IMT Atlantique
Bretagne-Pays de la Loire
École Mines-Télécom

PhD Position :

POLYTECHNIQUE MONTRÉAL
UNIVERSITÉ D'INGÉNIERIE

UnrelAIble: training Deep Neural Networks using unreliable hardware

1 - Context and funding

Polytechnique Montréal and IMT Atlantique Brest are recruiting a PhD student in the fields of Artificial Intelligence and Electrical Engineering. The candidate will benefit a joint supervision leading to a joint diploma from both institutions. The funding is guaranteed. The candidate is expected to share his time between both institutions. Traveling costs will be covered.

2 - Research project

The core of the project is to investigate the ability of Stochastic Gradient Descent, the algorithm at the core of the training process in Deep Learning architectures, to accommodate for errors in computations and memory when implemented on unreliable hardware. Compensating methods are to be invented and explored. The candidate is expected to perform experiments using both theoretical models and high-level code and dedicated hardware. The ambition is to design deep learning systems using significantly less energy.

3 -Team supervision and PhD registration

The PhD supervision will consist of Prof. Leduc Primeau of Polytechnique Montréal and Prof. Vincent Gripon of IMT Atlantique. Polytechnique Montréal is a flagship of engineering in Québec, and is also one of Canada's leading engineering educational and research institutions. Since its establishment in 1873, Polytechnique Montréal has trained nearly 50,000 engineers, specialists, and researchers. IMT Atlantique is one of the top 10 engineering schools in France, and one of the top 400 universities in the world in THE World University Ranking. It is a general engineering *grande école* financed by the Ministry of Industry and Digital Communication, and the first Institut Mines Télécom "Mines-Telecom" Technological university, founded on January 1st, 2017 from the merger of Mines Nantes and Télécom Bretagne.

4 - Candidate profile

We are looking for a candidate with a background in Electrical Engineering and Deep Learning. Strong skills in signal processing would be appreciated.

5 - How to apply

Send a CV, transcripts and at least one recommendation letter to vincent.gripon@imt-atlantique.fr before April 15th, 2022.

6 - References

[1] M. Alioto, "Ultra-low power VLSI circuit design demystified and explained : A tutorial," Circuits and Systems I : Regular Papers, IEEE Transactions on, vol. 59, no. 1, pp. 3–29, 2012.
[2] G. B. Hacene, F. Leduc-Primeau, A. B. Soussia, V. Gripon, and F. Gagnon, "Training modern deep neural networks for memory-fault robustness," in Proc. IEEE International Symposium on Circuits and Systems (ISCAS), 2019.
[3] Sanghamitra Dutta, Ziqian Bai, Tze Meng Low, and Pulkit Grover. CodeNet: Training Large Scale Neural Networks in Presence of Soft-Errors. pages 1–54, 2019.