

Ivan Sosnovik
Applied Scientist, Amazon
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Research Interests

Generative AI, Structured Neural Networks
Computer Vision, Machine Learning, Invariance and Equivariance in Neural Networks

Education

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|-------------|---|
| 2017 – 2023 | PhD, Computer Vision ,
University of Amsterdam, Amsterdam, The Netherlands
<i>“Symmetry-Based Learning from Limited Data”</i>
[Thesis] |
| 2015 – 2017 | MSc with Honors, Applied Mathematics and Physics ,
Moscow Institute of Physics and Technology, Moscow, Russia
Skolkovo Institute of Science and Technology, Moscow, Russia
<i>“Neural Networks for Topology Optimization”</i> |
| 2011 – 2015 | BSc with Honors, Applied Mathematics and Physics ,
Moscow Institute of Physics and Technology, Moscow, Russia
<i>“Two-dimensional system for the prior positioning of the STM”</i> |

Highlights

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| Scholarships | <i>“Foundation for the Development of Innovation Education”</i> (2012 – 2014) |
| Awards | BMVC 2021 Best Paper Award [link] [interview]
Kaggle <i>“Leaf Classification”</i> competition [interview]
National Physics Olympiad for Students 2013
Moscow Physics Olympiad 2011
Phystech Mathematical Olympiad 2011
Phystech Physics Olympiad 2011
Moscow Mathematical Olympiad 2010
Moscow Physics Olympiad 2010 |

Academic Experience

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| Teaching | MSc course Applied Machine Learning ,
University of Amsterdam, 2017 – 2020

MSc, PhD course iOS Game Development ,
Skolkovo Institute of Science and Technology, 2016 |
| Reviewing | ICLR 2023, TPAMI 2022, ICML INNF+ 2021, ICCV 2021, ICLR 2021, WACV 2021, CVPR 2018, Computer Vision and Image Understanding, Engineering Optimization, Computer Methods in Applied Mechanics and Engineering, The Visual Computer |

Academic Experience

Supervision Cees Kaandorp, Lucas Meijer, Dario E. Shehni Abbaszadeh, Dave Meijdam, Jonne Goedhart, Daan Ferdinandusse, Gongze Cao, Michał Szmaja, Jan Jetze Beitler

Work Experience

06.2023 – Present **Amazon Generative AI Innovation Center**, Applied Scientist

03.2022 – 05.2023 **Amazon ML SL**, Applied Scientist
Worked on a wide range of AI projects: multimodal video summarization for movies, anomaly detection in assembly lines, fine-grained image analysis for quality control, photo and video content moderation, etc.

06.2021 – 10.2021 **Amazon ML SL**, Applied Scientist Intern
Worked on representation learning for 3D garment reconstruction.

08.2016 – 09.2016 **SAP Labs**, Intern
Developed prototypes for a smart fleet management system. Designed software and hardware solutions for tracking the engine's and the vehicle's parameters.

02.2016 – 08.2016 **Teachbase**, iOS Developer
Developed a client-server iOS application for watching educational courses. [\[link\]](#)

09.2014 – 06.2015 **P.L. Kapitza Institute for Physical Problems**, Laboratory Assistant
Studied nano-structured materials. Designed a system for the prior positioning of the needle of the scanning tunneling microscope.

Skills

Coding Python, Objective-C, Swift, C

Technical Cryogenics, Vacuum Equipment, Scanning Tunneling Microscopy

Publications

2023 I. Sosnovik, A. Moskalev, C. Kaandorp, A. Smeulders, “*Learning to Summarize Videos by Contrasting Clips*”, Preprint, 2023 [\[pdf\]](#)

2022 A. Moskalev, A. Sepiarskaia, I. Sosnovik, A. Smeulders, “*LieGG: Studying Learned Lie Group Generators*”, NeurIPS, 2022 [\[pdf\]](#)[\[video\]](#)

 A. Moskalev, I. Sosnovik, V. Fischer, A. Smeulders, “*Contrasting Quadratic Assignments for Set-based Representation Learning*”, ECCV, 2022 [\[pdf\]](#)[\[code\]](#)[\[poster\]](#)

2021 S. Gulshad*, I. Sosnovik*, A. Smeulders, “*Wiggling Weights to Improve the Robustness of Classifiers*”, Preprint, 2021 [\[pdf\]](#)

Publications

- I. Sosnovik, A. Moskalev, A. Smeulders, “*DISCO: accurate Discrete Scale Convolutions*”, BMVC (Oral), 2021, **Best Paper Award** [[pdf](#)][[code](#)]
- A. Moskalev, I. Sosnovik, A. Smeulders, “*Two is a Crowd: Tracking Relations in Videos*”, Preprint, 2021 [[pdf](#)]
- I. Sosnovik, A. Moskalev, A. Smeulders, “*How to Transform Kernels for Scale-Convolutions*”, ICCV VIPriors Workshop, 2021 [[pdf](#)][[code](#)]
- A. Moskalev, I. Sosnovik, A. Smeulders, “*Relational Prior for Multi-Object Tracking*”, ICCV VIPriors Workshop (Oral), 2021 [[link](#)]
- S. Gulshad*, I. Sosnovik*, A. Smeulders, “*Built-in Elastic Transformations for Improved Robustness*”, Preprint, 2021 [[pdf](#)]
- 2020 I. Sosnovik*, A. Moskalev*, A. Smeulders, “*Scale Equivariance Improves Siamese Tracking*”, WACV, 2021 [[pdf](#)][[code](#)]
- 2019 I. Sosnovik, M. Szmaja, A. Smeulders, “*Scale-Equivariant Steerable Networks*”, ICLR, 2020 [[pdf](#)][[code](#)]
- A. Atanov, A. Volokhova, A. Ashukha, I. Sosnovik, D. Vetrov, “*Semi-Conditional Normalizing Flows for Semi-Supervised Learning*”, ICML INNF, 2019 [[pdf](#)][[code](#)]
- I. Sosnovik, I. Oseledets, “*Neural Networks for Topology Optimization*”, Russian Journal of Numerical Analysis and Mathematical Modelling, 34(4) [[pdf](#)][[code](#)]
- 2018 J.J. Beitler, I. Sosnovik, A. Smeulders, “*PIE: Pseudo-Invertible Encoder*” [[pdf](#)]

Patents

- 2021 I. Sosnovik, A. Smeulders, K. Groh “*Training a machine learnable model to estimate relative object scale*”, 2021 DE, 2022 US CN JP KR [[link](#)]
- 2020 I. Sosnovik, A. Smeulders, K. Groh “*Device and Method for Training a Scale-Equivariant Convolutional Neural Network*”, 2020 EP, 2021 US CN [[link](#)]
- A. Moskalev, I. Sosnovik, A. Smeulders, K. Groh “*Recognition of Objects in Images with Equivariance or Invariance in Relation to the Object Size*”, 2020 DE 2021 US CN [[link](#)]
- 2019 I. Sosnovik, A. Smeulders, K. Groh, M. Szmaja “*Method and Apparatus for Processing Sensor Data Using a Convolutional Neural Network*”, 2019 DE, 2020 US CN [[link](#)]