DRIO-5201A	Deep Learning

Statut : ESIEE 5e année 1er semestre

Horaires : Horaire Cours : 12 Horaire TD : Horaire TP : 18 Horaire P :

Langue(s) de l'unite enseignee : ANGLAISE **Crédits ECTS:** 3

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Objectif(s) :

Designing devices showing « intelligent behavior » is an early concern of human intelligence. Recently, at the very beginning of the « Computer Era », the field of Artificial Intelligence (AI) developed and organized itself in a scientific domain. One may roughly classify the lines of researches into Symbolic (or Logic) AI and Numeric AI. Expert systems on one hand and networks of formal neurons on the other hand are among the highest achievement in Symbolic and Numeric AI.

By now, multilayered neural networks (MLNN) is a standard among networks of formal neurons. In a MLNN each inner layer of formal neurons receives its inputs from the « previous » network layer. The connexions between layers are weighted; these weights are the parameters of the model. An iterative procedure acts on these parameter so as to minimize the error between the model's outputs and the expected ones: deep learning. Recently the error minimization procedure was significantly improved and the number of parameters lowered, allowing running networks with far more layers of neurons. Furthermore, a dramatic decrease of computation time was achieved by extensive use of graphics processing units in MLNN implementations.

The demand for applications is very high and increasing. The achievements are impressive and since the model is very general, the applications are in very wide range of fields: command and control, image and speech processing and recognition, autonomous vehicles, banking industry, data mining, ...

Compétences :

After attending this unit, the students should be able to :
-- design an application of deep learning,
-- implement it in a dedicated programming environment (Matlab, Python, ...),
-- assessing the performances.

Nature de l'évaluation	Commentaire	Durée	Coef.
Projet			

Bibliographie :

Documents de références

[1] Ian Goodfellow, Yoshua Bengio, Aaron Courville, *Deep Learning*, MIT Press (2016)

[2] Yann le Cun, Yoshua Bengio, Geoffrey Hinton, *Deep Learning*, Nature, vol. 521 (28 mai 2015)

[3] Hagan, M. T. Hagan, H. B. Demuth and M.H. Beale, *Neural Network Design*, PWS Publishing, Boston

[4] M. T. Hagan and H. B. Demuth and O. De Jesús, *An introduction to the use of neural networks in control systems*, International Journal of Robust and Nonlinear Control, John Wiley & Sons

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