Aleksei Sholokhov

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EDUCATION

University of Washington **Seattle, WA**
Ph.D. in Applied Mathematics *Expected Graduation: 07/2023*

University of Washington **Seattle, WA**
M.Sc. in Applied Mathematics *07/2021*

SKILLS

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 machine learning models in population health applications. Implemented it as a `python` package `skmixed`; 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; in collaboration with a team of 130 researchers. This tool helped the decision makers (including national, state, and local governments) to allocate resources and plan ahead during 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%.
- Accelerated deep neural network training using Fletcher-Reeves and Newton-Krylov methods, and implemented image recognition libraries using `TensorFlow` and `jax` that achieved state-of-the-art performance for selected image recognition tasks.

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.
- Enabled SVM classifiers to work with large-scale data using stochastic optimization. Implemented it as 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, communication, and quantitative problem-solving skills by teaching graduate-level classes on Scientific Computing, HPC, and Optimization to classes of 200+ students (UW).
- Lead `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 the team of 4 researchers and successfully met tight deadlines. Published 2 novel quality metrics for topic models based on this work.

SELECTED PUBLICATIONS

- **``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

Department of Applied Mathematics, University of Washington **Seattle, WA**
Diversity, Equity, and Inclusion (DEI) Committee Member *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.