

GERGELY HAJGATÓ

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RESEARCH EXPERIENCE

Nokia Bell Labs

Research Intern

Budapest

June 2018 to Sept 2018

- Earned a 3-month scholarship for deep learning research mentored by Dr. Csaba Nemes.
- Developed an OpenAI Gym-like environment for water distribution networks (WDNs).
- Developed a deep q-network agent to control the pumps in a WDN optimally.
- Constructed an analogy between optimal WDN operation and virtual network function scaling to extend the agent's usability.
- Results were presented in a Pecha Kucha for Bell Labs. Continued research led to the submission of 1 journal paper.

Dept. of Hydrodynamic Systems

Research assistant fellow

Budapest

June 2014 to Sept 2017

- Examined the performance of gradient-free optimization algorithms for hydrodynamic shape optimization.
- Studied meta-modeling techniques to speed up shape optimization.
- Examined optimal solution's sensitivity to the hyperparameters of the optimization algorithm.
- Developed a shape-optimization framework for Grundfos that maximizes the efficiency of wastewater impellers.
- Participated and supervised short-term (2 weeks–6 months) industrial projects (over 15).
- Experiences motivated me to join the PhD program focused on deep learning.

EDUCATION AND PROFESSIONAL DEVELOPMENT

- **PhD** (2017-present), Deep Learning and Fluid Mechanics, Budapest University of Technology and Economics (Hungary). Supervisors: Dr. György Paál and Dr. Bálint Gyires-Tóth. CGPA: 4.27 out of 4.3.
- **Lecture series**, Machine Learning for Fluid Mechanics, von Karman Institute for Fluid Dynamics (Belgium), 2020.
- **MOOC**, Learning from Data, California Institute of Technology (USA), 2016.
- **MSc**, Fluid Mechanics, Budapest University of Technology and Economics (Hungary), 2014.
- **BSc**, Process Engineering, Budapest University of Technology and Economics (Hungary), 2011.
- Relevant **coursework** (graded excellent): *Analysis of Matrices, Numerical Methods of Linear Algebra, Design of Experiments, Deep Learning in Practice, Applications of Complex Analysis in Engineering*.

TEACHING AND MENTORING EXPERIENCE

- Supervised **3 graduates** in their final project for master degree, one of them won the Pattantyús-Pállfy award for his thesis.
- Supervised **7 undergraduates** in their final project for bachelor degree and over 15 students in individual and homework projects.
- Courses **taught**: *Deep Learning in Practice* (BSc/MSc, practice), *Signal Processing and measurement evaluation* (MSc, practice), *Design of Fluid Machinery* (MSc, lecture), *Fluid Machinery* (BSc, practice), *Introduction to Mechanical Engineering* (BSc, practice).
- Participated in workshops by NVIDIA Deep Learning Institute as a **teaching assistant**.

AWARDS

- Pattantyús-Pállfy **award** for the best master thesis in the field of hydrodynamics, 2014.
- **3rd place** on the National Conference of Student Research Societies, 2011.
- **1st place** on the Conference of Student Research Societies, 2010.

CONFERENCE PRESENTATIONS

- **Hajgató, G.**, Gyires-Tóth, B. and Paál G. (2018) "Predicting the flow field in a U-bend with deep neural networks", Conference on Modelling Fluid Flow (CMFF'18), 17th event of the International Conference Series on Fluid Flow Technologies. arXiv: 2010.00258.

PUBLICATIONS

- **Hajgató, G.**, Paál, G. and Gyires-Tóth B. (2020) "Deep Reinforcement Learning for Real-Time Optimization of Pumps in Water Distribution Systems", *J Water Res Plan Man*, 146(11), pp. (04020079)1-11. DOI: 10.1061/(ASCE)WR.1943-5452.0001287. arXiv: 2010.06460.
- **Hajgató, G.**, Gyires-Tóth, B. and Paál, G. (2019) "Accelerating Convergence of Fluid Dynamics Simulations with Convolutional Neural Networks", *Period Polytech Mech Eng*, 63(3), pp. 230-239. DOI: 10.3311/PPme.14134.

TECHNICAL SKILLS

- **Programming**: accomplished 10+ projects in Python with machine learning packages, big data analytics and visualization, distributed hyperparameter optimization, asynchronous and parallel programming. Automated workflow with Bash.
- **Computational**: used high-performance computing clusters and distributed computing on remote machines.
- **Fluid flow modelling**: accomplished 5+ projects with computational fluid dynamics software (OpenFOAM, ANSYS CFX).
- **Data acquisition**: assembled measurements for pressure, flow rate and vibration sensing in various environments.

OTHER

Service Member of the Committee of Informatics at the Faculty of Mechanical Engineering for 3 years.

Languages *English*: conversationally fluent. *German*: Basic words and phrases. *Hungarian*: native.