

Shuyu Dong

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Last updated: November 2023

EDUCATION

- May 2021 **PhD**, Université catholique de Louvain, Louvain-la-Neuve, Belgium.
PhD with the FNRS–FRIA scholarship
Thesis title: Low-rank matrix and tensor completion using graph-based regularization
Advisors: P.-A. Absil, Kyle A. Gallivan
- March 2016 **Ingénieur, master**, Ecole polytechnique & Télécom ParisTech, Ile-de-France, France.
Ingénieur Télécom and MVA at ENS: Machine learning and computer vision
Master thesis: Learning graph topologies for diffusion signal representation on graphs at EPFL, Lausanne, Switzerland. Advisor: Pascal Frossard
- 2014 **Ingénieur**, Ecole polytechnique, Palaiseau, France.
- 2011 **Licence Mathématiques**, Université Paris VI, Paris, France.

PROFESSIONAL EXPERIENCE

- 2021–present **Postdoctoral researcher**, TAU Team, INRIA, LISN, Université Paris-Saclay, Gif-sur-Yvette, France.
2023–present Starting Research Position
- 2016–2021 **Teaching Assistant, PhD student**, Université catholique de Louvain, Louvain-la-Neuve, Belgium.
2016–2020 FNRS–FRIA Doctoral Scholarship
- Apr–Aug 2014 **Research Internship**, Invoxia, Issy-les-Moulineaux, France.
Information geometric methods for real-time speaker diarization
- Jul–Aug 2013 **Summer internship**, SDESS, Banque de France, Paris.
Parallel computing for sparse linear systems in CUDA

RESEARCH INTERESTS

- Causal discovery • Causal inference • Optimization on Riemannian manifolds • Large-scale matrix/tensor decomposition • Matrix and tensor recovery, phase retrieval, PCA, ICA • Kernel methods • Large-scale graph clustering, network embedding, synchronization • Neural networks • Optimal transport

PAPERS

- Shuyu Dong, Kento Uemura, Akito Fujii, Shuang Chang, Yusuke Koyanagi, Koji Maruhashi, and Michèle Sebag. Learning large causal structures from inverse covariance matrix via matrix decomposition. *arXiv preprint arXiv:2211.14221*, pages 1–32, 2023. URL <https://arxiv.org/pdf/2211.14221.pdf>.
- Shuyu Dong and Michèle Sebag. From graphs to DAGs: a low-complexity model and a scalable algorithm. *Machine Learning and Knowledge Discovery in Databases (ECML-*

PKDD). *Lecture Notes in Computer Science*, vol 13717, pages 107–122, 2022. URL https://doi.org/10.1007/978-3-031-26419-1_7.

- Shuyu Dong, Bin Gao, Wen Huang, and Kyle A. Gallivan. On the analysis of optimization with fixed-rank matrices: a quotient geometric view. *arXiv preprint arXiv:2203.06765*, pages 1–27, 2022. URL <https://arxiv.org/pdf/2203.06765.pdf>.
- Shuyu Dong, Bin Gao, Yu Guan and François Glineur. New Riemannian preconditioned algorithms for tensor completion via polyadic decomposition. *SIAM Journal on Matrix Analysis and Applications* 43 (2), pages 840-866, 2022. URL <https://doi.org/10.1137/21M1394734>.
- Yu Guan, Shuyu Dong, Bin Gao, P.-A. Absil, and François Glineur. Alternating minimization algorithms for graph-regularized tensor completion. *arXiv preprint arXiv:2008.12876*, pages 1–22, 2023. URL <https://arxiv.org/pdf/2008.12876.pdf>.
- Shuyu Dong, P.-A. Absil, and Kyle A. Gallivan. Riemannian gradient descent methods for graph-regularized matrix completion. *Linear Algebra and its Applications*, 2020. URL <https://doi.org/10.1016/j.laa.2020.06.010>.
- Shuyu Dong, P.-A. Absil, and Kyle A. Gallivan. Preconditioned Conjugate Gradient Algorithms for Graph Regularized Matrix Completion. In *European Symposium on Artificial Neural Networks (ESANN)*, pages 239–244, 2019. URL <https://www.eLEN.ucl.ac.be/Proceedings/esann/esannpdf/es2019-133.pdf>.
- Shuyu Dong, P.-A. Absil, and Kyle A. Gallivan. Graph learning for regularized low rank matrix completion. In *23rd International Symposium on Mathematical Theory of Networks and Systems (MTNS)*, pages 460–467, 2018. URL <http://mtns2018.ust.hk/media/files/0153.pdf>.
- Shuyu Dong, Dorina Thanou, P.-A. Absil, and Pascal Frossard. Learning sparse models of diffusive graph signals. In *European Symposium on Artificial Neural Networks (ESANN)*, pages 251–256, 2017. URL <https://www.eLEN.ucl.ac.be/Proceedings/esann/esannpdf/es2017-116.pdf>.

TALKS AND PRESENTATIONS

- The 14th International Conference on Numerical Optimization and Numerical Linear Algebra (ICNONLA), Taiyuan, China, August 2023
- Fundamental Challenges in Causality, Univ. Grenoble-Alpes, Grenoble, France, May 2023
- Spring School on Causality (Poster), Sorbonne Univ., Paris, France, March 2023
- Joint European Conference on Machine Learning and Knowledge Discovery in Databases (ECML PKDD), Grenoble, France, September 2022
- Low-rank models 2020 Winter School (Poster), Villars-sur-Ollon, Switzerland, January 2020
- The International Council for Industrial and Applied Mathematics (ICIAM) 2019, Valencia, Spain, 2019
- The 27th European Symposium on Artificial Neural Networks (ESANN), Bruges, Belgium, 2019

- The 23rd International Symposium on Mathematical Theory of Networks and Systems (MTNS 2018), Hong Kong, China, 2018
- The 25th European Symposium on Artificial Neural Networks (ESANN), Bruges, Belgium, 2017
- The 36th Benelux Meeting on Systems and Control (Benelux Meeting 2017), Spa, Belgium, 2017
- BeNet 2016, Louvain-la-Neuve, Belgium, 2016

TEACHING EXPERIENCE

- Algorithmique et complexité (chargé de TDs, 2023–2024) • Analyse 2 (assistant, 2020–2021) • Numerical Analysis 2 (assistant, 2016–2020) • Economie de l'Entreprise (assistant, 2016–2017)

COMPUTER SKILLS

- Programming: Python, Matlab, C/C++, Java • ML/Opt packages: Scikit-Learn, Pytorch, Tensorflow, Manopt, Pymanopt, ROPTLIB, LINE, NetSMF, redsvd

SOFTWARE

- ICID (causal discovery) <https://github.com/shuyu-d/icid-exp>
- LoRAM (DAG computation): <https://github.com/shuyu-d/loram-exp>
- ROPTbox • TC-Precon (tensor completion): <https://gitlab.com/shuyudong.x11/tcprecon>

LANGUAGES

- English • French (C1, 2008) • Chinese (native speaker)

PROFESSIONAL SERVICES

Co-supervisor (with Prof. Absil) of Anuj Diwan (IIT) in summer internship 2019, *Graph-regularized matrix completion*, ICTEAM, UCLouvain.

Referee for journals and conferences: • IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI) • IEEE Transactions on Signal Processing (TSP) • Computational Optimization and Applications (COAP) • Applied Mathematical Modelling (AMMOD) • Journal of Computational Science (JOCSI) • Journal of Computational and Applied Mathematics • ECML PKDD • EURASIP • EUSIPCO