MINES PARIS | PSL | TTI.5° The Transition Institute

PhD OFFER

CARBON-AWARE HIGH PERFORMANCE ARTIFICIAL INTELLIGENCE

Project description:

The aim of this PhD is to foster an energy-aware design of AI technology. The focus will be given to two mainstream computing platforms: standard HPC solutions (clusters, and datacenters) and embedded devices. In both, the consumed energy is critical. In the former, the available energy is considered unlimited, thus the main concern in this aspect is generally on the associated cost (electricity and cooling system) and the carbon footprint [3]. In the latter, energy consumption is taken into account at the design time since the targeted devices are likely to be battery powered. Nonetheless, the battery life-cycle's ecological burden is non-negligible too.

Context:

Artificial Intelligence (AI) is becoming ubiquitous in modern life, with various applications of genuine interest in uncountable domains of everyday life. It enables computers to perform "intelligent" tasks such as decision making, problem solving, perception/identification and even understanding human communication and behavior and predict his needs and actions. Current and future expectations from AI are challenging, yet significant advances have already been made thanks to powerful computational facilities and exascale datasets that are available to foster and unleash AI capabilities. This comes, however, in pair with the increase of energetic consumption and carbon impact. Considering the importance of AI, it follows that there is a clear benefit of optimizing AI implementations.

Method:

The research methodology for this PhD will follow three main axes: computer science (optimization of AI models and efficient implementations) ; applied mathematics (formal transformations, mixed precision, iterative solvers, numerical optimization); applications (computer vision and fluid mechanics).

Keywords: machine vision, fluid dynamics, deep learning

References:

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7. R. Alomairy, W Bader, H. Ltaief, Y. Mesri, D Keyes, High-performance 3D Unstructured Mesh Deformation Using Rank Structured Matrix Computations, ACM Transactions on Parallel Computing 9 (1), 1-23, 2022.
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Profile:

Master in Computer science, with interest in applications (vision, physics).
We are looking for a motivated candidate to investigate energy-aware high-performance implementation of cutting-edge AI applications

Application process:

To apply please send your CV no later than June 10 2022 to Claude Tadonki (claude.tadonki@mines-paristech.fr) together with a few lines about your motivation and the suitability of your profile.

This a fully-funded PhD position.

THIS PHD WILL TAKE PLACE WITHIN THE FRAMEWORK OF THE TRANSITION INSTITUTE 1.5 (TTI.5).

TTI.5 IS A RESEARCH INSTITUTE OF MINES PARIS – PSL DEDICATED TO THE LOW-CARBON TRANSITION.

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