Samuel **Horváth**

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Education

King Abdullah University of Science & Technology   *Thuwal, Saudi Arabia*

PHD IN MACHINE LEARNING AND OPTIMIZATION   *Jan. 2019 - Present*

- Supervised by Peter Richtárik
- GPA: 4.00/4.00

King Abdullah University of Science & Technology   *Thuwal, Saudi Arabia*

MSC IN STATISTICS   *Aug. 2017 - Dec. 2018*

- Supervised by Peter Richtárik
- GPA: 3.82/4.00

Comenius University   *Bratislava, Slovakia*

B.S. IN FINANCIAL MATHEMATICS   *Sep. 2014 - Jun. 2017*

- GPA 4.00/4.00 # 1
- Thesis: Visualization of Portfolio Optimization with R Shiny

Honors & Awards

2020	**The Best Paper Award**, (1888 USD) NeurIPS 2020–SpicyFL Workshop	*Online*
2020	**Best Reviewer Award (Top 10%)**, NeurIPS 2020	*Online*
2020	**Progress towards PhD rated as outstanding**,	*Saudi Arabia*
2020	**MLSS Acceptance**, Machine Learning Summer School (MLSS) 2020, Tuebingen(acceptance rate 180/1300+), also accepted to MLLSS 2020 Indonesia	*Germany*
2019	**Top Reviewer Award**, NeurIPS 2019	*Canada*
2019	**Progress towards PhD rated as outstanding**,	*Saudi Arabia*
2018	157th/4049, IEEEXtreme 24-Hour Programming Competition 12.0 joint with Dmitry Kovalev	*Saudi Arabia*
2018	**The Best Poster**, (500 EUR) Data Science Summer School, awarded as one of two out of total 170 posters presented at DS^3 at Ecole Polytechnique	*France*
2017	131th/3350, IEEEXtreme 24-Hour Programming Competition 11.0 joint with Konstantin Mishchenko	*Saudi Arabia*
2017	**KAUST Fellowship**, A generous fellowship provided for MSc/PhD students at KAUST	*Saudi Arabia*
2017	**Universities**, Accepted to MSc programmes at Imperial College London (Statistics), University College London (Data Science) and University of Edinburgh (Statistical Data Science)	*United Kingdom*
2017	2nd **place**, CFA Institute Research Challenge hosted by CFA Society Czech Republic	*Czech republic*
2017	37th **place** , Vojtech Jarnik International Mathematical Competition- Category II	*Czech republic*
2017	**Excellence Scholarship**, Scholarship for top 5% students at Comenius University	*Slovakia*
2016	**Third Prize**, 23rd International Mathematics Competition for university students	*Bulgaria*
2016	36th **place**, Vojtech Jarnik International Mathematical Competition- Category I	*Czech republic*
2016	**Excellence Scholarship**, Scholarship for top 5% students at Comenius University	*Slovakia*
2015	**Excellence Scholarship**, Scholarship for top 5% students at Comenius University	*Slovakia*
2014	18th **place**, Slovak national round of Mathematical Olympiad for high school students	*Slovakia*
2014	1st **place**, Region round of Mathematical Olympiad for high school students	*Slovakia*

Publications

A Field Guide to Federated Optimization

WANG ET AL. *Jul. 2021*

- `https://arxiv.org/pdf/2107.06917.pdf`

FjORD: Fair and Accurate Federated Learning under heterogeneous targets with Ordered Dropout

SAMUEL HORVÁTH, STEFANOS LASKARIDIS, MARIO ALMEIDA, ILIAS LEONTIADIS, STYLIANOS I. VENIERIS, NICHOLAS D. LANE *Jan. 2021*

- Federated Learning Workshop, ICML 2021
- `https://arxiv.org/pdf/2102.13451.pdf`

Hyperparameter Transfer Learning with Adaptive Complexity

SAMUEL HORVÁTH, AARON KLEIN, PETER RICHTÁRIK, CEDRIC ARCHAMBEAU *Jan. 2021*

- Proceedings of the 24th International Conference on Artificial Intelligence and Statistics, AISTATS 2021
- `https://arxiv.org/pdf/2102.12810.pdf`

Optimal Client Sampling for Federated Learning

WENLIN CHEN, SAMUEL HORVÁTH, PETER RICHTÁRIK *Oct. 2020*

- Privacy Preserving Machine Learning Workshop, NeurIPS 2020
- `https://arxiv.org/pdf/2010.13723.pdf`

Lower Bounds and Optimal Algorithms for Personalized Federated Learning

FILIP HANZELY, SAMUEL HORVÁTH, SLAVOMÍR HANZELY , PETER RICHTÁRIK *Sep. 2020*

- Proceedings of the 34th Thirty-fourth Conference on Neural Information Processing Systems
- `https://arxiv.org/pdf/2010.02372.pdf`

A Better Alternative to Error Feedback for Communication-Efficient Distributed Learning

SAMUEL HORVÁTH, PETER RICHTÁRIK *Jun. 2020*

- **The Best Paper Award** at NeurIPS 2020 Workshop on Scalability, Privacy, and Security in Federated Learning
- Proceedings of the 9th International Conference on Learning Representations
- Federated Learning One World Online Seminar, one hour talk: `https://www.youtube.com/watch?v=AAXcjq8OLVU`
- `https://openreview.net/pdf?id=vYVI1CHPaQg`

Adaptivity of Stochastic Gradient Methods for Nonconvex Optimization

SAMUEL HORVÁTH, LIHUA LEI, PETER RICHTÁRIK, MICHAEL JORDAN *Feb. 2020*

- **Spotlight** at Optimization for Machine Learning workshop, NeurIPS 2020
- `https://arxiv.org/pdf/2002.05359.pdf`

On Biased Compression for Distributed Learning

ALEKSANDR BEZNOSIKOV, SAMUEL HORVÁTH, PETER RICHTÁRIK, MHER SAFARYAN *Feb. 2020*

- **Oral** at NeurIPS 2020 Workshop on Scalability, Privacy, and Security in Federated Learning
- `https://arxiv.org/pdf/2002.12410.pdf`

Natural Compression for Distributed Deep Learning

SAMUEL HORVÁTH, CHEN-YU HO, ĽUDOVÍT HORVÁTH, ATAL SAHU, MARCO CANINI, PETER RICHTÁRIK *May. 2019*

- Workshop on AI Systems at Symposium on Operating Systems Principles 2019
- `https://arxiv.org/pdf/1905.10988.pdf`

Stochastic Distributed Learning with Gradient Quantization and Variance Reduction

SAMUEL HORVÁTH, DMITRY KOVALEV, KONSTANTIN MISHCHENKO, SEBASTIAN STICH, PETER RICHTÁRIK *Apr. 2019*

- A poster based on the results of this paper won **the Best Poster** at Control, Information and Optimization Summer School in Voronovo, Moscow, presented by Dmitry Kovalev
- `https://arxiv.org/pdf/1904.05115.pdf`

Don't Jump Through Hoops and Remove Those Loops: SVRG and Katyusha are Better Without the Outer Loop

DMITRY KOVALEV, SAMUEL HORVÁTH, PETER RICHTÁRIK *Jan. 2019*

- Proceedings of the 31st International Conference on Algorithmic Learning Theory, San Diego, California
- `https://arxiv.org/pdf/1901.08689.pdf`

Nonconvex Variance Reduced Optimization with Arbitrary Sampling

SAMUEL HORVÁTH, PETER RICHTÁRIK   *Sep. 2018*

- A poster based on the results of this paper won **the Best Poster** at Data Science Summer School in Paris, 2018
- Proceedings of the 36th International Conference on Machine Learning, Long Beach, California
- `http://proceedings.mlr.press/v97/horvath19a.html`

Internships and Research Visits

Samsung AI Center   *Cambridge, UK*

RESEARCH INTERN   *Sept. 2020 - Feb. 2021*

- Intern at Embedded AI Team with focus on Federated Learning under supervision Nicholas Lane, Stefanos Laskaridis, and Ilias Leontiadis.
- While on the internship, I was invited to give a talk at the Machine Learning Systems lab at the University of Cambridge led by Nicholas Lane.

Amazon   *Berlin, Germany*

APPLIED SCIENTIST INTERN   *Summer 2019*

- Intern at AI Core Team with focus on Hyperparameters Optimization supervised by Cedric Archambeau and Matthias Seeger.

University of California, Berkeley   *Berkeley, California*

VISITING PHD STUDENT   *Spring 2019*

- Research visit of Prof. Michael I. Jordan. As part of the visit, I attended Deep Learning Foundations Workshop in Simons Institute.

Exponea   *Bratislava, Slovakia*

AI INTERN   *Summer 2018*

- I joined Exponea as AI Intern for Summer 2018. I was an intern at their Recommendation Team, where I worked on Sorting and Ranking Project for a personalized recommendation for e-commerce.

Dell Technologies   *Bratislava, Slovakia*

INTERN   *Jun 2016 - Jun 2017*

- Global tax automation. Part-time job during my undergraduate studies.

Conferences

ICML 2021   *Vienna (online), Austria*

INTERNATIONAL CONFERENCE ON MACHINE LEARNING   *Jul. 2021*

- I presented two posters based on our papers: **FjORD: Fair and Accurate Federated Learning under heterogeneous targets with Ordered Dropout** and **FedMix: A Simple and Communication-Efficient Alternative to Local Methods in Federated Learning**.

NeurIPS 2020   *Online*

CONFERENCE ON NEURAL INFORMATION PROCESSING SYSTEMS   *Dec. 2020*

- Main conference (1 paper accepted): **Lower Bounds and Optimal Algorithms for Personalized Federated Learning**
- Workshops (**4 papers accepted – Best Paper Award, Oral Presentation, Spotlight Talk and Poster**):
  - Privacy Preserving Machine Learning: **Optimal Client Sampling for Federated Learning** (poster)
  - Optimization for Machine Learning: **Adaptivity of Stochastic Gradient Methods for Nonconvex Optimization** (Spotlight Talk)
  - Workshop on Scalability, Privacy, and Security in Federated Learning: **A Better Alternative to Error Feedback for Communication-Efficient DistributedLearning** (Best Paper Award), **On Biased Compression for Distributed Learning** (Oral Presentation)

MLSS 2020   *Tuebingen (online), Germany*

MAX PLANCK INSTITUTE FOR INTELLIGENT SYSTEMS   *Jul. 2020*

- The Machine Learning Summer School
- I gave a 10 minutes talk about our paper: **Natural Compression for Distributed Deep Learning**.

KAUST - Tsinghua Workshop   *Thuwal, Saudi Arabia*

KAUST   *Nov. 2019*

- I presented a poster about our work **Natural Compression for Distributed Deep Learning**.

Amazon Research Days   *Berlin, Germany*

AMAZON   *Oct. 2019*

- Amazon Conference to promote collaboration with academia.

EMEA Research Internship Colloquium

Cambridge, United Kingdom

AMAZON

Aug. 2019

- Amazon Conference for all of its interns from EMEA region.
- I presented a poster about our work **Natural Compression for Distributed Deep Learning**.

ICCOPT

Berlin, Germany

TU BERLIN

Aug. 2019

- International Conference on Continuous Optimization
- I organized Minisymposia and gave a talk about our work **Stochastic Distributed Learning with Gradient Quantization and Variance Reduction**.

ICML 2019

Long Beach, USA

LONG BEACH CONVENTION CENTER

Jun. 2019

- Thirty-sixth International Conference on Machine Learning
- We had our **Nonconvex Variance Reduced Optimization with Arbitrary Sampling** accepted, which I presented as the 5 min talk as well as the poster

Deep Learning Boot Camp

Berkeley, USA

SIMONS INSTITUTE FOR THEORY AND COMPUTING

May 2019

- The Boot Camp is intended to acquaint program participants with the key themes of the program such as Generalization, Approximation Power, Adversarial Examples and Over-parametrized Neural Networks.

Data Science Summer School

Paris, France

ÉCOLE POLYTECHNIQUE

Jun. 2018

- The primary focus of the event is to provide a series of courses and practical sessions covering the latest advances in the field of data science
- speakers: Cédric VILLANI, Yann LECUN, Suvrit SRA, ...
- I was presenting poster, which was awarded as **the Best Poster** with **500 Euros** cash prize as one of two out of total 170 posters presented

Optimization and Big Data

KAUST, Saudi Arabia

KAUST

Feb. 2018

- 4 days conference aimed at novel optimization algorithms and distributed systems capable of working in the Big Data setting

Applied Machine Learning Days

Lausanne, Switzerland

EPFL

Jan. 2018

- 2 days hands-on workshops on Machine Learning and 2 days conference with speakers such as Christopher Bishop from Microsoft Research

Extracurricular Courses and Activities

Seminar co-organizer

Online

FEDERATED LEARNING ONE WORLD SEMINAR SERIES

2020-

- together with Peter Richtárik, Virginia Smith, Aurelien Bellet and Dan Alistarh, we organize Federated Learning One World (FLOW) seminar, `https://sites.google.com/view/one-world-seminar-series-flow`

Volunteer

Online

ICML 2020

2020

Reviewer

ICML '21 '20 '19, AISTATS '20, NeurIPS '20 '19 '18, DistributedML Workshop CoNEXT '20 '21, Optimization Methods AND Software

2018-

Minisymposia organizer

Berlin, Germany

ICCOPT

2019

- together with Filip Hanzely, we organized a minisymposia on the topic Large-Scale Stochastic First-Order Optimization consisting of 6 talks.

Nanodegree mentor

Online

UDACITY

2019-2020

- I serve as a mentor providing 1 on 1 meetings, code and project reviews and extra seminars for the students enrolled in Deep Learning Nanodegree

Seminar Organizer *KAUST, Saudi Arabia*

ALL HANDS MEETINGS ON BIG DATA OPTIMIZATION *2018*

- Organizer of a group seminar, gave 6 talks given the time period

Teaching Assistant *KAUST, Saudi Arabia*

SPECIAL TOPICS IN DATA SCIENCE *2018*

- I was teaching assistant for PhD level course, which covers a mathematically rigorous introduction to the field of big data optimization.

Enterpreunership program *Saudi Arabia*

CORNELL UNIVERSITY *2018*

- 7-days course covers the basic process of how to move from generating a new business idea to turning that idea into a real business
- taught by Cornell professors Chad Carlos, Wesley Sine, Thomas Kurz

Deep Learning Nanodegree *Online*

UDACITY *2018*

- Topics covered: Keras and TensorFlow, convolutional and recurrent networks, deep reinforcement learning, and GANs
- taught by authorities such as Sebastian Thrun, Ian Goodfellow, and Andrew Trask

Divide and Conquer, Sorting and Searching, and Randomized Algorithms *Online*

COURSERA/STANFORD UNIVERSITY *2018*

- taught by great CS Expert Tim Roughgarden
- Passed with Distinction (98% Grade)

Statistical Learning *Online*

STANFORD UNIVERSITY *2017*

- Topics covered: Linear Regression, Classification, Tree-based Methods, SVM, Unsupervised Learning
- Based on the book "An Introduction to Statistical learning, with Applications in R"
- Passed with Distinction (100% Grade)
- `https://verify.lagunita.stanford.edu/SOA/7e92a12167684ec7ba2fd1313b96fb5d/`

Machine Learning *Online*

COURSERA/STANFORD UNIVERSITY *2017*

- Topics covered: Linear and Logistic Regression, Neural Networks, SVM, Unsupervised Learning, Recommend Systems, ...
- taught by Machine Learning Expert Andrew Ng
- Passed with Distinction (100% Grade)

Skills

Mathematics	Probability and Statistics, Calculus, Linear Algebra, Statistical Learning, Deep Learning
Programming	Python, PyTorch, MXNet, Tensorflow, Keras, Pandas, Julia, R, R Shiny, Matlab, VBA, SQL
Tools	MS Office, LaTeX, SQL Server, Tableau
Languages	Slovak C2, English C1, German A2

Hobbies

ALL KINDS OF SPORTS

- Football - used to play the regional league (over 200 matches), now just a hobby
- Fitness, Volleyball, Badminton