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- Organization, tooling

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- 3 days of courses, balanced with practical works
- Hands-on , with R/RStudio and python/anaconda/notebooks programs / libraries
- GPU settings on the cloud or on laptop configured with CUDA and an NVIDIA GPU card.
- Slides from several MOOCs, advanced materials on pdf e-books

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- Classical period
- 90's
- Renewal in 2000's , triumvirat : Hinton, Bengio, Le Cun

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- Cloud and GPU usage => scaling for Big Data
- Mainly supervised algorithms

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Golden age of NN, 90's

Applications

- Unsupervised Classification
- Semi-physical modelization, optimal control and command (Recurrent NN)
- Supervised Classification and Regression

Deep learning, around 2006 + Applications

- Supervised learning with big database (e.g. Imagenet)
- Facebook image recognition, word2vec, text classification
- Google text mining and processing, speech / image recognition
- Amazon recomandation engine at scale

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Topics

- Start with the perceptron
- Add hidden layers
- Train with the back-propagation algorithm to explain
- Small practical work with Regression (Housing.csv + keras)

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Starting point :

- Yann Le Cun slides
- Application : handwriting recognition (letter and banknote processing)
- Demo with NVIDIA DIGITS environment

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Richard Socher and all courses (Stanford)

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- As CNN takes advantage of the locality structure of the data (image, videos). "Spatial similarity",
- RNN takes advantage of the temporal features of the data (speech, text).

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Pros

- State of the art performance and accuracy if you have lot of datas or use pre-trained network
- Scale very well

Cons

- Black-box algorithm
- Could be difficult to tune, and long to train if you have not the dedicated hardware (several weeks of training on a GPU clusters)

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Classical NN

- Element of Statistical Learning, chap. 11 , Springer 2nd edition
- Pattern Recognition and ML, Chap. 5, Bishop, Springer
- Réseaux de neurones, Méthodologie et applications, G.Dreyfus et al., Eyrolles
- Statistique et méthodes neuronales, S.Thiria et al., Dunod

Deep Learning NN

- [http ://www.deeplearningbook.org/](http://www.deeplearningbook.org/) Goodfellow and Bengio
- Hinton DL
- DL and NLP