

The use of HPC and Cloud resources for Deep Learning

Sidi Ahmed Mahmoudi

Département Informatique et Gestion

Université de Mons, Belgique

Sidi.mahmoudi@umons.ac.be

Abstract: the last few years have been strongly marked by the great evolution of artificial intelligence domain due to arrival of new methods of Machine and Deep learning. According to literatureⁱ, investments in artificial intelligence have increased by 300% with a turnover that should be multiplied by 5.9x in 2020. The main reason for this interest is the explosion of data using complex algorithms. To manage all this, it is necessary to rely on HPC infrastructures that must meet the needs of calculation and massive data storage. In this context, we are working on the efficient exploitation of HPC and cloud resources by implementing parallel versions [1] of classification and data learning algorithms using local or distant processors (CPUs or GPUs) in a transparent way for the user. The exploitation of HPC resources should be generic in order to exploit the various techniques of Machine and Deep Learning, existing in the literature (Caffe, Neon, TensorFlow, Theano, Torch, etc. [2]). This solution should also provide the ability to use HPC resources in the cloud to facilitate the use of these platforms (Figure 1). Indeed, the users will be able to exploit our solution without having to download, install or configure the libraries and materials used [3, 4].



Figure 1: HPC and Cloud for artificial intelligence

References:

- [1] S. A. Mahmoudi, P. Manneback, "Multi-CPU/Multi-GPU Based Framework for Multimedia Processing« , in *IFIP Advances in Information and Communication Technology. Computer Science and Its Applications*, 456, 2015, 54-65, 2015.
- [2] Soheil Bahrapour, Soheil Bahrapour, Naveen Ramakrishnan, Lukas Schott, Mohak Shah, "Comparative Study of Deep Learning Software", *Cornell University Library*, 1-9. 2016.
- [3] S. A. Mahmoudi, M. A. Belarbi, S. Mahmoudi, G. Belalem, "Towards a Smart Selection of Resources in the Cloud for Low-energy Multimedia Processing" in *Concurrency & Computation: Practice & Experience*, 2017.
- [4] S. A. Mahmoudi, P. Manneback, « Multi-GPU based Event Detection and Localization using High Definition Videos » ", in *"The 4th International Conference on Multimedia Computing and Systems (ICMCS'14)*, Morocco, 2014.
- [5] M. A. Larhmam, S. A. Mahmoudi, M. Benjelloun, S. Mahmoudi, P. Manneback, "A Portable Multi-CPU/Multi-GPU based Vertebra Localization in Sagittal MR Images", *Image Analysis and Recognition (Springer)*, 2014
- [6] S. A. Mahmoudi, M. Kierzyńska, P. Manneback, "Real-Time GPU-Based Motion Detection and Tracking Using Full HD Videos", *Intelligent Technologies for Interactive Entertainment*, 2014
- [7] S. A. Mahmoudi, P. Manneback, C. Augonnet, S. Thibault "Traitements d'Images sur Architectures Parallèles et Hétérogènes", *Technique et science informatiques(TSI)*, vol. 31, 2012.
- [8] S. A. Mahmoudi et al., "Abnormal Event Detection in Real Time Video", International Workshop on Multimodal Interactions Analysis of Users in a Controlled Environment, Greece, 2008.

Bibliography:

Sidi Ahmed Mahmoudi received the graduate engineering degree in computer science from the University of Tlemcen, Algeria, the master degree in multimedia processing from the Faculty of Engineering in Tours, France, and the PhD degree from the University of Mons, Belgium, in 2006, 2008, and 2013, respectively. Currently, he is working as PhD research associate at the University of Mons, Belgium. My research interests are focused on the efficient exploitation of local and cloud computing resources (multi-CPU/ multi-GPU) architectures for multimedia processing and machine learning algorithms within Big Data volumes. Sidi Ahmed Mahmoudi has participated in several national (ARC-OLIMP, Numédiart, Slowdio, Comptoux, CLEO and FEDER IDEES) projects and European actions (COST IC 805 and COST NESUS IC1305). I am author or co-author in more than 50 international publications.

The Program:

<http://www.deeplearningindaba.com/indabax-algeria.html>

ⁱ The statistica Portal. <https://www.statista.com/statistics/607716/worldwide-artificial-intelligence-market-revenues/>