

# Aleksei Sholokhov

202 Lewis Hall, Seattle, WA 98105

🌐 [linkedin.com/in/aksholokhov](https://www.linkedin.com/in/aksholokhov)

✉ [aksh@uw.edu](mailto:aksh@uw.edu)

📞 [aksholokhov](https://www.instagram.com/aksholokhov)

📠 505-557-59-81

## EDUCATION

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### University of Washington

*Ph.D. in Applied Mathematics*

Seattle, WA

*Expected Graduation: 06/2023*

## SKILLS

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### Research in Machine Learning Algorithms, Deep Learning, and Optimization

Seattle, WA

*As Research Assistant at the University of Washington*

*09/2018-now*

- Integrated **Neural ODE** techniques into model discovery library **SINDy**, under the supervision of J. Nathan Kutz and Steve Brunton. Decreased the amount of data needed to model noisy dynamical systems by a factor of 10.
- Accelerated training of deep neural networks using higher-order optimization methods. Implemented it as **TensorFlow** and **jax** modules. Achieved state-of-the-art performance for selected image recognition tasks.

### Data Science and Statistical Analysis

Seattle, WA

*As Research Assistant at the Institute for Health Metrics and Evaluation (IHME)*

*09/2019-12/2021*

- Invented new statistical modeling tool **pysr3** which does feature selection using non-convex optimization techniques. Implemented it as a **scikit-learn**-compatible **python** package. Achieved 30-fold speed-up relative to the competitors.
- Developed a statistical model that projects cases and deaths from COVID-19 in collaboration with a team of 130 researchers. It helped governmental decision makers manage resources and plan ahead during the pandemic.

### Software Development in Python, MATLAB, and C++

Seattle, WA

*As Research Assistant at University of Washington and IHME*

*09/2018-now*

- Developed **gspack**: python-autograder to accelerate grading of coding assignments. This package is successfully used for 5 scientific computing classes for thousands of homeworks in Department of Applied Mathematics.
- Enabled SVM classifiers to work with large-scale data using approximate nearest neighbor search. Implemented it using **SQL**, **C++**, and **Python**. Improved accuracy and memory costs by 30% over competitors.
- Learned **OpenMP**, **MPI**, **CUDA**, and **MATLAB** by working as a teaching assistant for graduate-level High-Performance Computing and Scientific Computing classes for 6 quarters.

### Project Management, Communication, and Leadership skills

Moscow, Russia

*As Research Student at Computing Center of Russian Academy of Science*

*02/2016-07/2018*

- Led **RySearch** project: an exploratory data analysis and recommender system that simplifies knowledge discovery with NLP techniques such as topic modeling. Implemented it using **python**, **JavaScript**, and **MongoDB**.
- Effectively organized research and software development in a team of 4 researchers. Published 2 novel quality metrics for topic models based on this work.

### Negotiation Skills, Cross-Functional Collaboration, and Cross-Cultural Dialog

Seattle, WA

*As a Diversity, Equity, and Inclusion (DEI) Committee Member at UW*

*09/2020 - Now*

- Developed 10-year Diversity Action Plan for the Department of Applied Mathematics.
- Negotiated \$20k financial commitment from the department of Applied Mathematics to Early Scholars Program.
- Organized and led climate orientations and educational seminars on importance of diversity and inclusion in academia.

## SELECTED PUBLICATIONS

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- Sholokhov A., Santomauro D., Burke J., Zheng P., and Aravkin A., "Universal Feature Selection for Mixed-Effects Models with Non-Convex Penalties", *in preparation*
- Sholokhov, A., Zheng, P., and Aravkin, A., "pysr3: Python Library for Sparse Relaxed Regularized Regression", *under peer-review*
- IHME Covid-19 Forecasting Team, "Modeling COVID-19 scenarios for the United States". *Nature Medicine*, 2020
- Belyy A.V., Selezniova, M.S., Sholokhov, A., and Vorontsov, K., "Quality Evaluation and Improvement for Hierarchical Topic Modelling", *24rd International Conference on Computational Linguistics*