Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Distributed Computing

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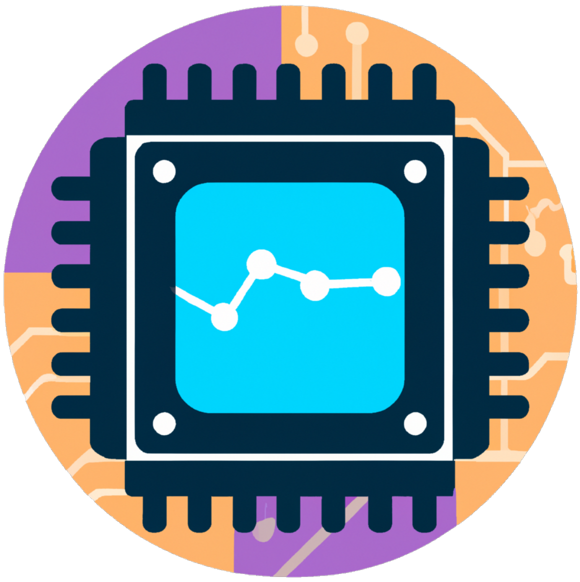
CLRS - Understanding GNNs through Algorithms

Graph Neural Networks (GNNs) have demonstrated their potential and capability of learning algorithms. A key feature of an algorithm is that it can be applied to inputs which vary in their size. With this in mind, recently, the CLRS Benchmark has been introduced by researches from DeepMind. It is specifically design to evaluate the ability of GNNs to learn various classic algorithms such as shortest path, sorting, or convex hull. Moreover, the benchmark evaluates extrapolation on graphs that are larger than those encountered during training.



The main goal of this thesis is to better understand and test the limits of the CLRS benchmark. Can we reproduce the given findings? How well do the current methods actually extrapolate? Can we break their performance by scaling to even larger graphs or using a different class of graph inputs? How well can the algorithms still be learned when fewer hints are provided during the learning process. Can we adapt the current baselines to get better performance, i.e. by making them recurrent. Can we even extend the current benchmark with other algorithms?
Other inputs or directions are welcomed. If you have your own ideas which are similar or just interested in CLRS in general we can set up a meeting to discuss a possible thesis.

Requirements: Strong motivation, knowledge in deep learning, or a solid background in machine learning, Python and libraries such as TensorFlow or PyTorch. We will have weekly meetings to discuss open questions and determine the next steps.

Interested? Please contact us for more details!

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