

Open Thesis / Project

Does Merging Channels Amplify Bias in DNNs?

Embedded Learning and Sensing Systems Group

Motivation

As deep learning models become increasingly prevalent in various applications, their computational demands grow, posing significant challenges for deployment on resource-constrained devices. One promising approach to address this issue is model pruning, which has demonstrated the ability to achieve high network compression levels with surprisingly little degradation in model accuracy. However, pruning often requires retraining the pruned model and also specialized hardware, making it infeasible in scenarios with strict hardware limitations. Channel merging, *i.e.*, a technique that combines multiple structures (*i.e.*, channels or neurons in Conv2D/Linear layers), offers an elegant solution to reduce model complexity and speed up inference without the need of retraining or specialized hardware. The goal of this thesis is to extend our previous work [1] by investigating the impact of channel merging on each model's class, quantifying which samples are affected, *i.e.*, Pruning Identified Exemplars, and comparing these results with our earlier findings.

Interested? Please contact us for more details!

Target Group

Students in ICE, Computer Science or Software Engineering.

Thesis Type

Master Project / Master Thesis.

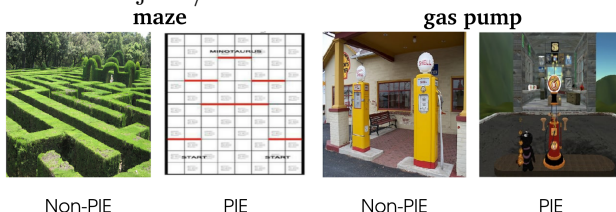


Image source: <https://arxiv.org/pdf/1911.05248>

Goals and Tasks

The project includes the following tasks:

- Conduct a thorough literature review on model compression and the properties of examples that the network forgets;
- Develop a theory by examining examples that the model forgets, possibly by estimating the impact of model merging on internal computations (see <https://arxiv.org/pdf/2404.11534>);
- Test the findings on semi-supervised or unsupervised trained networks;
- Present the results of your work and summarize the outcomes in a written report.

Requirements:

- Knowledge of neural networks;
- Programming skills in Python;
- Knowledge of PyTorch.

Used Tools & Equipment

- A compute cluster of TU Graz.

References

- [1] Francesco Corti et al. “Studying the impact of magnitude pruning on contrastive learning methods”. In: *ICML Workshop on Hardware Aware Efficient Training* (2022).

Contact Persons

- Francesco Corti (francesco.corti@tugraz.at)
- Dong Wang (dong.wang@tugraz.at)
- Assoc. Prof. Dr. Olga Saukh (saukh@tugraz.at)

