

Majeure Machine Learning

Deep learning
Architectures

Contenu



- Convolutional Neural Nets
- Recurrent Neural Nets
- Generative Neural Nets (zoom GAN)

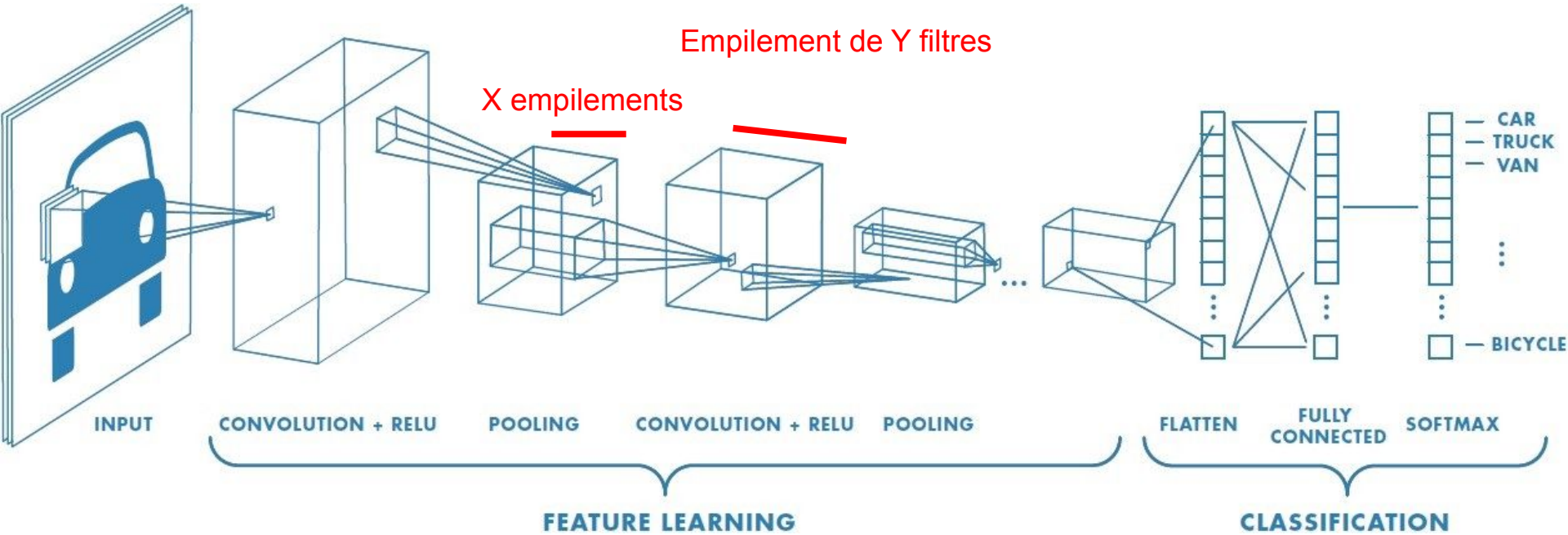
Ce que vous devrez savoir faire



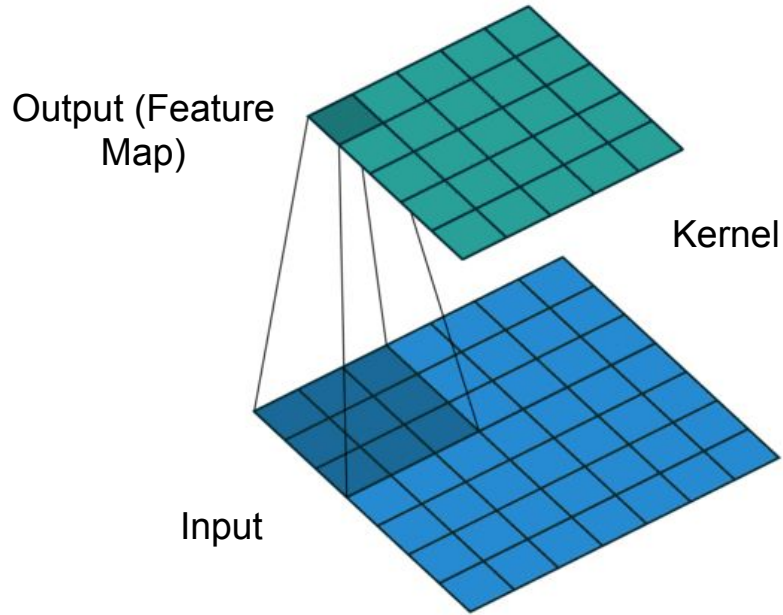
- Comprendre le principe de convolution
- Comprendre le principe de récurrence
- Avoir l'intuition de l'avantage des LSTM
- Avoir l'intuition du GAN
- Savoir qu'il existe un grand nombre d'architectures

Convolution

Convolution



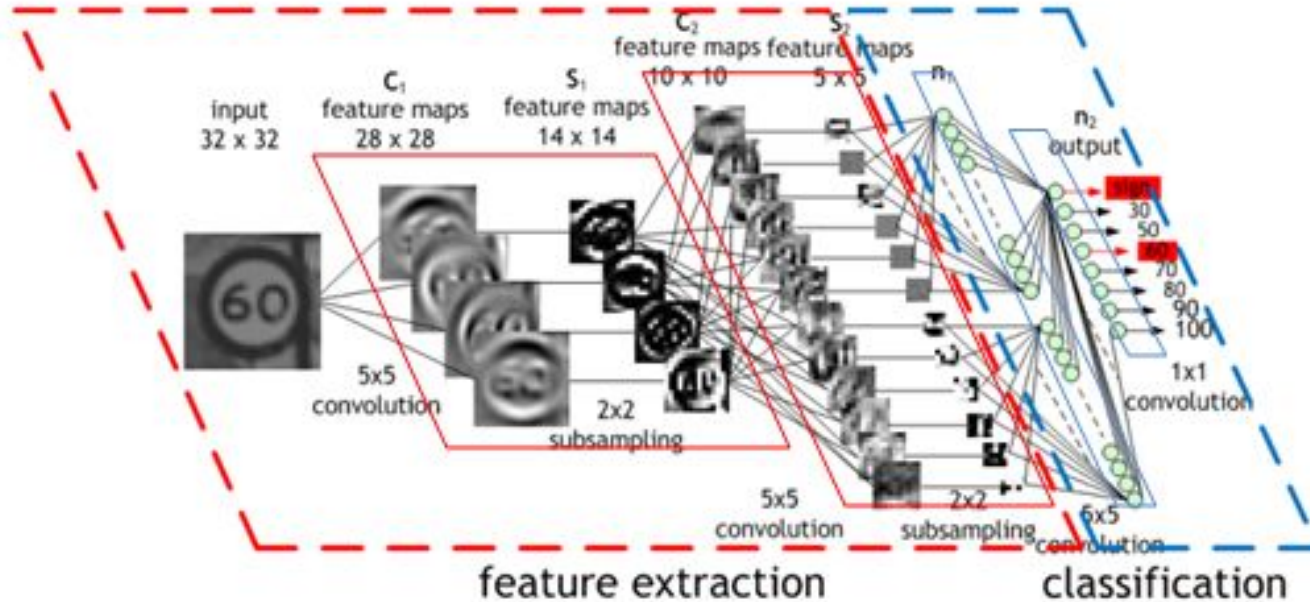
Convolution - Filtres



[DEMO -
TensorSpace](#)

```
kernel_size=(3, 3),  
strides=(1, 1),
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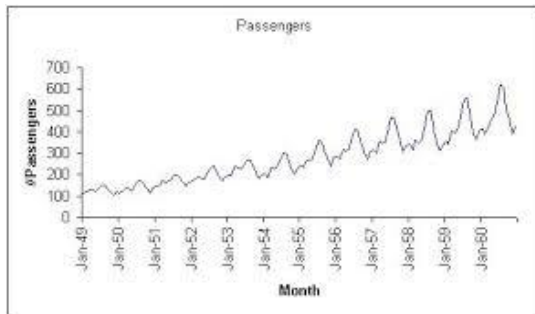
Convolution - de plus en plus précis



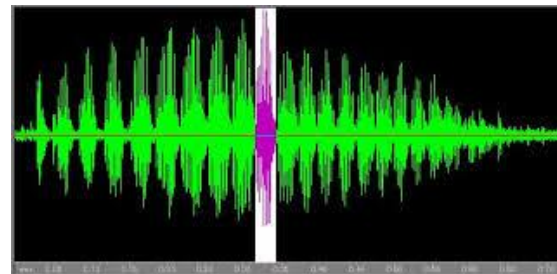
Récurrance

Motivation - Sequence Learning

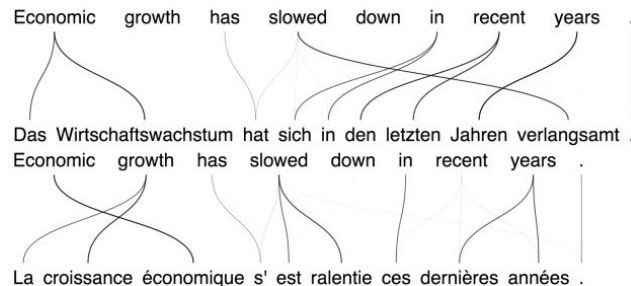
Comment apprendre dans le cas où un exemple est influencé par les exemples précédents (Séquence) ?



Séries temporelles

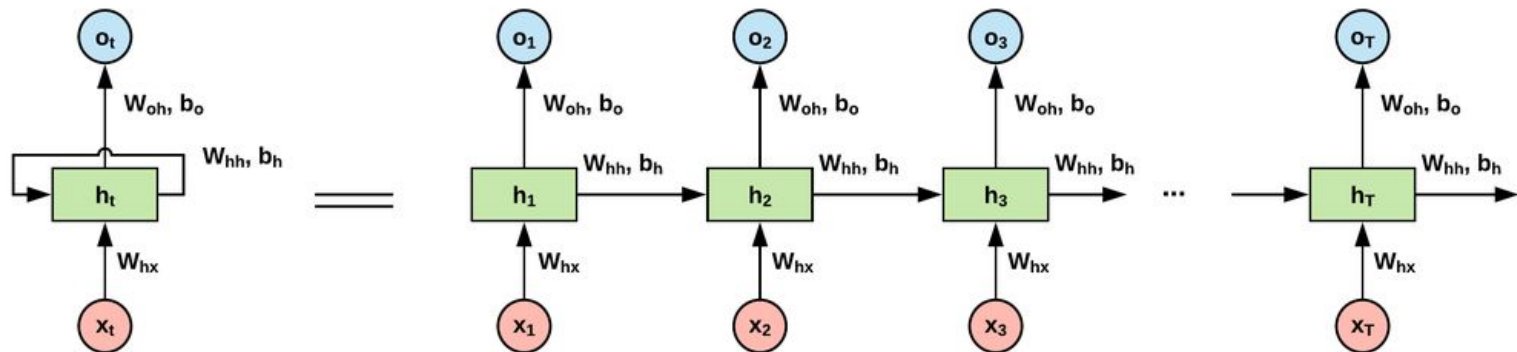


Ondes



Texte (NLP)

Recurrent Neural Network



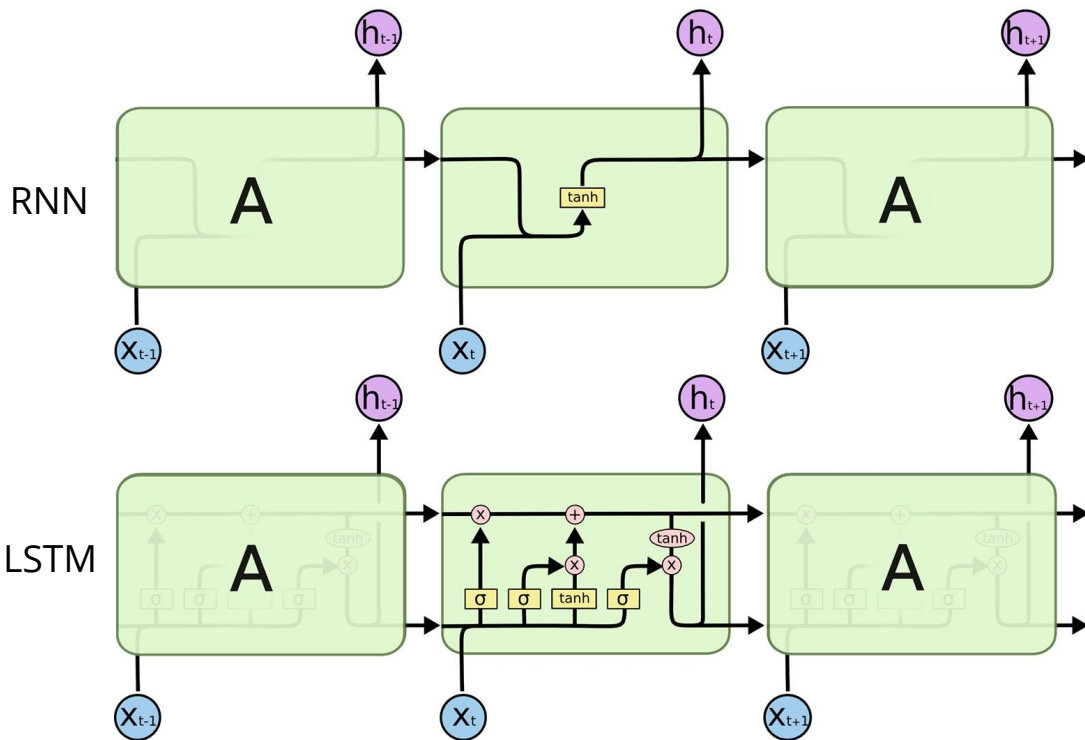
Exemple 1 :

J' aime le ... Learning

Exemple 2 :

[02, 10, 2015, 1500] [03, 10, 2015, 1205] [04, 10, 2015, 1820] ... [05, 10, 2015, 1900]
 Jour, mois, année, valeur

Long Short Term Memory (LSTM)



Principe :

- Ajoute un principe de "mémoire"
- Cellules à porte (Gated Recurrent Unit)

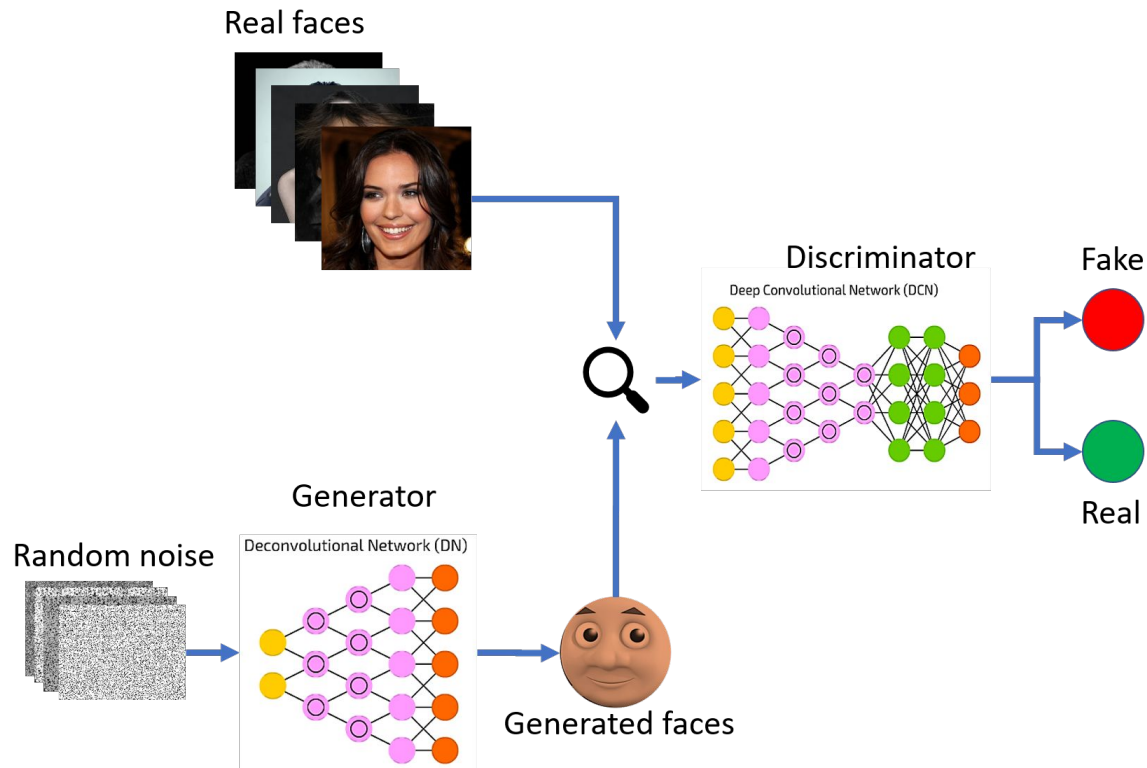
Avantages :

- Gère des dépendances à long terme grâce à la "mémoire"
- Souffre moins de l'instabilité d'apprentissage des RNNs

=> La référence actuelle en terme de récurrence

Generative Adversarial Network (GAN)

GAN - Principe



GAN - Démo

Monet \leftrightarrow Photos



Monet \rightarrow photo

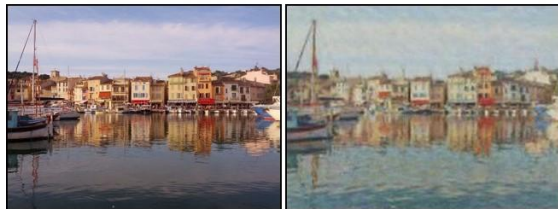


photo \rightarrow Monet

Zebras \leftrightarrow Horses



zebra \rightarrow horse



horse \rightarrow zebra

Summer \leftrightarrow Winter



summer \rightarrow winter



winter \rightarrow summer



Photograph



Monet



Van Gogh



Cezanne



Ukiyo-e

GAN - Démo



Reference



Our Result

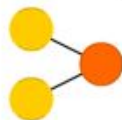
Autres architectures

Neural Networks

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- Backfed Input Cell
- Input Cell
- △ Noisy Input Cell
- Hidden Cell
- Probabilistic Hidden Cell
- △ Spiking Hidden Cell
- Output Cell
- Match Input Output Cell
- Recurrent Cell
- Memory Cell
- △ Different Memory Cell
- Kernel
- Convolution or Pool

Perceptron (P)



Feed Forward (FF)



Radial Basis Network (RBF)



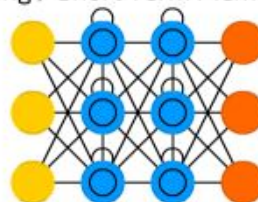
Deep Feed Forward (DFF)



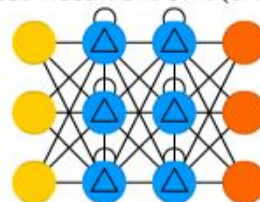
Recurrent Neural Network (RNN)



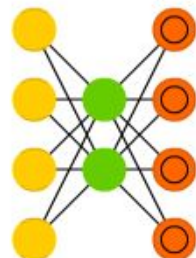
Long / Short Term Memory (LSTM)



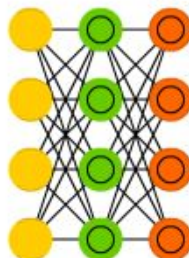
Gated Recurrent Unit (GRU)



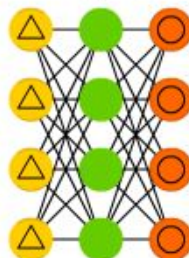
Auto Encoder (AE)



Variational AE (VAE)



Denoising AE (DAE)



Sparse AE (SAE)



Markov Chain (MC)



Hopfield Network (HN)



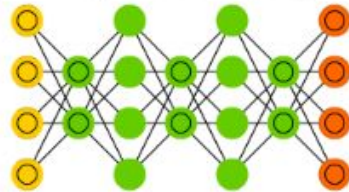
Boltzmann Machine (BM)



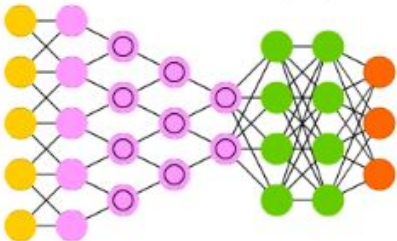
Restricted BM (RBM)



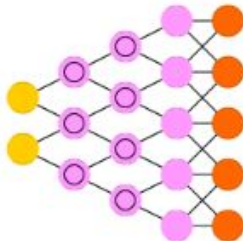
Deep Belief Network (DBN)



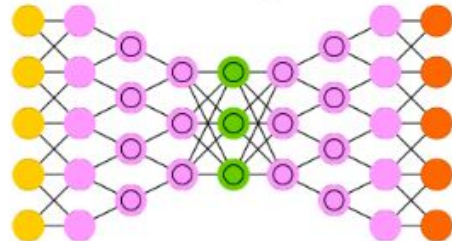
Deep Convolutional Network (DCN)



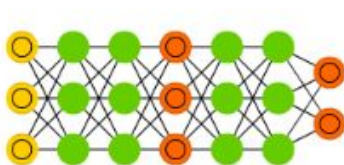
Deconvolutional Network (DN)



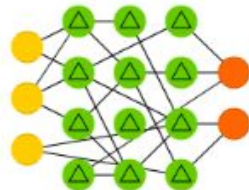
Deep Convolutional Inverse Graphics Network (DCIGN)



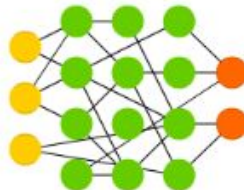
Generative Adversarial Network (GAN)



Liquid State Machine (LSM)



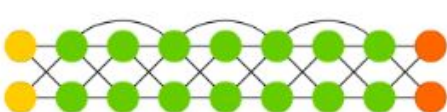
Extreme Learning Machine (ELM)



Echo State Network (ESN)



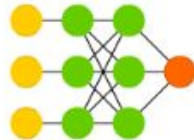
Deep Residual Network (DRN)



Kohonen Network (KN)

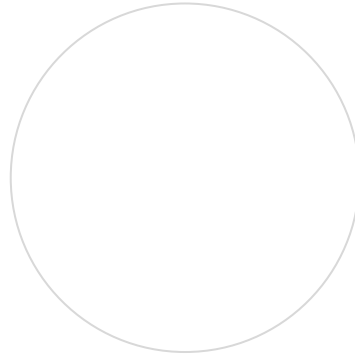


Support Vector Machine (SVM)



Neural Turing Machine (NTM)





Fin du chapitre 5.3