Senior Research Scientist at Google DeepMind

Summary

My research is centered on developing and understanding highly effcient and adaptable foundation models. Currently, my interests lie in understanding and utilizing in-context learning to improve model reasoning and adaptation. This builds on my expertise in meta-learning, nonlinear optimization, and manifold learning. My work has resulted in over 25 publications in top ML venues (NeurIPS, ICML, ICLR, CVPR) and impactful product launches across Google.

PERSONAL DATA

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WORK EXPERIENCE

- Developed a method for effective in-context compression in LLMs, enabling efficient processing of long context data (preprint).
- Proposed a practical meta-optimizer achieving up to 5× speedup for LLM fine-tuning (preprint).
- Formalized a connection between in-context learning and gradient descent (ICML'23 oral, NeurIPS'24).
- Developed methods for on-the-fly weight generation using Transformers and HyperNetworks (ICML'22, TMLR'24).

Apr. 2016 to Aug. 2020: Senior Research Scientist, GOOGLE RESEARCH

- Developed sequence-based models (Transformers, BERT, Mixture of Experts) to predict user satisfaction from user interaction logs.
- Designed models for addressing presentation bias in search.
- \bullet Applied these models to enhance ranking and triggering mechanisms in Google Search, ultimately handling close to 100% of the search traffic.

- Developed semantic analysis and a query triage system using embedding clustering techniques.
- Built the company's first deep learning search ranking algorithm.
- Improved performance of the email spam filtering system.

- Published 8 papers (7 as a first author) in leading ML conferences on novel techniques for efficient large-scale nonlinear optimization.
- Created efficient manifold learning algorithms for high-quality visualization of large datasets (1M+points) using standard CPUs.

EDUCATION

Thesis: Large-Scale Methods for Nonlinear Manifold Learning.

Thesis: Design and Optimization of Cargo Transportation Delivery.

Thesis: Stability of Some Stochastic Models in Economics.

Sep. 2004 to July 2009: BS and MS, Intern. Econ. Relations (cum laude) Kharkiv National University, Ukraine. GPA: 3.7/4.0

Thesis: Crisis of the Global Financial System and Its Impact on the Ukrainian Economy.

Publication List. Google Scholar

♣ In-Context Learning, Mechanistic Interpretability, Algorithm Discovery

- ▷ Aleksandar Petrov, Mark Sandler, Andrey Zhmoginov, Nolan Miller, Max Vladymyrov: "Long Context In-Context Compression by Getting to the Gist of Gisting", preprint, 2025.
- ▶ Andrey Zhmoginov, Jihwan Lee, Max Vladymyrov, Mark Sandler: "Contextually Guided Transformers via Low-Rank Adaptation", preprint, 2025.
- ▷ Chen Sun, Renat Aksitov, Andrey Zhmoginov, Nolan Miller, Max Vladymyrov, Ulrich Rueckert, Been Kim, Mark Sandler: "How new data permeates LLM knowledge and how to dilute it", ICLR 2025, spotlight.
- ▶ Max Vladymyrov, Johannes von Oswald, Mark Sandler, Rong Ge: "Linear transformers are versatile in-context learners", NeurIPS 2024.
- ▶ Max Vladymyrov, Johannes von Oswald, Nolan Miller, Mark Sandler: "Efficient linear system solver with transformers", AI for Math Workshop, ICML 2024.
- ▷ Chen Sun, Nolan Miller, Andrey Zhmoginov, Max Vladymyrov, Mark Sandler: "Learning and unlearning of fabricated knowledge in language models", Mechanistic Interpretability Workshop, ICML 2024.
- ▶ Andrey Zhmoginov, Jihwan Lee, **Max Vladymyrov**, Mark Sandler: "Learning fast and slow: representations for in-context weight modulation", Workshop on In-Context Learning, ICML 2024.
- ⊳ Johannes von Oswald, Eyvind Niklasson, Maximilian Schlegel, Seijin Kobayashi, Nicolas Zucchet, Nino Scherrer, Nolan Miller, Mark Sandler, Max Vladymyrov, Razvan Pascanu, João Sacramento: "Uncovering mesa-optimization algorithms in transformers", preprint, 2023.
- ⊳ Johannes von Oswald, Eyvind Niklasson, Ettore Randazzo, João Sacramento, Alexander Mordvintsev, Andrey Zhmoginov, Max Vladymyrov: "Transformers learn in-context by gradient descent", ICML 2023, oral.

Y Few-Shot Learning, HyperNetworks

- ▶ Max Vladymyrov, Andrey Zhmoginov, Mark Sandler: "Continual HyperTransformer: a metalearner for continual few-shot learning", TMLR 2024.
- ▶ Andrey Zhmoginov, Mark Sandler, **Max Vladymyrov**: "HyperTransformer: model generation for supervised and semi-supervised few-shot learning", *ICML 2022*.

Nonlinear Optimization, Model Adaptation

- ▶ Mark Sandler, Andrey Zhmoginov, **Max Vladymyrov**, Nolan Miller: "Training trajectories, mini-batch losses and the curious role of the learning rate", preprint, 2023.
- ▷ Utku Evci, Bart van Merrienboer, Thomas Unterthiner, **Max Vladymyrov**, Fabian Pedregosa: "GradMax: growing neural networks using gradient information", *ICLR 2022*.
- ▶ Mark Sandler, Andrey Zhmoginov, **Max Vladymyrov**, Andrew Jackson: "Fine-tuning image transformers using learnable memory", CVPR 2022.
- ▷ Alexander D'Amour, ..., Max Vladymyrov, ...: "Underspecification presents challenges for credibility in modern machine learning", JMLR 2022.

Meta-Learning, Learning-to-Learn

- ▷ Gus Kristiansen, Mark Sandler, Andrey Zhmoginov, Nolan Andrew Miller, Anirudh Goyal, Jihwan Lee, Max Vladymyrov: "Narrowing the focus: learned optimizers for pretrained models", preprint, 2024.
- ▶ Andrey Zhmoginov, Mark Sandler, Nolan Miller, Gus Kristiansen, Max Vladymyrov: "Decentralized learning with multi-headed distillation", CVPR 2023.
- ▶ Mark Sandler, **Max Vladymyrov**, Andrey Zhmoginov, Nolan Miller, Tom Madams, Andrew Jackson, Blaise Agüera Y Arcas: "Meta-learning bidirectional update rules", *ICML 2021*.

Manifold Learning, Dimensionality Reduction

- ▶ Max Vladymyrov: "No pressure! Addressing the problem of local minima in manifold learning algorithms", NeurIPS 2019.
- ▶ Max Vladymyrov and M. Á. Carreira-Perpiñan: "Fast, accurate spectral clustering using locally linear landmarks" IJCNN 2017.
- ▶ Max Vladymyrov and M.Á. Carreira-Perpiñán: "The variational Nyström method for large-scale spectral problems". *ICML 2016*.
- ▶ M.A. Carreira-Perpiñán and Max Vladymyrov: "A fast, universal algorithm to learn parametric nonlinear embeddings". NeurIPS 2015.
- ▶ Max Vladymyrov and M.Á. Carreira-Perpiñán: "Linear-time training of nonlinear low-dimensional embeddings", AISTATS 2014.
- ▶ Max Vladymyrov and M.Á. Carreira-Perpiñán: "Locally linear landmarks for large-scale manifold learning". ECML 2013.

- ▶ Max Vladymyrov and M.Á. Carreira-Perpiñán: "Entropic affinities: properties and efficient numerical computation". ICML 2013.
- ▶ Max Vladymyrov and M.Á. Carreira-Perpiñán: "Partial-Hessian strategies for fast learning of nonlinear embeddings". *ICML 2012*.

Professional Service

- ▷ Co-orgnized ICLR 2023 Workshop "From Cells to Societies: Collective Learning Across Scales".
- \triangleright JMLR Editorial Board (2020–present).
- \triangleright Area chair: NeurIPS (2025).
- ightharpoonup Conference reviewer: ICML (2018–2024), NeurIPS (2013–2025), ICLR (2021), ICCV (2017), ECCV (2016), WWW (2015–2016), SDM (2013), KDD (2015–2016), IJCAI-ML (2015).
- ▶ Top reviewer award: NeurIPS (2020, 2024).
- ightharpoonup Journal reviewer: PAMI, Connection Science, Neurocomputing, Pattern Recognition, Pattern Recognition Letters, IJNS, IEEE Transactions on Neural Networks and Learning Systems.