Ivan Sosnovik

Applied Scientist, Amazon
London, UK

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Research Interests

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

Education

2017 – 2023 **PhD, Computer Vision**,
University of Amsterdam, Amsterdam, The Netherlands
"Symmetry-Based Learning from Limited Data"
[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
"Neural Networks for Topology Optimization"

2011 – 2015 **BSc with Honors, Applied Mathematics and Physics**,
Moscow Institute of Physics and Technology, Moscow, Russia
"Two-dimensional system for the prior positioning of the STM"

Highlights

Scholarships *"Foundation for the Development of Innovation Education"* (2012 – 2014)

Awards
BMVC 2021 Best Paper Award [link][interview]
Kaggle *"Leaf Classification"* 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

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 MLSL**, Applied Scientist Worked on a wide range of AI projects: multimodal video summarization for movies, anomaly detection in assembly lines, fine-grained image analsysis for quality control, photo and video content moderation, etc.
06.2021 – 10.2021	**Amazon MLSL**, 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. Sepliarskaia, 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]