SERGEY SHUVAEV

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Ph.D. in applied mathematics and physics with focus on computer science and computational neuroscience
Research focus on using cognitive priors and machine learning to develop models of decision-making

Experience

Postdoctoral Fellow 11/22-now**, Student in Residence** 7/16-10/22,
Koulakov Lab, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY

- Developed data-driven models of decision-making for stay-or-leave decisions (RL) (NeurIPS '20), motivation (RL) (Front Sys Neurosci '21), and conflict (Bayesian/Game theoretic) (NeurIPS '23)
- Worked on a deep learning framework to predict the smell of odorants (ICML '19) and analyzed olfactory connectivity data to investigate how the smell is processed in the brain (bioRxiv '23)
- Co-developed methods for neural network compression (bioRxiv '21) and unfolding (PNAS '19)

Research Associate 7/16-12/18**, Research Assistant** 1/12-6/16**,**
Enikolopov Lab, Moscow Institute of Physics and Technology, Moscow, Russia

- Developed automatic procedures to analyze cell populations in whole-brain samples: microscopy (MethodsX '19), 3D data alignment (Sci Reports '22), and object detection (Front Neuroanat '17)
- Performed microscopy and analyzed data to evaluate common impacts on adult neurogenesis: irradiation (NeuroReport '19); antidepressants, brain development, and cell migration

Research Assistant 8/13-7/15**,** *Superconductivity Department*, Kurchatov Institute, Moscow, Russia

- Developed numerical models and worked towards experimental measurements of electro- and thermodynamics in high-current superconductive cables to pursue requirement-based design

Education

Ph.D., Physics and Mathematics (Biophysics), Moscow Institute of Physics and Technology, 2022
M.S., Applied Mathematics and Physics, Moscow Institute of Physics and Technology, 2015, GPA 4.0
B.S., Applied Mathematics and Physics, Moscow Institute of Physics and Technology, 2013, GPA 4.0

Publications

- 10+ publications, 100+ citations; **see next page for details**
- 5 first-authored papers (incl. 2 NeurIPS and PNAS); 3 co-authored papers (incl. ICML); 4 preprints

Professional service

Reviewer for NeurIPS, ICLR, ICML, COSYNE

Skills and qualifications

- Python, PyTorch, TensorFlow, Matlab, Wolfram Mathematica, C, C++, git, shell, LaTeX
- Reinforcement learning, Bayesian inference, game theory, POMDP, theory of mind, sequence modeling, computer vision, computational neuroscience, theory of mind

Awards

- Highlighted Reviewer: ICLR, 2022; NeurIPS, 2022. *Awarded to top-5%/top-10% reviewers*
- Travel awards: CSHL; Gatsby Charitable, Burroughs Wellcome, Google DeepMind, Simons, 2020
- Swartz Fellow in Computational Neuroscience, 2016-2017. *$100k+/2yrs toward salary and travel*
- Alexandrov Scholar, 2012-2015. *Awarded to students with recent conference records & top-tier GPA*
- Abramov and Frolov Scholar, 2010-2012. *Awarded to undergraduate students with the 4.0 GPA*
- Kurchatov Award for Outstanding Research, 2013

Publications

The primacy model and the structure of olfactory space (bioRxiv '23)
Giaffar, H., ***Shuvaev, S.,*** *Rinberg, D., and Koulakov, A.*

A normative theory of social conflict (NeurIPS '23)
Shuvaev, S., *Amelchenko, E., Smagin, D., Kudryavtseva, N., Enikolopov, G., and Koulakov, A.*

Spatiotemporal 3D image registration for mesoscale studies of brain development (Sci Reports '22)
Shuvaev, S., *Lazutkin, A., Kiryanov, R., Anokhin, K., Enikolopov, G., and Koulakov, A.*

Encoding innate ability through a genomic bottleneck (bioRxiv '21)
Koulakov, A., ***Shuvaev, S.,*** *Lachi, D., and Zador, A.*

Neural networks with motivation (Front Sys Neurosci '21)
Shuvaev, S., *Tran, N., Stephenson-Jones, M., Li, B., and Koulakov, A.*

R-learning in actor-critic model offers a biologically relevant mechanism for sequential decision-making (NeurIPS '20)
Shuvaev, S.*, *Starosta, S.*, Kvitsiani, D., Kepecs, A., and Koulakov, A.*

DeepNose: Using artificial neural networks to represent the space of odorants (ICML '19)
Tran, N., Kepple, D., ***Shuvaev, S.,*** *and Koulakov, A.*

Network cloning using DNA barcodes (PNAS '19)
Shuvaev, S., *Başerdem, B., Zador, A., and Koulakov, A.*

Click histochemistry for whole-mount staining of brain structures (MethodsX '19)
Lazutkin, A., ***Shuvaev, S.,*** *and Barykina, N.*

Suppressed neurogenesis without cognitive deficits: effects of fast neutron irradiation in mice (NeuroReport '19)
Mineyeva, O., Barykina, N., Bezriadnov, D., ..., ***Shuvaev, S.,*** *Usova, S., and Lazutkin, A.*

DALMATIAN: an algorithm for automatic cell detection and counting in 3D (Front Neuroanat '17)
Shuvaev, S., *Lazutkin, A., Kedrov, A., Anokhin, K., Enikolopov, G., and Koulakov, A.*

Representations of sound in deep learning of audio features from music (arXiv '17)
Shuvaev, S., *Giaffar, H., and Koulakov, A.*

Details: scholar.google.com/citations?user=2u5O9OwAAAAJ