, pages 1294–1302, Naha, Okinawa, Japan, 16-18 April 2019. PMLR. ([†]contributed equally; poster presentation; 32.4% acceptance rate).

[10] Zoltán Szabó and Bharath K. Sriperumbudur. Characteristic and universal tensor product kernels. *Journal of Machine Learning Research*, 18(233):1–29, 2018.

[11] Wittawat Jitkrittum, Wenkai Xu, Zoltán Szabó, Kenji Fukumizu, and Arthur Gretton. A linear-time kernel goodness-of-fit test. In I. Guyon, U. V. Luxburg, S. Bengio, H. Wallach, R. Fergus, S. Vishwanathan, and R. Garnett, editors, *Advances in Neural Information Processing Systems (NIPS)*, pages 261–270, Long Beach, CA, U.S., 4-9 December 2017. Curran Associates, Inc. (Best Paper Award = in top 3 out of 3240 submissions).

[12] Wittawat Jitkrittum, Zoltán Szabó, and Arthur Gretton. An adaptive test of independence with analytic kernel embeddings. In Doina Precup and Yee Whye Teh, editors, *International Conference*

on *Machine Learning (ICML)*, volume 70, pages 1742–1751, Sydney, Australia, 6-11 August 2017. PMLR. (25.46% acceptance rate).

[13] Zoltán Szabó, Bharath K. Sriperumbudur, Barnabás Póczos, and Arthur Gretton. Learning theory for distribution regression. *Journal of Machine Learning Research*, 17(152):1–40, 2016.

[14] Wittawat Jitkrittum, Zoltán Szabó, Kacper Chwialkowski, and Arthur Gretton. Interpretable distribution features with maximum testing power. In D. D. Lee, M. Sugiyama, U. V. Luxburg, I. Guyon, and R. Garnett, editors, *Advances in Neural Information Processing Systems (NIPS)*, pages 181–189, Barcelona, Spain, 5-10 December 2016. Curran Associates, Inc. (full oral presentation = top 1.84%).

[15] Bharath K. Sriperumbudur and Zoltán Szabó. Optimal rates for random Fourier features. In C. Cortes, N. D. Lawrence, D. D. Lee, M. Sugiyama, and R. Garnett, editors, *Advances in Neural Information Processing Systems (NIPS)*, pages 1144–1152, Montréal, Canada, 7-12 December 2015. Curran Associates, Inc. (contributed equally; spotlight presentation – 3.65% acceptance rate).

[16] Heiko Strathmann, Dino Sejdinovic, Samuel Livingstone, Zoltán Szabó, and Arthur Gretton. Gradient-free Hamiltonian Monte Carlo with efficient kernel exponential families. In C. Cortes, N. D. Lawrence, D. D. Lee, M. Sugiyama, and R. Garnett, editors, *Advances in Neural Information Processing Systems (NIPS)*, pages 955–963, Montréal, Canada, 7-12 December 2015. Curran Associates, Inc. (poster presentation; 17.46% acceptance rate).

[17] Mijung Park, Wittawat Jitkrittum, Ahmad Qamar, Zoltán Szabó, Lars Buesing, and Maneesh Sahani. Bayesian manifold learning: The locally linear latent variable model. In C. Cortes, N. D. Lawrence, D. D. Lee, M. Sugiyama, and R. Garnett, editors, *Advances in Neural Information Processing Systems (NIPS)*, pages 154–162, Montréal, Canada, 7-12 December 2015. Curran Associates, Inc. (poster presentation; 17.46% acceptance rate).

[18] Wittawat Jitkrittum, Arthur Gretton, Nicolas Heess, Ali Eslami, Balaji Lakshminarayanan, Dino Sejdinovic, and Zoltán Szabó. Kernel-based just-in-time learning for passing expectation propagation messages. In *Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 405–414, Amsterdam, Netherlands, 12-16 July 2015. (34% acceptance rate).

[19] Zoltán Szabó, Arthur Gretton, Barnabás Póczos, and Bharath K. Sriperumbudur. Two-stage sampled learning theory on distributions. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, pages 948–957, San Diego, California, USA, 9-12 May 2015. (oral presentation; 6.11% acceptance rate).

[20] Balázs Pintér, Gyula Vörös, Zoltán Szabó, and András Lőrincz. Wikifying novel words to mixtures of Wikipedia senses by structured sparse coding. In Ana Fred and Maria De Marsico, editors, *Pattern Recognition Applications and Methods*, volume 318 of *Advances in Intelligent and Soft Computing*, pages 241–255. Springer, 2015.

[21] Zoltán Szabó. Information theoretical estimators toolbox. *Journal of Machine Learning Research*, 15:283–287, 2014.

[22] László Jeni, András Lőrincz, Zoltán Szabó, Jeffrey F. Cohn, and Takeo Kanade. Spatio-temporal event classification using time-series kernel based structured sparsity. In David Fleet, Tomas Pajdla, Bernt Schiele, and Tinne Tuytelaars, editors, *European Conference on Computer Vision (ECCV)*, volume 8692 of *Lecture Notes in Computer Science*, pages 135–150, Zürich, Switzerland, 6-12 September 2014. Springer International Publishing Switzerland. (27.9% acceptance rate).

[23] Balázs Pintér, Gyula Vörös, Zoltán Szabó, and András Lőrincz. Explaining unintelligible words by means of their context. In *International Conference on Pattern Recognition Applications and Methods (ICPRAM)*, pages 382–387, Barcelona, Spain, 15-18 February 2013.

[24] Balázs Pintér, Gyula Vörös, Zsolt Palotai, Zoltán Szabó, and András Lőrincz. Determining unintelligible words from their textual contexts. *Procedia - Social and Behavioral Sciences*, 73:101–108, 2013. (Proceedings of the 2nd International Conference on Integrated Information (IC-ININFO 2012), Budapest, Hungary, 30 August – 3 September).

[25] Zoltán Szabó and András Lőrincz. Distributed high dimensional information theoretical image registration via random projections. *Digital Signal Processing*, 22(6):894–902, 2012.

[26] László A. Jeni, András Lőrincz, Tamás Nagy, Zsolt Palotai, Judit Sebők, Zoltán Szabó, and Dániel Takács. 3D shape estimation in video sequences provides high precision evaluation of facial expressions. *Image and Vision Computing*, 30(10):785–795, 2012.

[27] Balázs Pintér, Gyula Vörös, Zoltán Szabó, and András Lőrincz. Automated word puzzle generation using topic models and semantic relatedness measures. *Annales Universitatis Scientiarum Budapestinensis de Rolando Eötvös Nominatae, Sectio Computatorica*, 36:299–322, 2012.

[28] Zoltán Szabó, Barnabás Póczos, and András Lőrincz. Collaborative filtering via group-structured dictionary learning. In Fabian Theis, Andrzej Cichocki, Arie Yeredor, and Michael Zibulevsky, editors, *International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA)*, volume 7191 of *Lecture Notes in Computer Science*, pages 247–254, Tel-Aviv, Israel, 12-15 March 2012. Springer-Verlag, Berlin Heidelberg.

[29] Zoltán Szabó, Barnabás Póczos, and András Lőrincz. Separation theorem for independent subspace analysis and its consequences. *Pattern Recognition*, 45(4):1782–1791, 2012.

[30] Barnabás Póczos, Zoltán Szabó, and Jeff Schneider. Nonparametric divergence estimators for independent subspace analysis. In *European Signal Processing Conference (EUSIPCO) – Special Session on Dependent Component Analysis*, pages 1849–1853, Barcelona, Spain, 29 August – 2 September 2011. (ISSN: 2076-1465).

[31] Zoltán Szabó and Barnabás Póczos. Nonparametric independent process analysis. In *European Signal Processing Conference (EUSIPCO)*, pages 1718–1722, Barcelona, Spain, 29 August – 2 September 2011. (ISSN: 2076-1465).

[32] Zoltán Szabó, Barnabás Póczos, and András Lőrincz. Online group-structured dictionary learning. In *IEEE Computer Vision and Pattern Recognition (CVPR)*, pages 2865–2872, Colorado Springs, CO, USA, 20-25 June 2011.

[33] Zoltán Szabó. Autoregressive independent process analysis with missing observations. In Michel Verleysen, editor, *European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN)*, pages 159–164. d-side, 28-30 April 2010. (ISBN 2-930307-10-2).

[34] Zoltán Szabó, Barnabás Póczos, and András Lőrincz. Auto-regressive independent process analysis without combinatorial efforts. *Pattern Analysis and Applications*, 13(1):1–13, February 2010.

[35] Zoltán Szabó and András Lőrincz. Complex independent process analysis. *Acta Cybernetica*, 19:177–190, 2009.

[36] Zoltán Szabó and András Lőrincz. Controlled complete ARMA independent process analysis. In *International Joint Conference on Neural Networks (IJCNN)*, pages 3038–3045, 14-19 June 2009. (IEEE Catalog Number: CFP09IJS-CDR; ISBN: 978-1-4244-3553-1; ISSN: 1098-7576).

[37] Zoltán Szabó and András Lőrincz. Fast parallel estimation of high dimensional information theoretical quantities with low dimensional random projection ensembles. In Tülay Adali, Christian Jutten, João Marcos T. Romano, and Allan Kardec Barros, editors, *International Conference on Independent Component Analysis and Signal Separation (ICA)*, volume 5441 of *Lecture Notes in Computer Science*, pages 146–153, Berlin Heidelberg, 15-18 March 2009. Springer-Verlag.

[38] Zoltán Szabó. Complete blind subspace deconvolution. In Tülay Adali, Christian Jutten, João Marcos T. Romano, and Allan Kardec Barros, editors, *International Conference on Independent Component Analysis and Signal Separation (ICA)*, volume 5441 of *Lecture Notes in Computer Science*, pages 138–145, Berlin Heidelberg, 15-18 March 2009. Springer-Verlag.

[39] Zoltán Szabó, Barnabás Póczos, and András Lőrincz. Undercomplete blind subspace deconvolution via linear prediction. In Joost N. Kok, Jacek Koronacki, Ramon Lopez de Mantaras, Stan Matwin, Dunja Mladenič, and Andrzej Skowron, editors, *European Conference on Machine Learning (ECML)*, volume 4701 of *Lecture Notes in Artificial Intelligence*, pages 740–747, Berlin Heidelberg, 17-21 September 2007. Springer-Verlag.

[40] Zoltán Szabó, Barnabás Póczos, Gábor Szirtes, and András Lőrincz. Post nonlinear independent subspace analysis. In Joaquim Marques de Sá, Luís A. Alexandre, Wlodzislaw Duch, and Danilo P. Mandic, editors, *International Conference on Artificial Neural Networks (ICANN)*, volume 4668 of *Lecture Notes in Computer Science - Part I*, pages 677–686, Berlin Heidelberg, 9-13 September 2007. Springer-Verlag.

[41] Barnabás Póczos, Zoltán Szabó, Melinda Kiszlinger, and András Lőrincz. Independent process analysis without a priori dimensional information. In Mike E. Davies, Christopher J. James, Samer A. Abdallah, and Mark D. Plumbley, editors, *International Conference on Independent Component Analysis and Signal Separation (ICA)*, volume 4666 of *Lecture Notes in Computer Science*, pages 252–259, Berlin Heidelberg, 9-12 September 2007. Springer-Verlag.

[42] Zoltán Szabó, Barnabás Póczos, and András Lőrincz. Undercomplete blind subspace deconvolution. *Journal of Machine Learning Research*, 8:1063–1095, 2007.

[43] András Lőrincz and Zoltán Szabó. Neurally plausible, non-combinatorial iterative independent process analysis. *Neurocomputing - Letters*, 70(7-9):1569–1573, 2007.

[44] Zoltán Szabó and András Lőrincz. Independent subspace analysis can cope with the „curse of dimensionality". *Acta Cybernetica*, 18:213–221, 2007.

[45] Zoltán Szabó and András Lőrincz. Multilayer kerceptron. *Journal of Applied Mathematics*, 24:209–222, 2007.

[46] Zoltán Szabó, Barnabás Póczos, and András Lőrincz. Cross-entropy optimization for independent process analysis. In Justinian Rosca, Deniz Erdogmus, José C. Príncipe, and Simon Haykin, editors, *International Conference on Independent Component Analysis and Blind Source Separation (ICA)*, volume 3889 of *Lecture Notes in Computer Science*, pages 909–916. Springer, 5-8 March 2006.

[47] Zoltán Szabó and András Lőrincz. ϵ-sparse representations: Generalized sparse approximation and the equivalent family of SVM tasks. *Acta Cybernetica*, 17(3):605–614, 2006.

[48] György Hévízi, Mihály Biczó, Barnabás Póczos, Zoltán Szabó, Bálint Takács, and András Lőrincz. Hidden markov model finds behavioral patterns of users working with a headmouse driven writing tool. In *International Joint Conference on Neural Networks (IJCNN)*, 26-29 July 2004. (IJCNN2004 CD-ROM Conference Proceedings, Paper No. 1268. IEEE Catalog Number: 04CH37541C, ISBN: 0-7803-8360-5).

Unreferred Conference, Workshop and Symposium Papers

[1] Alex Lambert, Sanjeel Parekh, Zoltán Szabó, and Florence d'Alché-Buc. Continuous emotion transfer using kernels. In *Advances in Neural Information Processing Systems (NeurIPS): Workshop on Controllable Generative Modeling in Language and Vision (CtrlGen)*, 13 December 2021. (acceptance rate < 50%).

[2] Pierre-Cyril Aubin-Frankowski and Zoltán Szabó. Hard shape-constrained kernel regression. In *SMAI-MODE*, 7-9 September 2020.

[3] Pierre-Cyril Aubin-Frankowski and Zoltán Szabó. Hard shape-constrained kernel regression. In *Joint Structures and Common Foundations of Statistical Physics, Information Geometry and Inference for Learning (SPIGL)*, 27-31 July 2020.

[4] Matthieu Lerasle, Zoltán Szabó, Timothée Mathieu, and Guillaume Lecué. Median-of-means for outlier-robust MMD estimation. In *Workshop on Data, Learning and Inference (DALI)*, San Sebastian, Spain, 2-5 September 2019.

[5] Romain Brault[†], Alex Lambert[†], Zoltán Szabó, Maxime Sangnier, and Florence d'Alché-Buc. Infinite task learning in RKHSs. In *Conference on Machine Learning (CAp)*, Toulouse, France, 3-5 July 2019. ([†]contributed equally).

[6] Alex Lambert[†], Romain Brault[†], Zoltán Szabó, Maxime Sangnier, and Florence d'Alché-Buc. A functional extension of multi-output learning. In *International Conference on Machine Learning (ICML): Adaptive & Multitask Learning (AMTL)*, Long Beach, CA, U.S., 15 June 2019. ([†]contributed equally).

[7] Romain Brault[†], Alex Lambert[†], Zoltán Szabó, Maxime Sangnier, and Florence d'Alché-Buc. Infinite task learning. In *PASADENA Workshop*, Paris, France, 15 February 2019. ([†]contributed equally).

[8] Zoltán Szabó and Bharath K. Sriperumbudur. Random Fourier features on kernel derivatives. In *Data Learning and Inference (DALI)*, George, South Africa, 3-5 January 2019.

[9] Zoltán Szabó and Bharath K. Sriperumbudur. Independence via cross-covariance operators. In *Polish-Italian Mathematical Conference: Challenges and Methods of Modern Statistics*, Wroclaw, Poland, 17-20 September 2018.

[10] Alex Lambert, Romain Brault, Zoltán Szabó, Maxime Sangnier, and Florence d'Alché-Buc. Infinite-task learning with vector-valued reproducing kernel Hilbert spaces. In *Junior Conference on Data Science and Engineering (JDSE)*, 13-14 September 2018.

[11] Zoltán Szabó and Bharath K. Sriperumbudur. Characteristic tensor product kernels. In *Conference of the International Society for Non-Parametric Statistics (ISNPS)*, Salerno, Italy, 11-15 June 2018.

[12] Bharath K. Sriperumbudur and Zoltán Szabó. Kernel dependency measures. In *Conference of the International Society for Non-Parametric Statistics (ISNPS)*, Salerno, Italy, 11-15 June 2018.

[13] Matthieu Lerasle, Zoltán Szabó, Éric Moulines, Guillaume Lecué, Sidonie Lefebvre, and Gaspar Massiot. MOM-based robust nonlinear anomaly detection for multispectral and hyperspectral data. In *50émes Journées de Statistique (JdS)*, Palaiseau, France, 28 May – 1 June 2018.

[14] Zoltán Szabó and Bharath K. Sriperumbudur. Tensor product kernels: Characteristic property, universality. In *Hangzhou International Conference on Frontiers of Data Science*, Hangzhou, China, 18-20 May 2018.

[15] Zoltán Szabó and Bharath K. Sriperumbudur. HSIC, a measure of statistical independence? In *Workshop on Data, Learning and Inference (DALI)*, Lanzarote, Canary Islands, Spain, 3-5 April 2018.

[16] Wittawat Jitkrittum, Wenkai Xu, Zoltán Szabó, Kenji Fukumizu, and Arthur Gretton. A linear-time kernel goodness-of-fit test. In *Workshop on Functional Inference and Machine Intelligence*, Tokyo, Japan, 19-21 February 2018.

[17] Wittawat Jitkrittum, Zoltán Szabó, Kenji Fukumizu, and Arthur Gretton. A fast goodness-of-fit test with analytic kernel embeddings. In *Greek Stochastics Workshop – Model Determination*, Milos, Greece, 14-17 July 2017.

[18] Wittawat Jitkrittum, Zoltán Szabó, and Arthur Gretton. The finite-set independence criterion. In *UCL Workshop on the Theory of Big Data*, London, UK, 28 June 2017.

[19] Zoltán Szabó and Éric Moulines. Locally-adaptive kernel tests. In *Workshop on Data, Learning and Inference (DALI)*, Tenerife, Spain, 17-20 April 2017.

[20] Wittawat Jitkrittum, Zoltán Szabó, and Arthur Gretton. An adaptive test of independence with analytic kernel embeddings. In *Probabilistic Graphical Model Workshop*, Tokyo, Japan, 24 February 2017.

[21] Heiko Strathmann, Dino Sejdinovic, Samuel Livingstone, Ingmar Schuster, Maria Lomeli Garcia, Zoltán Szabó, Christophe Andrieu, and Arthur Gretton. Kernel techniques for adaptive Monte Carlo methods. In *Greek Stochastics Workshop on Big Data and Big Models*, Tinos, Greece, 10-13 July 2016.

[22] Wittawat Jitkrittum, Zoltán Szabó, Kacper Chwialkowski, and Arthur Gretton. Distinguishing distributions with interpretable features. In *International Conference on Machine Learning (ICML): Data-Efficient Machine Learning workshop*, New York, 24 June 2016.

[23] Zoltán Szabó, Bharath K. Sriperumbudur, Barnabás Póczos, and Arthur Gretton. Minimax-optimal distribution regression. In *Conference of the International Society for Non-Parametric Statistics (ISNPS)*, Avignon, France, 11-16 June 2016.

[24] Bharath K. Sriperumbudur and Zoltán Szabó. Optimal uniform and L^p rates for random Fourier features. In *Theory of Big Data Workshop*, London, UK, 6-8 January 2016. (contributed equally).

[25] Bharath K. Sriperumbudur and Zoltán Szabó. Optimal uniform and L^p rates for random Fourier features. Quinquennial Review Symposium of the Gatsby Unit, 23 September 2015. (contributed equally).

[26] Mijung Park, Wittawat Jitkrittum, Ahmad Qamar, Zoltán Szabó, Lars Buesing, and Maneesh Sahani. Bayesian manifold learning: Locally linear latent variable model (LL-LVM). Quinquennial Review Symposium of the Gatsby Unit, 23 September 2015.

[27] Wittawat Jitkrittum, Arthur Gretton, Nicolas Heess, Ali Eslami, Balaji Lakshminarayanan, Dino Sejdinovic, and Zoltán Szabó. Just-in-time kernel regression for expectation propagation. In *International Conference on Machine Learning (ICML) – Large-Scale Kernel Learning: Challenges and New Opportunities workshop*, Lille, France, 10-11 July 2015.

[28] Zoltán Szabó, Bharath K. Sriperumbudur, Barnabás Póczos, and Arthur Gretton. Distribution regression - make it simple and consistent. In *Workshop on Data, Learning and Inference (DALI)*, La Palma, Canaries, Spain, 10-12 April 2015.

[29] Wittawat Jitkrittum, Arthur Gretton, Nicolas Heess, Ali Eslami, Balaji Lakshminarayanan, Dino Sejdinovic, and Zoltán Szabó. Kernel-based just-in-time learning for passing expectation propagation messages. In *Workshop on Data, Learning and Inference (DALI)*, La Palma, Canaries, Spain, 10-12 April 2015.

[30] Zoltán Szabó, Arthur Gretton, Barnabás Póczos, and Bharath K. Sriperumbudur. Consistent vector-valued distribution regression. In *UCL Workshop on the Theory of Big Data*, London, UK, 7-9 January 2015.

[31] Zoltán Szabó, Arthur Gretton, Barnabás Póczos, and Bharath K. Sriperumbudur. Simple consistent distribution regression on compact metric domains. In *UCL-Duke Workshop on Sensing and Analysis of High-Dimensional Data (SAHD)*, London, UK, 4-5 September 2014.

[32] Zoltán Szabó, Arthur Gretton, Barnabás Póczos, and Bharath K. Sriperumbudur. Learning on distributions. In *Kernel methods for big data workshop*, Lille, France, 2 April 2014.

[33] Zoltán Szabó. Information theoretical estimators toolbox. In *Advances in Neural Information Processing Systems (NIPS) – Workshop on Machine Learning Open Source Software 2013: Towards Open Workflows*, Harrahs and Harveys, Lake Tahoe, Nevada, United States, 10 December 2013.

[34] András Lőrincz, László A. Jeni, Zoltán Szabó, Jeffrey Cohn, and Takeo Kanade. Emotional expression classification using time-series kernels. In *IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPRW): IEEE International Workshop on Analysis and Modeling of Faces and Gestures (AMFG)*, pages 889–895, Portland, Oregon, USA, 23-28 June 2013.

[35] Balázs Pintér, Gyula Vörös, Zoltán Szabó, and András Lőrincz. Automated word puzzle generation via topic dictionaries. In *International Conference on Machine Learning (ICML) – Sparsity, Dictionaries and Projections in Machine Learning and Signal Processing workshop*, Edinburgh, Scotland, 30 June 2012.

[36] Balázs Pintér, Gyula Vörös, Zoltán Szabó, and András Lőrincz. Automated word puzzle generation using topic models and semantic relatedness measures. In Zoltán Csörnyei, editor, *Joint Conference on Mathematics and Computer Science (MaCS)*, Siófok, Hungary, 9-12 February 2012.

[37] Zoltán Szabó, Barnabás Póczos, and András Lőrincz. Online dictionary learning with group structure inducing norms. In *International Conference on Machine Learning (ICML) – Structured Sparsity: Learning and Inference workshop*, Bellevue, Washington, USA, 2 July 2011.

[38] Zoltán Szabó. Independent subspace analysis in case of missing observations. In *Symposium of Intelligent Systems*, 20 November 2009.

[39] Zoltán Szabó and András Lőrincz. Towards independent subspace analysis in controlled dynamical systems. In *ICA Research Network International Workshop (ICARN)*, pages 9–12, 25-26 September 2008.

[40] Zoltán Szabó and András Lőrincz. Post nonlinear hidden infomax identification. In *Joint Conference of Hungarian PhD students*, pages 52–58, 2008.

[41] Zoltán Szabó and András Lőrincz. Real and complex independent subspace analysis by generalized variance. In *ICA Research Network International Workshop (ICARN)*, pages 85–88, 18-19 September 2006.

Habilitation

[1] Zoltán Szabó. Contributions to kernel techniques, 2019. (HDR, with distinction).

Patent

[1] Zoltán Szabó, László Jeni, and Dániel Takács. Method and apparatus with deformable model fitting using high-precision approximation. European Patent (EP2672425A1), 2013.

Theses

[1] Zoltán Szabó. *Group-Structured and Independent Subspace Based Dictionary Learning*. PhD thesis, Eötvös Loránd University, Budapest, 2012. (PhD in Applied Mathematics).

[2] Zoltán Szabó. *Separation Principles in Independent Process Analysis*. PhD thesis, Eötvös Loránd University, Budapest, 2009. (PhD in Computer Science).

[3] Zoltán Szabó. Retina based sampling in face component recognition. Master's thesis, Eötvös Loránd University, Budapest, 2003.

Technical Reports (–2011)

[1] András Lőrincz, Viktor Gyenes, Zsolt Palotai, Balázs Pintér, Zoltán Szabó, and Gyula Vörös. Innovation engine for blogspaces (EOARD - US Air Force Research Laboratories). Technical report,

Eötvös Loránd University, Budapest, 2011.
(`http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA550367`).

[2] Zoltán Szabó. Towards nonstationary, nonparametric independent process analysis with unknown source component dimensions. Technical report, Eötvös Loránd University, Budapest, 2010. (`http://arxiv.org/abs/1008.1393`).

[3] Zoltán Szabó, Barnabás Póczos, and András Lőrincz. Separation theorem for $\mathbb{K}$-independent subspace analysis with sufficient conditions. Technical report, Eötvös Loránd University, Budapest, 2006. (`http://arxiv.org/abs/math.ST/0608100`).

[4] Zoltán Szabó, Barnabás Póczos, and András Lőrincz. Separation theorem for independent subspace analysis with sufficient conditions. Technical report, Eötvös Loránd University, Budapest, 2006. (`http://arxiv.org/abs/math.ST/0603535`).

[5] Zoltán Szabó, Barnabás Póczos, and András Lőrincz. Separation theorem for independent subspace analysis. Technical report, Eötvös Loránd University, Budapest, 2005. (`https://zoltansz.github.io/publications/szabo05separation_TR.pdf`).

[6] Zoltán Szabó and András Lőrincz. L_1 regularization is better than L_2 for learning and predicting chaotic systems. Technical report, Eötvös Loránd University, Budapest, 2004. (`http://arxiv.org/abs/cs/0410015`).

INVITED TALKS & POSTERS

[1] Kernel machines with shape constraints. PhD Open Day, Department of Statistics, LSE, poster, 28 November 2022.

[2] Support vector machines with hard shape constraints. Combinatorics, Game Theory, and Optimisation (CGO) Seminar, Department of Mathematics, LSE, presentation, 29 September 2022.

[3] Shape-constrained kernel machines. Data Science Research Lightning Talks event, Data Science Institute, LSE, presentation (3 minutes), 21 September 2022.

[4] Kernel machines with shape constraints. BIRS workshop on New Interfaces of Stochastic Analysis and Rough Paths, presentation (25 minutes), 8 September 2022.

[5] When shape constraints meet kernel machines. International Conference on Econometrics and Statistics (EcoSta): Recent Advances in Machine Learning session, presentation (25 minutes), 4 June 2022.

[6] Tensor product kernels for independence. DataSig Seminar, Mathematical Institute, University of Oxford, presentation (45 minutes), 26 May 2022.

[7] When kernel machines meet shape constraints. Machine Learning External Seminar at the Gatsby Unit, UCL, presentation (50 minutes), 26 January 2022.

[8] Continuous emotion transfer using RKHSs. Lifting Inference with Kernel Embeddings winter school and workshop (LIKE22; Bern, Switzerland), presentation (45 minutes), 12 January 2022.

[9] Vector-valued infinite task learning in style transfer. CMStatistics, Advanced Statistical Methods for High Dimensional Data session, presentation (25 minutes), 19 December 2021.

[10] Information theory, kernels & applications. Research Showcase at Data Science Institute, LSE, presentation (5 minutes), 13 December 2021.

[11] Shape constraints meet kernel machines. Data Science Seminar at Eurecom, presentation (50 minutes), 4 November 2021.

[12] Distribution regression and beyond. LSE Statistics Open House, presentation (20 minutes), 14 October 2021.

[13] Applications of kernel-based information theoretical measures. LSE Statistics Open House, presentation (15 minutes), 14 October 2021.

[14] Kernel regression with hard shape constraints. Workshop on Advances in Convex Optimization (EUROPT), presentation (25 minutes), 8 July 2021.

[15] Vector-valued prediction with RKHSs and hard shape constraints. Computer Science and Systems Laboratory, Aix-Marseille University, presentation (1 hour), 20 May 2021.

[16] Information theory, kernels and applications. Department of Statistics, LSE, presentation (50 minutes), 4 March 2021.

[17] Shape-constrained kernel machines. Department of Statistics, Texas A&M University, presentation (1 hour), 12 February 2021.

[18] Kernel machines with hard shape constraints. Meeting on Mathematical Statistics (MMS): Robustness and Computational Efficiency of Algorithms in Statistical Learning, presentation (40 minutes), 15 December 2020.

[19] Kernel information theory and finance. D. E. Shaw Group, New York, U.S., presentation (30 minutes), 21 January 2020.

[20] Towards large-scale approximation of tasks with derivatives – a kernel perspective. International Conference on Modern Mathematical Methods and High Performance Computing in Science & Technology (M3HPCST), Ghaziabad, India, presentation (30 minutes), 9-11 January 2020.

[21] Orlicz Fourier features. International Indian Statistical Association Conference (IISA), IIT Bombay, India, presentation (20 minutes), 26-30 December 2019.

[22] Consistency of Orlicz random Fourier features. EPFL, presentation (45 minutes), 23 September 2019.

[23] Orlicz random Fourier features. Gatsby 21st Birthday Symposium, London, UK, presentation (20 minutes), 11-13 July 2019.

[24] Outlier-robust divergence estimation on kernel-endowed domains with median of means. Third International Conference on Mathematics of Data Science (MathoDS 3), City University of Hong Kong (CityU), Hong Kong, China, presentation (30 minutes), 19-23 June 2019.

[25] Towards outlier-robust statistical inference on kernel-enriched domains. RIKEN AIP Workshop, Tokyo, Japan, presentation (30 minutes), 15 April 2019.

[26] From distance covariance to Hilbert-Schmidt independence criterion. Statistical Seminar in Rennes, presentation (1 hour), 26 October 2018.

[27] HSIC, a measure of independence? Laboratory for Information and Inference Systems (LIONS), EPFL, presentation (40 minutes), 28 February 2018.

[28] HSIC, an independence measure? Machine Learning & Computational Biology Lab, Department of Biosystems Science and Engineering (D-BSSE), ETH Zürich, presentation (1 hour), 26 February 2018.

[29] Linear-time divergence measures with applications in hypothesis testing. Tao Seminar, INRIA Saclay, presentation (45 minutes), 13 February 2018.

[30] Characterizing independence with tensor product kernels. Department of Statistics, Pennsylvania State University, presentation (1 hour), 13 December 2017.

[31] Tensor product kernels: Independence and beyond. Google Brain, Mountain View, presentation (1 hour), 1 December 2017.

[32] Tensor product kernels: Characteristic property and beyond. Advanced Methods Group, Cubist Systematic Strategies, New York, presentation (90 minutes), 28 November 2017.

[33] Independence with tensor product kernels. Yahoo Research, New York, presentation (1 hour), 28 November 2017.

[34] Tensor product kernels: Characteristic property and universality. Research Seminar, SfS, ETH Zürich, presentation (45 minutes), 3 November 2017.

[35] Characteristic tensor kernels. CREST Statistics Seminar, ENSAE, presentation (75 minutes), 9 October 2017.

[36] Data-efficient independence testing with analytic kernel embeddings. PASADENA Seminar, Télécom ParisTech, presentation (1 hour), 17 May 2017.

[37] Distribution regression: A simple technique with minimax-optimal guarantee. Parisian Statistics Seminar, Henri Poincaré Institute, presentation (1 hour), 27 March 2017.

[38] A linear-time adaptive nonparametric two-sample test. Signal Processing and Machine Learning Seminar, Marseilles, presentation (1 hour), 24 March 2017.

[39] Minimax-optimal distribution regression. Probability and Statistics Seminar, Orsay, presentation (1 hour), 16 March 2017.

[40] T-testing: A linear-time adaptive nonparametric technique. Machine Learning Seminar, Télécom ParisTech, presentation (1 hour), 2 February 2017.

[41] Distribution regression. New Directions for Learning with Kernels and Gaussian Processes Dagstuhl Seminar, presentation (30 minutes), 1 December 2016.

[42] Adaptive linear-time nonparametric t-test. Facebook AI Research, Paris, France, presentation (45 minutes), 21 November 2016.

[43] Distinguishing distributions with maximum testing power. Realeyes, Budapest, Hungary, presentation (1 hour), 24 August 2016.

[44] Optimal regression on sets. eResearch Domain launch event, London, UK, poster, 29 June 2016.

[45] Hypothesis testing with kernels. International Workshop on Pattern Recognition in Neuroimaging (PRNI), Trento, Italy, presentation (1 hour), 22-24 June 2016.

[46] Kernel-based learning on probability distributions. University of California, San Diego, presentation (30 minutes), 25 April 2016.

[47] Distribution regression with minimax-optimal guarantee. MASCOT-NUM, presentation (45 minutes), 25 March 2016.

[48] Performance guarantees for kernel-based learning on probability distributions. Special Symposium on Intelligent Systems, MPI, Tübingen, presentation (20 minutes), 16 March 2016.

[49] Optimal rates for the random Fourier feature technique. École Polytechnique, presentation (2 hours), 14 March 2016.

[50] Learning theory for vector-valued distribution regression. CMStatistics 2015, presentation (35 minutes), 12 December 2015.

[51] Optimal uniform and L^p rates for random Fourier features. Pennsylvania State University, presentation (1 hour), 4 December 2015.

[52] Optimal rates for the random Fourier feature method. Statistical ML Reading Group, Carnegie Mellon University, presentation (1 hour), 1 December 2015.

[53] Distribution regression: Computational and statistical tradeoffs. ML Lunch Seminar, Carnegie Mellon University, presentation (50 minutes), 30 November 2015.

[54] Distribution regression: Computational and statistical tradeoffs. Princeton University, presentation (1 hour), 26 November 2015.

[55] Optimal rates for random Fourier feature approximations. University of Alberta, presentation (1 hour), 24 November 2015.

[56] Optimal rates for random Fourier feature kernel approximations. AMPLab, UC Berkeley, presentation (1 hour), 20 November 2015.

[57] Performance guarantees for random Fourier features - limitations and merits. Neil Lawrence's lab, University of Sheffield, presentation (1 hour), 25 June 2015.

[58] Regression on probability measures: A simple and consistent algorithm. Centre for Research in Statistical Methodology Seminars, Department of Statistics, University of Warwick, presentation (1 hour), 29 May 2015.

[59] Vector-valued distribution regression - keep it simple and consistent. Computational Statistics and Machine Learning reading group, Department of Statistics, University of Oxford, presentation (50 minutes), 1 May 2015.

[60] A simple and consistent technique for vector-valued distribution regression. Artificial Intelligence and Natural Computation seminars, University of Birmingham, presentation (50 minutes), 26 January 2015.

[61] Consistent vector-valued regression on probability measures. Bernhard Schölkopf's Lab, MPI for Intelligent Systems, Tübingen, presentation (1 hour), 15 January 2015.

[62] Vector-valued distribution regression: A simple and consistent approach. Statistical Science Seminars, UCL, presentation (1 hour), 9 October 2014.

[63] Distribution regression - the set kernel heuristic is consistent. CSML Lunch Talk Series, UCL, presentation (1 hour), 2 May 2014.

[64] Consistent distribution regression via mean embedding. University of Hertfordshire, presentation (1 hour), 5 March 2014.

[65] Dictionary learning: Independence, structured sparsity and beyond. Gatsby Unit, UCL, presentation (45 minutes), 23 April 2013.

[66] Dictionary optimization problems and their applications. Eötvös Loránd University, Day of Science, presentation (40 minutes), 22 November 2012.

[67] Recommender systems, applications in education. Child's Play with Adult's Mind, Conference, Budapest University of Technology and Economics, presentation (20 minutes), 22 March 2012.

[68] Collaborative filtering via group-structured dictionary learning. Eötvös Loránd University, Innovation Day, poster, 23 February 2012.

[69] Beyond independent subspace analysis. INRIA, SIERRA project-team, presentation (90 minutes), 17 January 2012.

[70] Hedging with Lasso. Morgan Stanley, presentation (25 minutes), 9 September 2011.

[71] Interpreting natural language: applications of group-structured dictionary learning. Eötvös Loránd University, Faculty of Informatics, Neumann's Day, poster, 12 May 2011.

[72] Interpreting words: an application of (structured) sparse coding. Eötvös Loránd University, Faculty of Informatics, Neumann's Day, poster, 12 May 2011.

[73] Online group-structured dictionary learning. Eötvös Loránd University, Faculty of Informatics, Neumann's Day, poster, 12 May 2011.

[74] Structured sparsity and non-convex sparsity-inducing methods. Morgan Stanley, presentation (25 minutes), 9 May 2011.

[75] Online group-structured dictionary learning. Eötvös Loránd University, TÁMOP Research Seminar, presentation (45 minutes), 28 January 2011.

[76] Online group-structured dictionary learning. Machine Learning at Budapest, presentation (45 minutes), 22 November 2010.

[77] Online structured dictionary learning and its applications. Eötvös Loránd University, Problem Solving Seminar for Applied Mathematicians, presentation (45 minutes), 5 November 2010.

[78] Nonparametric regression, Lasso. Eötvös Loránd University, Problem Solving Seminar for Applied Mathematicians, presentation (45 minutes), 12 November 2009.

[79] Analysis and prediction of time series with missing data. Morgan Stanley, Speaker Series Event, presentation (30 minutes), 9 October 2009.

[80] Analysis and prediction of time series with missing data. Morgan Stanley - BME Financial Innovation Centre Kick-off & Workshop, presentation (25 minutes), 15 June 2009.

[81] Independent subspace analysis; tensor-SVD, tensorfaces; blind subspace deconvolution. Eötvös Loránd University, Problem Solving Seminar for Applied Mathematicians, presentation (45 minutes), 19 October 2007.

[82] Exploration of behavioral patterns and its applications in human-computer interaction. Info Savaria, Szombathely, presentation (30 minutes), 14-16 April 2005.

[83] Recognition of behavioral patterns and its potentials of human-computer interaction. Info ÉRA, Békéscsaba, presentation (30 minutes), 14-16 April 2004.

[84] Adaptive human-computer interaction via face and gaze tracking. Eötvös Loránd University, Faculty of Informatics, Neumann's Day, presentation (20 minutes), 6 November 2003.

SOFTWARE

https://zoltansz.github.io/software.html

LECTURING (**G**–GRADUATE, **U**–UNDERGRADUTE)

LSE (UK)

Graph Data Analytics and Representation Learning (**g**).	Spring, 2023
Artificial Intelligence (**g**)	Autumn, 2022
– practical sessions: Francesca Panero, Marcos Barreto.	
Artificial Intelligence (**g**)	Autumn, 2021
– ca. 25 students,	
– practical sessions: Marcos Barreto.	

École Polytechnique (France)

Independence Measures and Testing (**g**)	Spring, 2021

    – mini-course (4 hours).

Structured Data: Learning, Prediction, Dependency, Testing (**g**, M2 MDA)	Spring, 2019

    – ca. 60 students,
    – with Prof. Florence d'Alché-Buc, Prof. Slim Essid.

Advanced Machine Learning (**g**, X-HEC)	Spring, 2019

    – ca. 60 students,
    – with Prof. Stéphane Canu, Prof. Erwan Le Pennec, Thomas Kerdeux,
    – tutoring: Jaouad Mourtada, Nicolas Prost.

Statistics (**g**, X-HEC)	Fall, 2018

    – ca. 60 students,
    – with Prof. Stéphanie Allassoniére, Prof. Elodie Vernet, Geneviéve Robin, Wei Jiang.

Introduction to Machine Learning (**g**, X-HEC)	Fall, 2018

    – ca. 60 students,
    – with Prof. Julie Josse, Prof. Erwan Scornet, Prof. Sylvain Le Corff, Florian Bourgey.

Structured Data: Learning, Prediction, Dependency, Testing (**g**, M2 MDA)	Spring, 2018

    – ca. 70 students,
    – with Prof. Florence d'Alché-Buc, Prof. Slim Essid, Prof. Arthur Tenenhaus,
        Alexandre Garcia (Datalab).

Advanced Machine Learning (**g**, X-HEC)	Spring, 2018

    – ca. 60 students,
    – with Prof. Stéphane Canu, Prof. Erwan Le Pennec, Anne Auger.

Structured Data: Learning, Prediction, Dependency, Testing (**g**, M2 MDA)	Spring, 2017

    – ca. 95 students,
    – with Prof. Florence d'Alché-Buc, Prof. Slim Essid, Prof. Arthur Tenenhaus.

Functional Data Analysis (**g**)	Fall, 2016

    – special course.

INRIA (France)

Kernel Methods, Divergence and Independence Measures, Hypothesis Testing (**g**)	July 15–17, 2019
– @ Summer School on Data Science for Document Analysis	July 18 & 20, 2018

        and Understanding,
    – 6-hour long course / year.

Manifold Learning and Classification for EEG Analysis (**g**)	July 27, 2017

    – @ Summer School on Mathematical and Computational Methods,
        for Life Sciences,
    – 3-hour long course.

HEC Paris (France)

Data for Management Certificate (**g**)	May 7 & 10, 2019

    – with Prof. Karim Lounici, Prof. Sylvain Le Corff,
    – 8 hours / day.

Carnegie Mellon University (US)

Kernel-based Dependency Measures and Hypothesis Testing (**g**)	Nov. 27, 2017

    – Guest Lecture @ School of Computer Science,
    – 80 minutes.

University College London (UK)

Advanced Topics in Machine Learning - Theory of RKHS (**g**)	Spring, 2015–2016

    – ca. 60 students,
    – with Prof. Arthur Gretton, Kacper Chwialkowski.

Adaptive Modelling, Introduction to Kernel Methods (**g**)	Spring, 2015–2016

– ca. 20 students,
– with Prof. Arthur Gretton, Heiko Strathmann, Wittawat Jitkrittum.

Eötvös Loránd University (Hungary)

Reinforcement Learning (**g**)   Spring, 2009–2013
  – ca. 45 students in each semester,
  – with Prof. András Lőrincz.

Artificial Neural Networks (**g**)   Fall, 2008–2012
  – ca. 45 students in each semester,
  – with Prof. András Lőrincz.

Image Processing, Speech Recognition, Applications of Artificial Intelligence (**g**)   2007–2008
  – ca. 25 students in each semester.

Introduction to Mathematics (**u**)   2006–2007
  – ca. 25 students in each semester.

Symbolic Programming (**u**)   2004–2006
  – ca. 25 students in each semester.

SUPERVISION & MENTORING

Supervision

Pingfan Su (Ph.D.)   Sept., 2022 –
  – Department of Statistics, LSE, UK,
  – co-supervised with Prof. Chengchun Shi,
  – topic: Reinforcement Learning in Nonstationary Environment.

Sakina Hansen (Ph.D.)   Sept., 2022 –
  – Department of Statistics, LSE, UK,
  – co-supervised with Prof. Joshua Loftus,
  – topic: Causality, Counterfactuals and Meta-learning to Address the Complexity
       of Fairness in Data Science and Machine Learning.

Linda Chamakh (Ph.D.)   Apr., 2018 – May, 2021
  – CMAP, École Polytechnique & BNP Paribas, France,
  – co-supervised with Prof. Emmanuel Gobet, Jean-Philippe Lemor,
  – topic: Uncertainty Quantification, Robustness of Systematic Strategies.

Alex Lambert (Ph.D.)   Oct., 2017 – May, 2021
  – CMAP, École Polytechnique & LTCI, Télécom ParisTech, France,
  – co-supervised with Prof. Florence d'Alché-Buc,
  – topic: Statistical Learning of Vector-Valued Functions with Operator
       Random Fourier Features.

Gaspar Massiot (PostDoc)   Oct., 2017 – Aug., 2018
  – French Aerospace Lab ONERA, France,
  – co-supervised with Prof. Éric Moulines, Sidonie Lefebvre,
  – topic: Kernel Methods in Hyperspectral Imaging.

Romain Brault (PostDoc)   Oct., 2017 – Oct., 2018
  – CMAP, École Polytechnique & LTCI, Télécom ParisTech, France,
  – co-supervised with Prof. Florence d'Alché-Buc, Prof. Arthur Tenenhaus,
  – topic: Prediction of Functional Outputs by Kernels.

Zoltán Milacski (M.Sc.)   2012–2013
  – School of Computer Science, Eötvös Loránd University (ELU), Hungary,
  – co-supervised with Prof. András Lőrincz of the national student competitor (2nd prize),
  – topic: Recurrent Reinforcement Learning in High-Frequency Algorithmic Trading.

Gabriella Merész (M.Sc.)   2012
  – Department of Applied Mathematics, ELU, Hungary,
  – topic: Prediction of Financial Time Series via ARMA-GARCH Methods.

Mentoring

CapStone project (M.Sc. students)   Nov., 2022 – Aug., 2023
  – team members: Sizhe Li, Yujie Zhang, Zhendong Wang, Jingyan Lu (LSE, UK),
  – topic: Food Recognition and Nutritional Analysis from Food Images,
  – joint mentoring with Wittawat Jitkrittum (Google Research, New York).

Florian Kalinke (LSE, UK)   Sept. – Dec., 2022
  – Ph.D. visitor from KIT, Germany.

Mentoring 20 B.Sc. students   2022–2023
  – students in Actuarial Science, Mathematics, Statistics and Business (LSE, UK),
  – academic mentoring.

Mentoring 12 B.Sc. students   2021–2022
  – students in Actuarial Science, Mathematics, Statistics and Business (LSE, UK),
  – academic mentoring.

CapStone project (M.Sc. students)   Dec., 2021 – Aug., 2022
  – team members: Deelan Gopaul, Josiah Suartono,
  – topic: Forecasting sea water transparency,
  – joint mentoring with Dima Karamshuk (Facebook).

Jonathan Cardoso-Silva (Research Officer)   Oct. – Dec., 2021
  – Department of Methodology, LSE, UK.

Bechir Trabelsi (M.Sc. intern)   May – Aug., 2020
  – ESTA, France,
  – topic: Shape-Constrained Risk Measures.

Michaël Allouche (M.Sc. intern)   Oct., 2019 – Jan., 2020
  – École Polytechnique, France,
  – co-supervised with Prof. Emmanuel Gobet,
  – topic: Structured Dictionary Learning of Migration Matrices.
        GANs on Time Series

Meyer Scetbon (M.Sc. intern)   Apr. – Sept., 2018
  – INRIA, France,
  – co-supervised with Gaël Varoquaux,
  – topic: Fast Kernel-based Hypothesis Testing.

Roulier Lorraine, Flore Martin (M.Sc.)   Jan. – Mar., 2018
  – Sciences for Environmental Challenges, École Polytechnique, France,
  – topic: Low-Dimensional Embedding of Environmental Variables.

Moussab Djerrab (Ph.D.)   Fall, 2017
  – LTCI, Télécom ParisTech, France,
  – topic: Structured Prediction with Surrogate Losses.

Wittawat Jitkrittum (Ph.D.)   2013–2016
  – Gatsby Unit, University College London, UK,
  – topic: Kernel Techniques, Statistics.

Máté Csákvári, Zoltán Tősér (M.Sc.)   2012–2013
  – School of Computer Science, ELU, Hungary,
  – topic: Information Theory, Dictionary Learning.

László Jeni (PostDoc)   2011–2013
  – Robotics Institute, Carnegie Mellon University, US,
  – topic: Extensions of Constrained Local Models, Facial Expression Recognition.

Balázs Pintér, Gyula Vörös (Ph.D.)   2011–2013
  – School of Computer Science, ELU, Hungary,
  – topic: Structured-Sparse Coding and Dictionary Learning in Natural
        Language Processing.

András Sárkány (M.Sc.)   2011–2013

   – School of Computer Science, ELU, Hungary,

   – topic: Hedging via Sparse Coding.

Gergő Hammer (M.Sc.)   2011 Autumn – 2012 Spring

   – Department of Applied Mathematics, ELU, Hungary,

   – topic: Self-Similar Structures for Financial Prediction.

Mária Mészáros, Dávid Retek (M.Sc.)   2009 Autumn – 2010 Spring

   – Department of Applied Mathematics, ELU, Hungary,

   – topic: Online Structured Dictionary Learning and Its Applications.

Kitti Korbács, Nóra Villányi, Gabriella Merész (M.Sc.)   2007 Autumn – 2008 Spring

   – Department of Applied Mathematics, ELU, Hungary,

   – topic: Tensor Textures.

Kata Péter, Anikó Márton (M.Sc.)   2007 Autumn – 2008 Spring

   – Department of Applied Mathematics, ELU, Hungary,

   – topic: Temporal Independent Subspace Analysis of Facial Features.

Referent Professor

Nicolas Bonnet's internship (M.Sc.)   Mar. – July, 2019

   – École Polytechnique & HEC Paris, France,

   – internship @ Atos (India),

   – title: Vertical Integration of Supply and Delivery Chain from India to France.

Camille Jandot's internship (M.Sc.)   Apr. – Sept., 2017

   – Télécom ParisTech, France,

   – title: Modelling Space Time Series with Operator-Valued Kernels

      – Application to Detection of Epidemics.

Committee (Global)

Thesis Committee

Valerii Likhosherstov (Ph.D.)   2023

   – University of Cambridge, UK,

   – thesis title: Random Features for Efficient Attention Approximation,

   – role: Examiner.

Omar Hagrass (Ph.D.)   2023

   – Department of Statistics, Pennsylvania State University

   – role: Reviewer, Jury Member.

Motonobu Kanagawa (HDR)   2023

   – Eurecom, France,

   – role: Reviewer.

Jonas Wacker (Ph.D.)   2022

   – Eurecom (France),

   – thesis title: Random Features for Dot Product Kernels and Beyond,

   – role: Reviewer, Jury Member.

Hai Pham (Ph.D.)   2022

   – Carnegie Mellon University (U.S.),

   – role: Committee Member for Thesis Proposal.

Luigi Carratino (Ph.D.)   2020

   – University of Genova, Computer Science and Systems Engineering Program (Italy),

   – thesis title: Resource Efficient Large-Scale Machine Learning,

   – role: Reviewer.

Romain Brault (Ph.D.)   2017

   – Télécom ParisTech (France),

   – thesis title: Large-scale Operator-Valued Kernel Regression,

   – role: Jury Member.

Gábor Matuz (M.Sc.) 2010
    – Budapest University of Technology and Economics (Hungary),
    – thesis title: Adaptive Algorithms in Multiagent Environments,
    – role: Jury Member.

Kornél Kovács (Ph.D.) 2008
    – University of Szeged (Hungary),
    – thesis title: Various Kernel Methods with Applications,
    – role: Jury Member.

COMMITTEE (LONDON SCHOOL OF ECONOMICS)

Sub-Board Chair of MSc Data Science 2022–
Recruitment Committee
    Chairing Recruitment Panels 2022–
        – substitute for the Vice Chair of the Appointments Committee.
    Department Search Committee 2022–2023
    Department Research Panel 2022–2023
    Department Teaching Panel 2022–2023
    LSE Fellow Recruitment Panel Apr, 2022
Departmental Research Committee 2021–

COMMITTEE (ECOLE POLYTECHNIQUE)

Recruitment Committee
    Data Science for Business (M.Sc., X-HEC) June 28, 2021
    Data Science for Business (M.Sc., X-HEC) Apr. 1, 2020
    Data Science for Business (M.Sc., X-HEC) May 27, 2019
    Data Science for Business (M.Sc., X-HEC) Feb. 8, 2019
    Data Science for Business (M.Sc., X-HEC) Nov. 21, 2018

Internship Committee
    X-HEC (M.Sc.) Sept. 10, 2018
    Statistical Models in Biology and Physics (M.Sc.) Mar. 22, 2018
    Data Science (M.Sc.) Sept. 27, 2017
        – École Polytechnique (morning) & Télécom ParisTech (afternoon)
    Data Science (M.Sc.) Sept. 4–5, 2017

GRANTS

Europlace Institute of Finance (EIF) 2020–2021
    topic: Machine Learning for Risk Management: Kernels with Shape Constraints
    joint work with Prof. Dino Sejdinovic (University of Oxford) and
                Olivier Derollez (BNP Paribas)
    amount: 10,000 EUR

Labex DigiCosme 2017–2018
    keywords: operator-valued kernels, prediction of function-valued functions
    joint work with Prof. Florence d'Alché-Buc (Télécom Paris) and
                Prof. Arthur Tenenhaus (CentraleSupélec)
    amount: 50,000 EUR

ACADEMIC AWARDS AND RESEARCH SCHOLARSHIPS

Winston Prize for the best Capstone Project (Forecasting sea water transparency) 2023
    – team: Deelan Gopaul, Josiah Suartono,

– joint supervision with Dima Karamshuk (Facebook).

Best Paper Award at NeurIPS (awarded to 3 papers out of the 3240 submissions)	2017
Research Scholarship of the John von Neumann Computer Society	2005–2012
Bronze Medal of the Pro Patria et Scientia Award of Hungarian Ph.D. Students	2008
Scientist of the Year Award of the School of Computer Science	2007
Research Scholarship of the Bliss Foundation	2004
Outstanding Student Award of the Faculty of Natural Sciences	2003
Research Scholarship of the Eötvös Loránd University	2003
National Scientific Student Competition and Conference (2nd prize)	2002

INTERVIEW

Memory (film; topic: AI & Brain)	Dec., 2018
At TWiML & AI on our work winning best paper award at NIPS-2017	Dec., 2017

LANGUAGES

○ English (fluent), Spanish (basic), Hungarian (native).

○ Programming languages: Python, Matlab/Octave, Maple, LaTeX, HTML.