

PhD Position: Energy-Efficient Machine Learning Algorithms

Joint degree between IMT Atlantique (France) and Polytechnique Montreal (Canada).
The PhD is expected to start in September or October 2019.

Supervisors

Dr. François Leduc-Primeau (<http://f.leduc-primeau.info>)

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Director

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Project description

There is a large and increasing demand for machine learning methods, which are now implemented on various and heterogeneous computation units (data centers, embedded systems, etc.). It is therefore crucial to tackle the energy consumption of these systems, not only for environmental reasons but also to augment the learning abilities of systems with strict energy budgets. In these systems, energy consumption can be greatly reduced by sharply lowering the chips power supply, which may introduce faults in the computation operations realized on these chips. This is why there is a need to develop machine learning algorithms that are robust to faults introduced by the circuit.

The first objective of the PhD will be to study the robustness to circuit faults of standard machine learning algorithms such as clustering or deep neural networks. The second objective will be to design novel and highly energy-efficient machine learning algorithms. The main challenges will be to study theoretically the performance of these algorithms under circuit faults, and to link the learning performance with the circuit energy consumption.

Context of the work

This emerging topic is studied in the framework of the ANR project EF-FEctive. The PhD candidate will interact with the project members, and will be encouraged to use the energy models that will be developed within the project.

The PhD candidate is expected to spend some time in both Polytechnique Montreal and IMT Atlantique, the two institutions being partners of the EF-FEctive project. Time-sharing between the two institutions will be organized with respect to the candidate's preferences.

How to apply

We seek for candidates with a solid academic background in signal processing, machine learning, or electrical engineering. The candidate should demonstrate good programming skills. To apply, send an email to François Leduc-Primeau (francois.leduc-primeau@polymtl.ca) and Elsa Dupraz (elsa.dupraz@imt-atlantique.fr). Please provide a CV and a brief statement of motivations.