

Mehdi Bahri

Machine Learning Engineer & PhD Student in Geometric Deep Learning

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Education

Imperial College London

LONDON, UNITED KINGDOM

PhD. Computer Science - (thesis submitted)

2017 – (exp. 10/2022)

Geometric Deep Learning & Generative Models on Graphs and Manifolds.

Thesis: Advances in Efficient Geometric Deep Learning for Surface and Graph Modelling.

- Learnable cross-modal registration of raw 3D scans in-the-wild by surface-to-surface translation
- Large-scale non-linear 3D deep morphable models and generative models with graph neural networks
- Model compression & knowledge distillation for graph and point cloud neural networks
- Geometry and topology of representations

*Awarded a **Qualcomm Innovation Fellowship** (2019).*

Supervisors: Prof. Stefanos Zafeiriou & Prof. Michael Bronstein.

MSc. Advanced Computing - Distinction (84%)

2015 – 2016

Focus on statistical machine learning.

Thesis: Robust Low-Rank modeling on Tensors: New Algorithms and Extensive Comparisons.

- Devised 4 ADMM solvers and a Variational Bayes algorithm for robust tensor factorizations
- Analyzed 500GB of experimental data, showed improvements of up to 16% higher PSNR and FSIM

*Awarded the **Winton Capital Advanced Computing MSc Project Prize** and published in **ICCV & T-PAMI**.*

Grenoble INP - Ensimag

GRENOBLE, FRANCE

BSc. and MSc. Applied Mathematics and Computer Science - with High Honours

2013 – 2016

Focus on statistics, numerical optimization, numerical analysis, databases, software engineering.

*2010 - 2013: **Classes Préparatoires aux Grandes Écoles PC*** - Lycée Chateaubriand, Rennes, France.*

Publications

1. S. Bakas, S. Ludwig, K. Barmpas, **M. Bahri**, Y. Panagakis, N. Laskaris, D. A. Adamos, and S. Zafeiriou. "Team cogitat at NeurIPS 2021: Benchmarks for EEG Transfer Learning Competition", preprint ([arXiv:2202.03267](https://arxiv.org/abs/2202.03267))
2. X. Wei, A. Faisal, M. Grosse-Wentrup, A. Gramfort, S. Chevallier, V. Jayaram, C. Jeunet, S. Bakas, S. Ludwig, K. Barmpas, **M. Bahri**, Y. Panagakis, N. Laskaris, D. A. Adamos, S. Zafeiriou, W. C. Duong, S. M. Gordon, V. J. Lawhern, M. Sliwowski, V. Rouanne, and P. Tempczyk. "2021 BEETL Competition: Advancing Transfer Learning for Subject Independence & Heterogenous EEG Data Sets", Proceedings of the NeurIPS 2021 Competitions and Demonstrations Track, PMLR 176:205-219, 2022 ([arXiv:2202.12950](https://arxiv.org/abs/2202.12950))
3. G. Bahl, **M. Bahri**, F. Lafarge, "Single-Shot End-to-end Road Graph Extraction", in Earthvision 2022 at CVPR Workshops ([arXiv:2112.05215](https://arxiv.org/abs/2112.05215))
4. **M. Bahri**, G. Bahl, and S. Zafeiriou, "Binary Graph Neural Networks", in CVPR 2021 ([arXiv:2012.15823](https://arxiv.org/abs/2012.15823))
5. **M. Bahri**, E. O' Sullivan, S. Gong, F. Liu, X. Liu, M. Bronstein, and S. Zafeiriou, "Shape My Face: Registering 3D Face Scans by Surface-to-Surface Translation", in International Journal of Computer Vision (IJCV), 2021 ([arXiv:2012.09235](https://arxiv.org/abs/2012.09235))
6. S. Gong*, **M. Bahri***, S. Zafeiriou, and M. Bronstein, "Geometrically Principled Connections in Graph Neural Networks", in CVPR 2020 ([arXiv:2004.02658](https://arxiv.org/abs/2004.02658))
7. **M. Bahri**, Y. Panagakis, and S. Zafeiriou, "Robust Kronecker Component Analysis" in IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI) 2019 ([arXiv:1801.06432](https://arxiv.org/abs/1801.06432))
8. **M. Bahri**, Y. Panagakis, and S. Zafeiriou, "Robust Kronecker-Decomposable Component Analysis for Low Rank Modeling" in International Conference on Computer Vision (ICCV) 2017 ([arXiv:1703.07886](https://arxiv.org/abs/1703.07886))
9. N. Xue, G. Papamakarios, **M. Bahri**, Y. Panagakis, and S. Zafeiriou, "Robust Low-rank Tensor Modelling Using Tucker and CP Decomposition" in European Signal Processing Conference (EUSIPCO) 2017

* denotes equal contributions.

Patents

1. "Method of generating a latent vector", UK Patent Application (filed), 2020
 2. "Generative geometric neural networks for 3D shape modelling", US Patent Application (filed), 2020
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Professional Experience

- Cogitat.io - Machine Learning Engineer** LONDON, UNITED KINGDOM
EEG Signal Analysis for BCI 06/21 - present
- Investigating novel ML approaches for EEG signal decoding
 - Applications to brain-computer interfaces in healthcare and entertainment
 - Part of the winning team of the *2021 NeurIPS BEETL Competition* for EEG transfer learning
- Google AI - Research Intern** NEW YORK, NY
Machine Intelligence & Machine Perception 10/18 - 01/19
- Robust generative models for meshes, pooling on meshes
 - Implementation in TensorFlow, Python, C++
- JPMorgan Chase & Co - Quantitative Associate Intern** LONDON, UNITED KINGDOM
Equities Systematic Trading QR 06/18 - 08/18
- Quantitative Research Off-Cycle Internship in Machine Learning
 - Time series forecasting and volatility modeling for automated trading of single stocks options
- Speechmatics (Cantab Research Ltd.) - Speech Recognition Intern** CAMBRIDGE, UNITED KINGDOM
Research & Development 04/17 - 07/17
- Improved the RNN language models by implementing research papers in TensorFlow and C++
 - Divided model size by 4 while keeping the same cross-entropy loss / perplexity and WER
- HarperCollins Publishers - Data Scientist** LONDON, UNITED KINGDOM
Global Pricing and Analytics 09/16 - 03/17
- Graph mining and influence maximization to maximize uplift of books on special offers
 - Analyzed MongoDB databases of more than 100Gb with scikit-learn and networkx
- Morgan Stanley - Summer Analyst (Tech & Data)** LONDON, UNITED KINGDOM
Full-stack development of a trade control system prototype 06/15 - 09/15
- Software engineering (Java, Javascript, git flow, legacy code, tests, architecture design)
 - Presented at the global meeting of the sub-department, project continued for integration into production
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Awards and Scholarships

- 2022 | NeurIPS 2021 BEETL Competition - *First place with team Cogitat*
- 2019 | Qualcomm Innovation Fellowship Europe (\$40 000)
- 2019 | Amazon AWS Cloud Credits for Research (\$6000)
- 2017 | Full PhD Scholarship from the Department of Computing, Imperial College London
- 2016 | Winton Capital Advanced Computing MSc Project Prize (£1200) *best thesis in Computer Science (1/188 students)*
- Travel grants:*
- 2019 | IPAM (UCLA) *Geometry and Learning from Data in 3D and Beyond* Workshops II and IV travel grants
- 2018 | Google Computer Vision Summit *fully-funded invitation to Google Zürich*
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Presentations and Talks

- Workshop presentations:*
- 2021 | Binary Networks for Computer Vision at CVPR (*Binary Graph Neural Networks*)
- 2021 | DiffCVML at CVPR (*Shape My Face*)
- 2021 | Embedded Vision at CVPR (*Binary Graph Neural Networks & Shape My Face*)
- Invited talks:*
- 2021 | Graph Neural Networks User Group (Invited Speaker: *Binary Graph Neural Networks and Dynamic Graph Models*)
- 2021 | Autodesk Research (Invited Speaker: *Robust and Efficient Geometric Deep Learning*)
- 2019 | Qualcomm - San Diego Headquarters (two talks to ML team and CV team)
- 2019 | KCL/UCL Junior Geometry Seminar (Invited Speaker: *Introduction to Geometric Deep Learning*)
- Posters at events:*
- 2018 | Presented poster at the Google Computer Vision Summit
- 2017 | Presented poster at the *Official Launch of the Machine Learning Initiative* at Imperial College London

Skills

	Computing skills	Languages
Programming (<i>advanced</i>)	Python, Java, C, Shell	French <i>Native</i>
Programming (<i>intermediate</i>)	SQL, Javascript, Prolog, C++	English <i>Fluent</i>
Modeling	MATLAB, R, NumPy, TensorFlow, Scikit-learn, PyTorch	Spanish <i>Intermediate</i>
Tools	Git, L ^A T _E X, MongoDB	

Teaching Activities

Tutorial support

2020 & 2021	Teaching Assistant for <i>Mathematics for Machine Learning and Probabilistic Inference</i>
2019 & 2020	Teaching Assistant for CO460 - <i>Deep Learning</i>
2018	Teaching Assistant for CO495 - <i>Advanced Statistical Machine Learning</i>
2018	Teaching Assistant for CO493 - <i>Data Analysis and Probabilistic Inference</i>

Student co-supervision

2018	MSc, Shunwang Gong (Independent Study Option and MSc thesis) <i>Geometric Deep Learning</i> with Prof. Stefanos Zafeiriou (<i>Distinguished Project Award</i>)
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Community Service and Leadership

2019 - 2021	Co-organizer of the <i>London Geometry and Machine Learning Summer School (LOGML.ai) 2021</i>
2019 - current	Reviewer for IEEE T-PAMI, IEEE T-SMC:Systems, IEEE TIP, IJCV

Professional bodies

Graduate Student Member of the IEEE and of the Computer Society.
Member of the Computer Vision Foundation (CVF).
Student Member of the ACM.

Interests

Fitness & Nutrition • Cycling • Cooking

REFERENCES AVAILABLE UPON REQUEST.