

# Samuel Horváth

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## Education

### King Abdullah University of Science & Technology

PHD IN MACHINE LEARNING AND OPTIMIZATION

- Supervised by Peter Richtárik
- GPA: 4.00/4.00

Thuwal, Saudi Arabia

Jan. 2019 - Present

### King Abdullah University of Science & Technology

MSc IN STATISTICS

- Supervised by Peter Richtárik
- GPA: 3.82/4.00

Thuwal, Saudi Arabia

Aug. 2017 - Dec. 2018

### Comenius University

B.S. IN FINANCIAL MATHEMATICS

- GPA 4.00/4.00 # 1
- Thesis: Visualization of Portfolio Optimization with R Shiny
- [samuelhorvath.shinyapps.io/efficient\\_frontier\\_visualization/](https://samuelhorvath.shinyapps.io/efficient_frontier_visualization/)

Bratislava, Slovakia

Sep. 2014 - Jun. 2017

## Honors & Awards

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

## Skills

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

# Extracurricular Courses and Activities

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## 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 '20 '19, AISTATS '20, NEURIPS '20 '19 '18, 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.

## Entrepreneurs 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/S0A/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)

# Conferences

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## MLSS 2020

MAX PLANCK INSTITUTE FOR INTELLIGENT SYSTEMS

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

*Tuebingen (online), Germany*

*Jul. 2020*

## KAUST - Tsinghua Workshop

KAUST

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

*Thuwal, Saudi Arabia*

*Nov. 2019*

## Amazon Research Days

AMAZON

- Amazon Conference to promote collaboration with academia.

*Berlin, Germany*

*Oct. 2019*

## EMEA Research Internship Colloquium

AMAZON

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

*Cambridge, United Kingdom*

*Aug. 2019*

## ICCOPT

TU BERLIN

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

*Berlin, Germany*

*Aug. 2019*

## ICML

LONG BEACH CONVENTION CENTER

- 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

*Long Beach, USA*

*Jun. 2019*

## Deep Learning Boot Camp

SIMONS INSTITUTE FOR THEORY AND COMPUTING

- 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.

*Berkeley, USA*

*May 2019*

## Data Science Summer School

ÉCOLE POLYTECHNIQUE

- 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

*Paris, France*

*Jun. 2018*

## Optimization and Big Data

KAUST

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

*KAUST, Saudi Arabia*

*Feb. 2018*

## Applied Machine Learning Days

EPFL

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

*Lausanne, Switzerland*

*Jan. 2018*

## Publications

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### Optimal Client Sampling for Federated Learning

WENLIN CHEN, SAMUEL HORVÁTH, PETER RICHTÁRIK

Oct. 2020

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

### Lower Bounds and Optimal Algorithms for Personalized Federated Learning

FILIP HANZELY, SAMUEL HORVÁTH, SLAVOMÍR HANZELY, PETER RICHTÁRIK

Sep. 2020

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

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

SAMUEL HORVÁTH, PETER RICHTÁRIK

Jun. 2020

- Federated Learning One World Online Seminar, one hour talk: <https://www.youtube.com/watch?v=AAxcjq80LVU>
- <https://arxiv.org/pdf/2006.11077.pdf>

### Adaptivity of Stochastic Gradient Methods for Nonconvex Optimization

SAMUEL HORVÁTH, LIHUA LEI, PETER RICHTÁRIK, MICHAEL JORDAN

Feb. 2020

- <https://arxiv.org/pdf/2002.05359.pdf>

### On Biased Compression for Distributed Learning

ALEKSANDR BEZNOSEKOV, SAMUEL HORVÁTH, PETER RICHTÁRIK, MHER SAFARYAN

Feb. 2020

- <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 31<sup>st</sup> 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 36<sup>th</sup> International Conference on Machine Learning, Long Beach, California
- <http://proceedings.mlr.press/v97/horvath19a.html>

## Internships and Research Visits

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### 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 Leonardidis.

### 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.

## Hobbies

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ALL KINDS OF SPORTS

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