Seminar Hora Informaticae   **Institute of Computer Science, Prague**

Tuesday, March 19, 2024, 14.00 – 15.30 (2 – 3:30 PM) CET

Meeting Room 318, Address: Pod Vodárenskou věží 2, Prague 8

ZOOM Meeting ID: 954 7823 4977 ,   Passcode: 712564

ZOOM: https://cesnet.zoom.us/j/95478234977?pwd=dXoyekFHbDJ0MkNrTjVVS3F2STZqUT09

G. Kadlecová, P. Vidnerová, Department of Artificial Intelligence, ICS Prague:

Performance Prediction for Neural Architecture Search.

The Neural Architecture Search is an established field in the research area of automated machine learning (AutoML). It studies the optimization problem of finding the optimal architecture of a neural network for a given data or task. In our talk, we will explain the basis of NAS research and discuss its main pitfalls. We will handle the NAS problem as a multi-objective optimization problem, as we analyse metrics beyond network accuracy – namely HW metrics (energy and latency) and robustness. We will discuss the time requirements of a typical NAS algorithm and explain how performance prediction can help us reduce the computational demands. We will present the Zero-cost Proxies (ZCP), a recently emerged promising tool for fast performance prediction, and discuss their limitations. Based on that, we propose a predictor based on the properties of the neural graph. We analyze it across different network search spaces and objectives, demonstrating that the method outperforms most existing predictors while being fast and interpretable.

References:

(1) Krishnakumar, A., White, C., Zela, A., Tu, R., Safari, M., Hutter, F. *NAS-Bench-Suite-Zero: Accelerating Research on Zero Cost Proxies.* NeurIPS Datasets and Benchmarks Track 2022. https://doi.org/10.48550/arXiv.2210.03230

(2) White, C., Safari, M., Sukthanker, R., Ru, B., Elsken, T., Zela, A., Dey, D., Hutter, F. *Neural architecture search: Insights from 1000 papers*, 2023. https://doi.org/10.48550/arXiv.2301.08727

(3) White, C., Zela, A., Ru, B., Liu, Y., Hutter, F.: *How Powerful are Performance Predictors in Neural Architecture Search?* NeurIPS 2021. https://doi.org/10.48550/arXiv.2104.01177

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Petra Vidnerová (https://www.cs.cas.cz/staff/vidnerova/en) is a scientist at the Department of Artificial Intelligence, Institute of Computer Science, The Czech Academy of Sciences. Her main research interests cover machine learning, deep neural networks, neural architecture search.

Gabriela Kadlecová (https://www.cs.cas.cz/staff/suchoparova/en) is a PhD student at the same department, and at the Faculty of Mathematics and Physics, Charles University. She is supervised by Roman Neruda. Her main research interests are performance prediction in neural architecture search and graph neural network models.