

# Aleksei Sholokhov

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## EDUCATION

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### University of Washington

*Ph.D. in Applied Mathematics*

Seattle, WA

*Expected Graduation: 07/2023*

### University of Washington

*M.Sc. in Applied Mathematics*

Seattle, WA

*07/2021*

## SKILLS

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### Data Science and Data Analytics

Seattle, WA

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

*09/2018-now*

- Devised new statistical modeling tools to improve the reliability of generalized linear models and mixed-effect models on epidemiologic data. Implemented it as a `python` package; achieved 30-fold speed-up upon deployment to the company's pipeline.
- Developed IHME Projections: a statistical model that projects cases and deaths from COVID-19 globally. Collaborated with a team of 130+ researchers while working on it. This tool helped the decision makers, like CDC, to properly allocate scarce resources at the beginning of the pandemic.

### Research in Machine Learning Algorithms and Deep Learning

Seattle, WA

*As Research Assistant at University of Washington*

*09/2018-now*

- Created an algorithm to extract interpretable models and learned physics laws from trained neural networks. Decreased the amount of data needed to model noisy dynamical systems by 90%.
- Adapted a reinforcement learning algorithm to dynamically control the energy consumption of electric loads.
- Adapted novel optimization methods to accelerate training of deep learning models with `tensorflow`, `jax`, and `CUDA`. Achieved state-of-the-art performance in selected image recognition applications.

### Software Development in Python, Scala, 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 over 3000 students in Department of Applied Mathematics.
- Self-taught `Scala`; successfully implemented a type-inference system on my free time.
- Enabled SVM classifiers to work with large-scale data. Implemented an open-source package `MEMOIR` using `SQL`, `C++`, and `Python`. Improved the accuracy and memory management by 30% over state-of-the-art.

### Project Management, Communication, Teamwork

Moscow, Russia

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

*02/2016-07/2018*

- Developed strong analytical and quantitative problem-solving skills by teaching graduate-level classes on Scientific Computing and Optimization to classes of 200+ students (UW).
- Lead `rysearch` project: an exploratory data analysis and recommender system that simplifies knowledge discovery with `MongoDB`, `BigARTM`. Written using `python` and `JavaScript`.
- Effectively organized research and software development in the team of 4 researchers to meet tight deadlines. Published 2 novel quality metrics for topic models based on this work.

## SELECTED PUBLICATIONS

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- **"Universal Feature Selection for Mixed-Effects Models with Non-convex Penalties"**  
Together with Santomauro D., Burke J., Zheng P., and Aravkin A., *in preparation*
- **"Distillation of Neural Differential Equations for Interpretable Model Discovery"**  
Together with Kutz, N., and Brunton, S. *in preparation*
- **"pysr3: Python Library for Sparse Relaxed Regularized Regression"**  
Together with Zheng, P., and Aravkin, A., *under peer-review*

- ``**Modeling COVID-19 scenarios for the United States**``.  
Together with IHME Covid-19 Forecasting Team. *Nature Medicine*, 2020.
- ``**Quality Evaluation and Improvement for Hierarchical Topic Modelling**``,  
Together with Belyy A.V., Selezniova, M.S., and Vorontsov, K.,  
*24rd International Conference on Computational Linguistics and Intellectual Technologies*
- ``**MEMOIR: Multi-class Extreme Classification with Inexact Margin**``.  
Together with Belyy, A., *arXiv preprint arXiv:1811.09863 (2018)*.

## SERVICE AND OUTREACH

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**Department of Applied Mathematics, University of Washington**

*Diversity, Equity, and Inclusion (DEI) Committee Member*

**Seattle, WA**

*09/2020 - Now*

- Developed 10-years Diversity Action Plan for the Department of Applied Mathematics
- Organized and led educational seminars on importance of diversity in academia.
- Interviewed faculty job candidates to assess their DEI action track.