Proposition de recherche doctorale

Deep Probabilistic Modeling on Novel Hardware

Mots clés :

- Directeur de thèse : Maurizio FILIPPONE
- Co-encadrant(s) :
- Unité de recherche : Laboratoire de recherche d’EURECOM
- École doctorale : École Doctorale Informatique, Télécommunications, Électronique de Paris
- Domaine scientifique principal : Sciences et technologies de l’information et de la communication

Résumé du projet de recherche (Langue 1)

Information and Communication Technologies (ICT) are constantly producing advancements that translate into a variety of societal changes including improvements to economy, better living conditions, access to education, wellbeing, and entertainment.

The widespread use and growth of ICT, however, is posing a huge threat to the sustainability of this development, given that the energy consumption of current computing devices is growing at an uncontrolled pace.

Within ICT, machine learning is currently one of the fastest growing fields, given its pervasive use and adoption in smart cities, retailing, finance, social media analysis, communication systems, and transportation.

This project aims at tackling this issue by investigating ways to perform machine learning exploiting novel hardware, and in particular the one developed by the French company LightOn which is a novel optical-based computing unit, called Optical Processing Units (OPU).

OPUs are capable of computing the norm of random projections of given vectors exploiting the properties of scattering of light; as a result, these computations happen literally at the speed of light.

Because of the intimate connection between the design of modern statistical models and computing, the vision of this project is that it is necessary to rethink the way we construct and implement modern statistical models to follow these new trends in computing hardware.

Such changes need to be introduced at the level of the design of the models, how to design inference algorithms, and the implementation with OPUs in distributed environments.

The Ph.D. project will focus on the development of such novel designs of modern statistical models based on Gaussian processes, Deep Gaussian processes and Bayesian Deep/Conv Nets.

Advancements in this direction would ultimately make statistical inference generally applicable to a large variety of problems while reduce the impact of computing on the environment.