Ivan Ilin

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Education

MS/PhD, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia
Computer Science
GPA: – *2023–Present*

M.Sc, Novosibirsk State University, Novosibirsk, Russia
Automation of Physical and Technical Research
GPA: 5.0/5.0 *2021–2023*
State-funded student

B.S., Novosibirsk State University, Novosibirsk, Russia
Automation of Physical and Technical Research
GPA: 4.67/5.0 *2017–2021*
State-funded student

Specialized Educational Scientific Center, Novosibirsk, Russia
Physical Mathematical School *2015–2017*

State-funded student

Professional Experience

ExpaSoft, Novosibirsk, Russia
Deep Learning Junior Researcher *2020–2023*

- Acceleration of the neural vocoder for speech generation using pruning and distillation. Tacatron-2 encoder and WaveGlow vocoder were used. As a method for optimizing the speed and size of the network, structured pruning was used, which was applied to an already trained model with subsequent fine tuning. As a result, we managed to speed up the model by more than 1.5 times on Nvidia GTX 1050-ti with quality improvement (MOS: +0.18, WER: -1.8%) and in 2 times without significant quality loss (MOS: -0.29, WER: +2%).

NSU, Novosibirsk, Russia
Programming teacher *2022–2023*

- Python programming teacher for 2nd year bachelor students of the Faculty of Physics

Budker Institute of Nuclear Physics, Novosibirsk, Russia
Undergraduate Research Assistant *Jan 2020–Aug 2020*

- Development of a system for automated testing of the electronics of the electromagnetic calorimeter of the Belle II detector. As a result of the work, it was possible to develop the necessary equipment tests. With the help of the Gcov utility, we found out that the share of test coverage of the ECL LIB library is 63%.

Lavrentyev Institute of Hydrodynamics, Novosibirsk, Russia
Study of induction throwing of cylindrical conductors by a pulsed magnetic field *Sep 2018–Aug 2019*

- Acceleration of cylindrical conductors by a pulsed magnetic field.

Research Interests

- **Deep Learning and Machine Learning**: image generation and recognition, NLP, voice generation, application of ml and dl in games
- **Graphics and Physics Engines**: foundation and advanced 3d graphics generation, physics simulations, game design
- **Animations and Design**: advanced programmed animations by manim or other libraries, product and gadget design, advertisement

Computer Skills

- **Programming Languages**: Python, C/C++
- **Libraries**: OpenCV, OpenGL, PyTorch, Manim, 3dzavr
- **Other**: git, UNIX, HTML/CSS, PHP, MySQL

Publications

Malinovskii, V., Panferov, A., Ilin, I., Guo, H., Richtárik, P. and Alistarh, D., 2024. Pushing the Limits of Large Language Model Quantization via the Linearity Theorem. arXiv preprint arXiv:2411.17525.

Malinovskii, V., Mazur, D., Ilin, I., Kuznedelev, D., Burlachenko, K., Yi, K., Alistarh, D. and Richtarik, P., 2024. PV-Tuning: Beyond Straight-Through Estimation for Extreme LLM Compression. arXiv preprint arXiv:2405.14852.

Tyurin, A., Pozzi, M., Ilin, I. and Richtarik, P., 2024. Shadowheart SGD: Distributed Asynchronous SGD with Optimal Time Complexity Under Arbitrary Computation and Communication Heterogeneity. arXiv preprint arXiv:2402.04785.

Xin, J., Ilin, I., Zhang, S., Canini, M. and Richtárik, P., 2023, December. Kimad: Adaptive Gradient Compression with Bandwidth Awareness. In Proceedings of the 4th International Workshop on Distributed Machine Learning (pp. 35-48).

My projects and achievements

Online math school "Vectozavr": School of mathematics for programmers and game developers on the basics of linear algebra and standard 3D graphics algorithms., started in Apr 2022. Full project (including curriculum development and creation of animations and simulations) was made by myself. link: https://vectozavr.ru

YouTube channel "Vectozavr": A YouTube channel where I post results of my work in physics, math and programming, started in Jan 2018. link 1: youtube/vectozavr link 2: GitHub/vectozavr

ilinblog.ru: My website that was created for publication of scientific articles, projects, research and experience. It has many readers and popular articles, started in Sep 2017.

3Dzavr: 3D engine from scratch (without OpenGL or any other 3D graphics library). The main goal - to implement basic 3D graphics from scratch. It has a real usage in a online shooter. The code is available on GitHub: link. It has more than 150 stars and more than 30 forks in total (shooter + engine), started in Sep 2021.

Pseudo 3D Engine: Simple engine that was designed for writing pseudo-3D games like Wolfenstein 3D or Doom. The code is available on GitHub: link. It has more than 150 stars and more than 30 forks, started in Sep 2020.

GameBoy on Arduino: Simple engine that was designed for writing pseudo-3D games like Wolfenstein 3D or Doom. The code is available on GitHub: link. It has more than 40 stars, started in Sep 2020.

IYPT: Captain of the Russian team in International Young Physicists Tournament in Singapore/Russia, 2016 – 2017.

Non Scientific Reports

I. Ilin. Acceleration of the flow based neural vocoder Waveglow for synthesizing speech speech from sound spectra. (in Russian) link

I. Ilin. Development of an automated testing system for the electronics of the electromagnetic calorimeter of the Belle II detector. (in Russian) link

I. Ilin. Measurement of the quantum efficiency spectrum of a semiconductor photocathode based on gallium arsenide. (in Russian) link

I. Ilin. Investigation of induction throwing of cylindrical conductors by a pulsed string magnetic field. (in Russian) link

I. Ilin. Study of the laws of Brownian motion and growth of DLA clusters. Experimental verification of the laws of Einstein-Smoluchowski. (in Russian) link

I. Ilin. Study of temperature measurement methods and limits of their applicability. Mathematical description of body temperature using Einstein's theory of Brownian motion and the heat equation. (in Russian) link

I. Ilin. Study of the mechanics and dynamics of motion of absolutely rigid balls and elastic rubber balls using Newton's laws, conservation of momentum, angular momentum and energy. (in Russian) link