DENIS UZHVA

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GitHub: https://github.com/denisuzhva

PROFILE

Highly motivated mathematical programming PhD student at Saint Petersburg State University. I have over three years of experience as a **deep learning engineer** and **data scientist** for scientific and industrial applications: from physical experiments data analysis at CERN to development of image processing and computer vision tools for smartphone photography. During that period, I developed programming skills and gained experience in various software frameworks and APIs such as PyTorch, TensorFlow, or OpenCV, as well as strong background in applied mathematics: statistics, dynamics and control theory. Now my interests also encompass multi-agent technology (swarm robotics, IoT), stochastic programming (signal filtration and compression), and music production, aside from maths and programming.

SKILLS

- Programming languages: Python, MATLAB, R, C++, Java
- Frameworks and APIs: PyTorch, TensorFlow, NVIDIA CUDA, Keras, Scikit-learn, JADE, OpenCV
- Data visualization: Matplotlib, NetworkX
- Mathematics: Dynamics, Discrete Mathematics, Optimization, Geometry, Statistics
- Other: Git, LaTeX, Vim, Bash, Docker
- Music: Ableton Live, Bitwig Studio, VCV Rack, analog and acoustic instruments
- Soft skills: communication, advanced problem solving, adaptability, team leadership

EDUCATION

St. Petersburg State University, Saint Petersburg　　　　　*September 2021 - Present*
Ph.D. in Mathematics
Department of Mathematics & Mechanics

St. Petersburg State University, Saint Petersburg　　　　　*September 2019 - June 2021*
M.Sc. in Software engineering
Department of Mathematics & Mechanics

St. Petersburg State University, Saint Petersburg　　　　　*September 2015 - June 2019*
B.Sc. in High energy and elementary particles physics
Department of Physics

EXPERIENCE

Junior Researcher　　　　　*April 2023 - Present*
Saint Petersburg State University

- Investigation and development of deep learning approaches for mechanics.
- Responsible for machine learning model development, data synthesis and validation.
- **Key achievement:** the developed reinforcement learning model can adequately predict solid body topology for desired durability.

Junior Researcher *October 2020 - Present*
Institute for Problems in Mechanical Engineering of the RAS

- Investigation and development of new methods to control swarm robotic systems.

- Responsible for development of mathematical theory, which is able to describe multi-agent networks. Also responsible for the development of the software environment for network simulations.

- **Key achievement:** the developed theory successfully describes cluster synchronization phenomenon in networks of intelligent agents.

Software Engineer *July 2021 - September 2021*
Saint Petersburg State University

- Investigation and development of algorithms for geophysical data compression.

- Responsible for development of a compression and reconstruction algorithms.

- **Key achievement:** the developed algorithm allows to compress geophysical data without much losses after reconstruction.

Research Engineer *January 2021 - January 2023*
Saint Petersburg State University

- Investigation and development of image processing algorithms for low luminosity photography quality improvement.

- Responsible for the de-noising deep learning model development and modeling of noise for simulated data. Also responsible for algorithm implementation and deployment on GPUs.

- **Key achievement:** the developed deep learning compressed sensing approach performs superior image enhancement in comparison to the SOTA approaches.

Research Assistant *September 2019 - December 2020*
Saint Petersburg State University

- Investigation and development of state-of-the-art machine learning methods to data analysis in the NA61/SHINE CERN physical experiment.

- Responsible for design of architecture and software implementation of ML models, as well as data preparation, augmentation and visualization.

- **Key achievement:** the developed models demonstrate superior accuracy in comparison with classical approaches such as decision trees and "cut-based analysis".

LANGUAGE SKILLS

- Russian: native

- English: proficient

- Japanese: beginner

CONFERENCES AND SCHOOLS

The 22nd IFAC World Congress 2023 (Yokohama, Japan)
"Adaptive Distributed Cluster Flow Control for a Group of Autonomous Robots"

61st IEEE Conference on Decision and Control 2022 (Cancún, Mexico)
"Compressed Cluster Sensing in multi-agent IoT Control"

XIV Multiconference on Control Problems 2021 (Divnomorsk, Russia)
"Cluster Flow Control in Distributed Network Systems"

Eighteenth Russian Conference on Artificial Intelligence 2020 (Moscow, Russia)
"Invariance preserving control of clusters recognized in networks of Kuramoto oscillators"

XIV Workshop on Particle Correlations and Femtoscopy 2019 (Dubna, Russia)
"Convolutional neural network for centrality in fixed target experiments"

NA61/SHINE CERN Analysis/Software/Calibration Meeting 2019 (Katowice, Poland)
"Convolutions neural nets for centrality in Be+Be"

Science And Progress 2018 (Saint Petersburg, Russia)
"Investigation of Deep Learning methods for the classification of events in the NOvA experiment"

JINR Summer Student Program 2018 (Dubna, Russia)
"Investigation of Deep Learning methods for the classification of events in the NOvA experiment"

MAIN PUBLICATIONS

- "Adaptive Distributed Cluster Flow Control for a Group of Autonomous Robots", The 22nd IFAC World Congress, 2023

- "Compressed Cluster Sensing in multi-agent IoT Control", 61st IEEE Conference on Decision and Control, 2022

- "Cluster Control of Complex Cyber-physical Systems", Cybernetics and Physics, 2021

- "Cluster Flows and multi-agent Technology", Mathematics, 2021

- "Invariance preserving control of clusters recognized in networks of Kuramoto oscillators", Artificial Intelligence, 2020

- "Convolutional neural network for centrality determination in fixed target experiments", Physics of Particles and Nuclei, 2020