


# DR. ARTEM MOSKALEV

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My research focuses on geometric deep learning and language models, with a keen interest in developing geometry-aware methods that efficiently learn from unlabeled data. I am driven by the challenge of scaling AI to tackle complex scientific problems that conventional methods struggle to solve.

## WORK EXPERIENCE

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### Machine Learning Research Scientist

*AI/ML for Drug Discovery*

**Johnson and Johnson**

September 2023 - current

I work on combining geometric neural networks and large language models to advance molecule generation and representation learning, focusing on large molecules such as RNA and proteins. My work involves collaborating with stakeholders to define problems, preparing and curating datasets, and implementing and training machine learning models.

### Machine Learning Intern

*Generative Modeling and Computational Imaging*

**Samsung**

May 2018 - August 2018

At Samsung, I worked on image enhancement and restoration. In particular, I was focusing on improving Generative Adversarial Networks (GANs) deblurring methods to alleviate restoration artifacts and hallucinations.

### Research Assistant

*PDE modelling of biological neurons*

**MSU Neuroscience**

February 2016 - March 2017

My work involved mathematical modeling and embedded software engineering. I implemented PDE models to describe the behavior of the neurons under the mechanical influence.

## EDUCATION

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### Ph.D. in Machine Learning

*Advisor:* prof. Arnold Smeulders

**University of Amsterdam**

August 2019 - September 2023

*Research:* geometric deep learning, self-supervised learning

*Thesis:* Representation Learning with Structured Invariance [\[link\]](#)

### M.Sc. in Applied Mathematics

*Advisor:* prof. Anh-Huy Phan

**Skolkovo Institute of Science and Technology**

September 2017 - June 2019

*Research:* inverse problems, signal processing, convex optimization

*Thesis:* Trainable regularization for Wiener filter deconvolution (top 3%) [\[link\]](#)

## RELEVANT SKILLS

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- Coding: python, R, bash, C++ (basic)
- Libraries: pytorch, huggingface, pytorch-geometric, e3nn, jax, sklearn, cvxpy, amplide
- Systems and Frameworks: Linux, Docker, Kubernetes, git, Slurm, Jenkins

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## SELECTED PUBLICATIONS

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- [4] Artem Moskalev et al. “SE(3)-Hyena Operator for Scalable Equivariant Learning (**Best Paper Award**)”. In: *ICML workshop on Geometry-grounded Representation Learning and Generative Modeling (ICML-GRaM)*. 2024.
- [5] Junjie Xu\* and Artem Moskalev\* et al. “Beyond Sequence: Impact of Geometric Context for RNA Property Prediction”. In: *Under review. arxiv preprint: 2410.11933*. 2024.
- [6] Mehdi Yazdani-Jahromi and Artem Moskalev et al. “HELM: Hierarchical Encoding for mRNA Language Modeling”. In: *Under review. arxiv preprint: 2410.12459*. 2024.
- [7] Artem Moskalev et al. “On genuine invariance learning without weight-tying”. In: *ICML workshop on Topology, Algebra, and Geometry in Machine Learning (ICML TAG-ML)*. 2023.
- [8] Artem Moskalev et al. “Contrasting quadratic assignments for set-based representation learning”. In: *European Conference on Computer Vision (ECCV)*. 2022.
- [9] Artem Moskalev et al. “LieGG: Studying Learned Lie Group Generators (**Spotlight**)”. In: *Advances in Neural Information Processing Systems (NeurIPS)*. 2022.
- [10] Artem Moskalev, Ivan Sosnovik, and Arnold W.M. Smeulders. “Relational Prior for Multi-Object Tracking (**Oral**)”. In: *2nd Visual Inductive Priors for Data-Efficient Deep Learning Workshop*. 2021. URL: <https://openreview.net/forum?id=1MZnMuu8mg4>.
- [11] Ivan Sosnovik, Artem Moskalev, and Arnold Smeulders. “DISCO: accurate Discrete Scale Convolutions (**Best Paper Award**)”. In: *British Machine Vision Conference (BMVC)*. 2021.
- [12] Ivan Sosnovik\*, Artem Moskalev\*, and Arnold W.M. Smeulders. “Scale Equivariance Improves Siamese Tracking”. In: *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*. 2021.

## ACADEMIC EXPERIENCE

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### Teaching assistant

*Statistics, Simulation and Optimization*

Statistical hypothesis testing, dynamic programming, simulation-based optimization.

**University of Amsterdam**

September 2019 - December 2022

### Lecturer

*Introduction to Image Processing*

A graduate-level mini-course to introduce the basics of computational imaging algorithms.

**Skolkovo Institute of Science and Technology**

February 2019 - March 2019

### Intern and Student Supervision

- Junjie Xu: Beyond Sequence: Impact of Geometric Context for RNA Property Prediction
- Mehdi Yazdani-Jahromi: HELM: Hierarchical Encoding for mRNA Language Modeling
- Evgenia Ilia: Efficient self-supervised learning for real-world tabular data
- Harm Manders: Dense contrastive learning for microscopy cell segmentation
- Lotte Bottema: Deep sequence modeling for trajectory forecasting
- Nadia Isiboukaren: Space-Time-Slot correspondence for video object segmentation
- Jorrit Ypenga: Domain-regularization for siamese object tracking

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## Research Impact

- **Spotlight/Best paper/Oral** recognitions at GRaM@ICML 2024, NeurIPS 2022, BMVC 2021, VIP@ICCV 2021
- Reviewing for: ICLR 23/24, NeurIPS 22/23, ICML 21/22/23, CVPR 19/20, ECCV/ICCV 20

## PATENTS

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- [1] Artem Moskalev, Arnold Smeulders, and Volker Fischer. “Computer implemented method and apparatus for unsupervised representation learning”. US20230359940A1: 2022 EP, 2023 US CN. URL: <https://patents.google.com/patent/US20230359940A1/en>.
- [2] Artem Moskalev, Arnold Smeulders, and Volker Fischer. “Device and computer-implemented method for object tracking”. US11886995B2: 2020 DE, 2021 US CN. URL: <https://patents.google.com/patent/US11886995B2/en>.
- [3] Artem Moskalev et al. “Recognition of objects in images with equivariance or invariance in relation to the object size”. 2020 DE, 2021 US CN. URL: <https://patents.google.com/patent/US11886995B2/en>.