

TECH WEEK



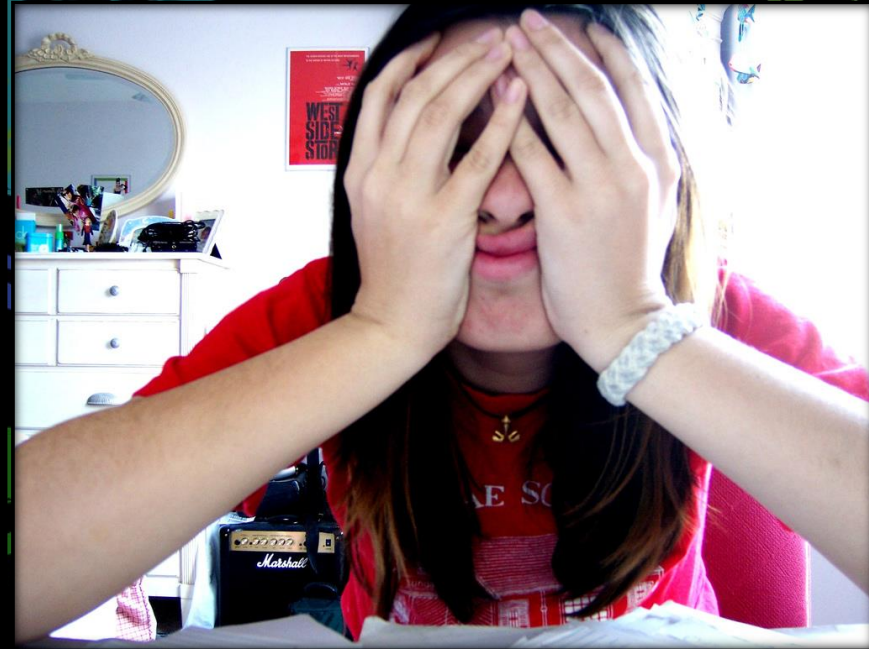
KAIZEN

Deep Learning et vision par ordinateur

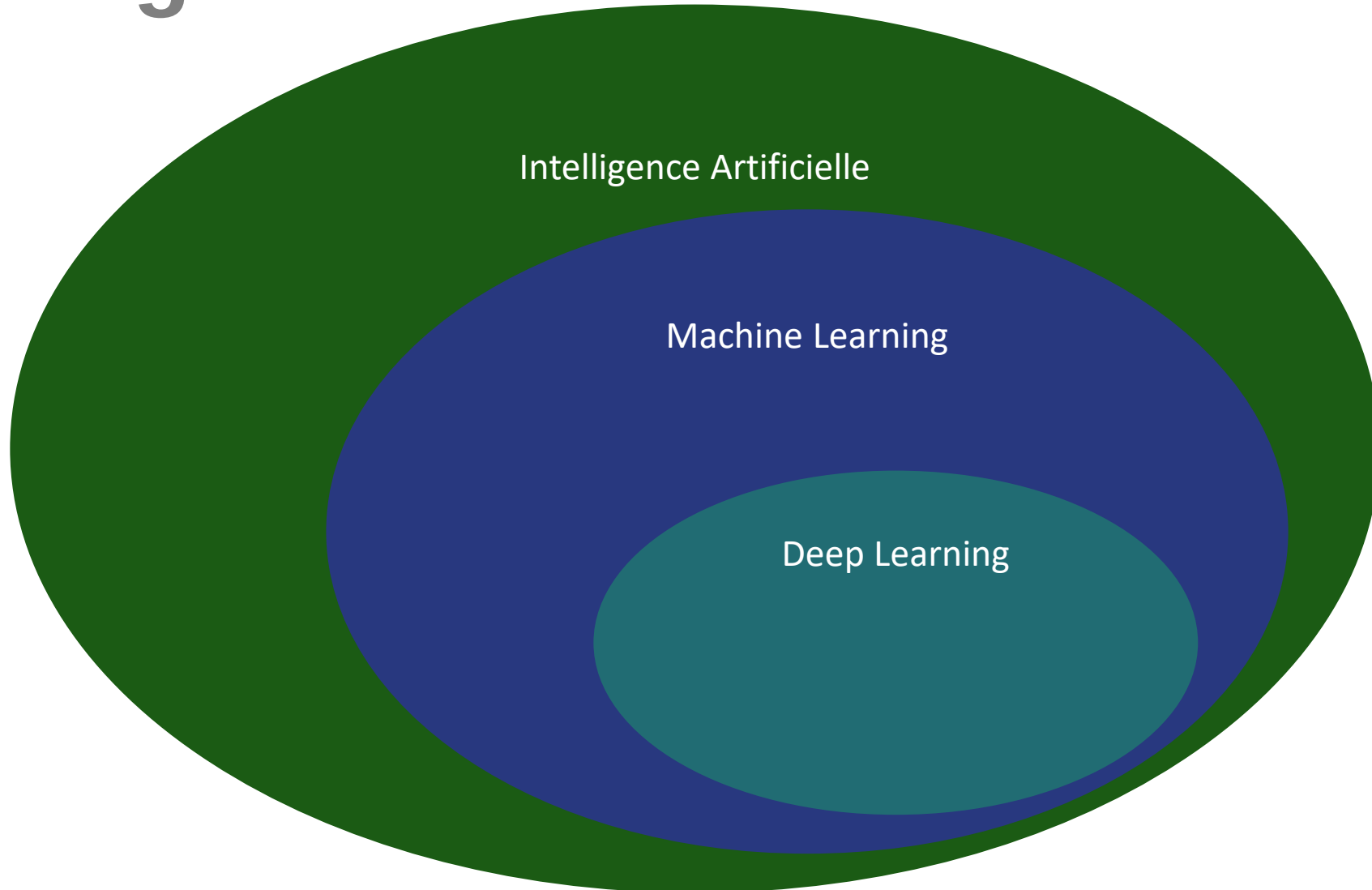
Intelligence artificielle

Deep Learning

Machine Learning



De l'Intelligence Artificielle au Deep Learning



Machine Learning

Estimation immobilière

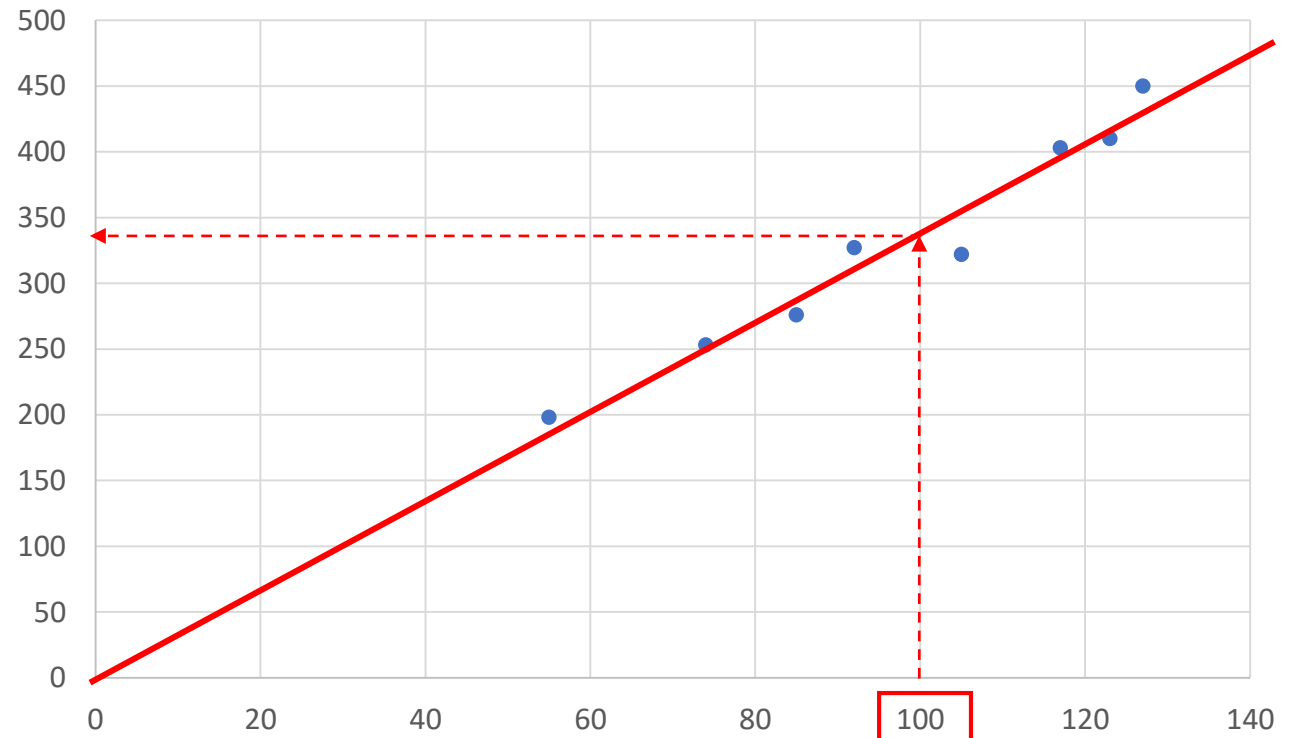


Machine Learning

Estimation immobilière

Superficie (m ²)	Prix (k€)
92	298
123	470
74	253
127	450
105	322
85	266
117	403
55	198

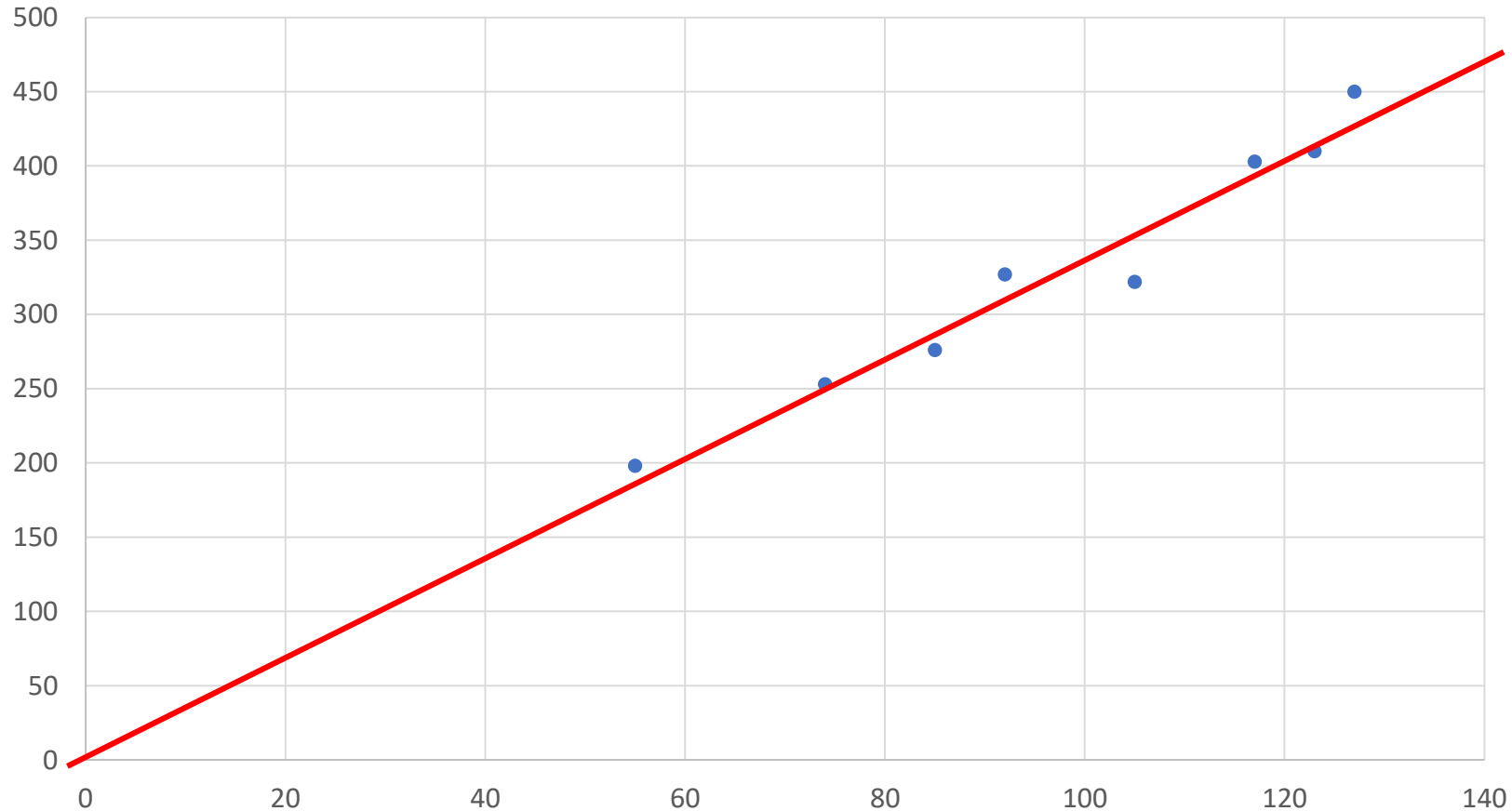
Base d'apprentissage



Modèle de prédiction

Machine Learning

Phase d'apprentissage

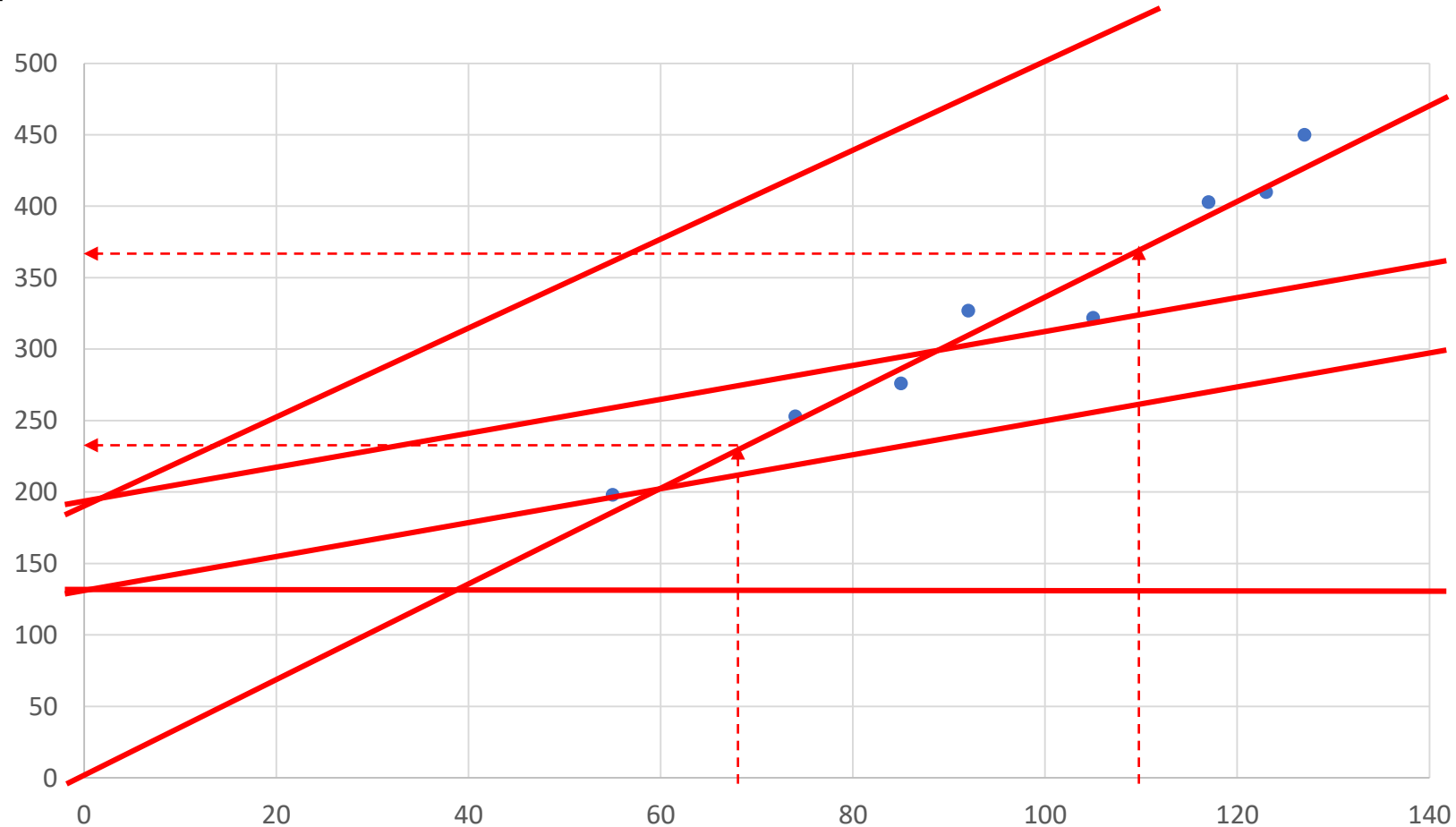


$$y = ax + b$$

Paramètres

Machine Learning

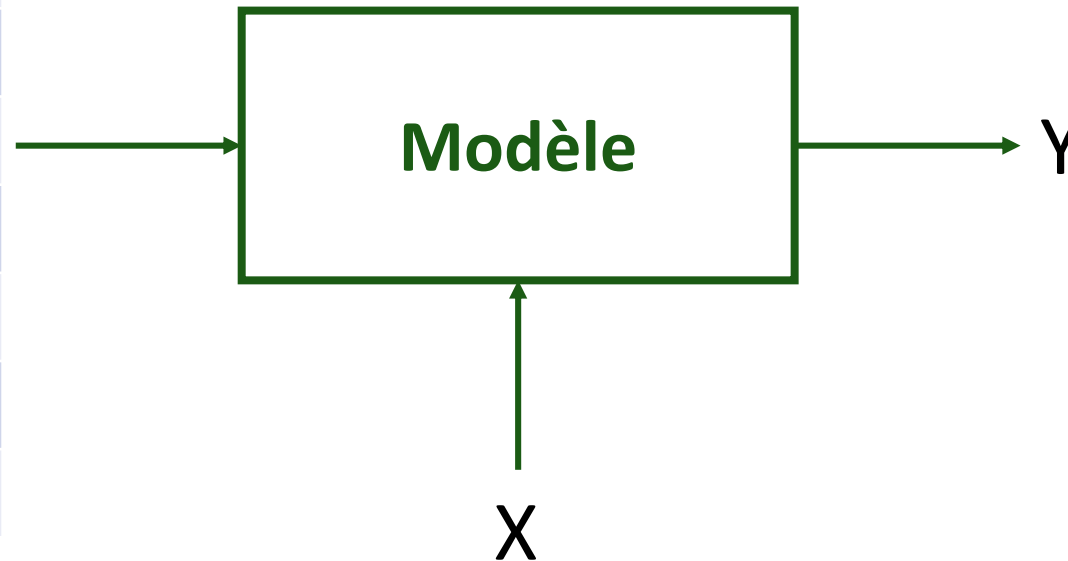
Phase d'apprentissage



Machine Learning

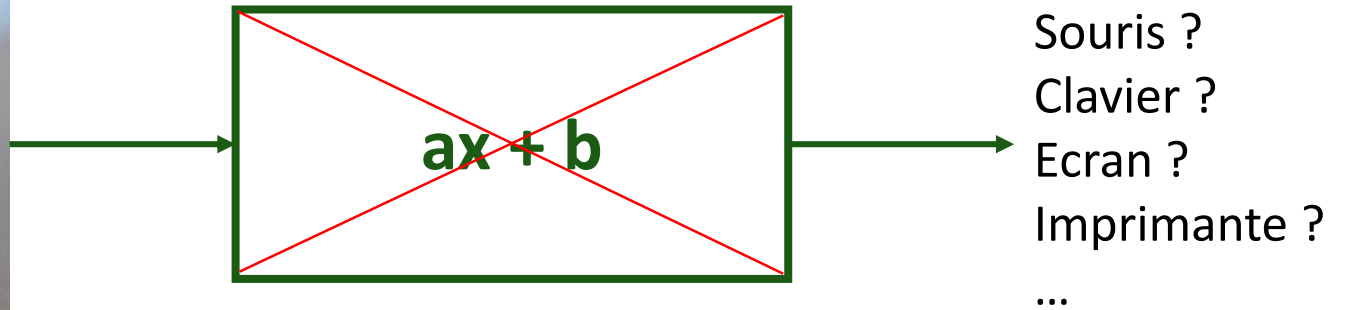
Phase de prédiction

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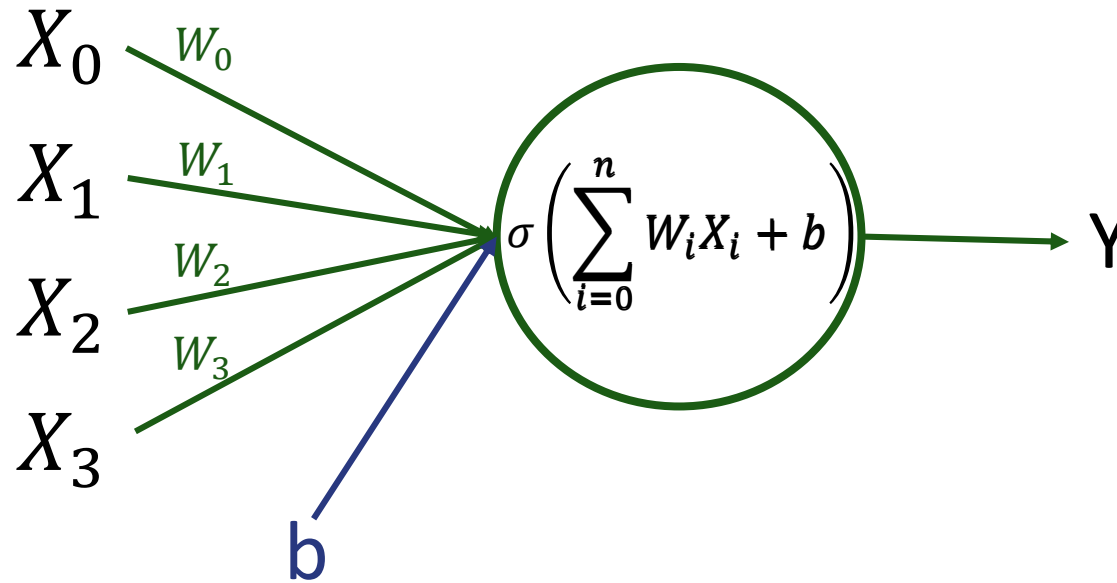
Machine Learning

Un problème plus complexe

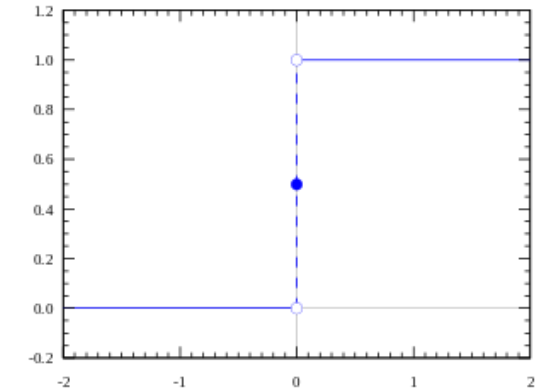


Machine Learning

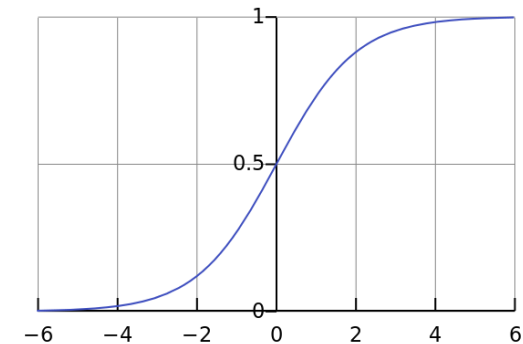
Neurones artificiels



$$\sigma(x) = \begin{cases} 0 & \text{si } x < \text{seuil} \\ 1 & \text{sinon} \end{cases}$$

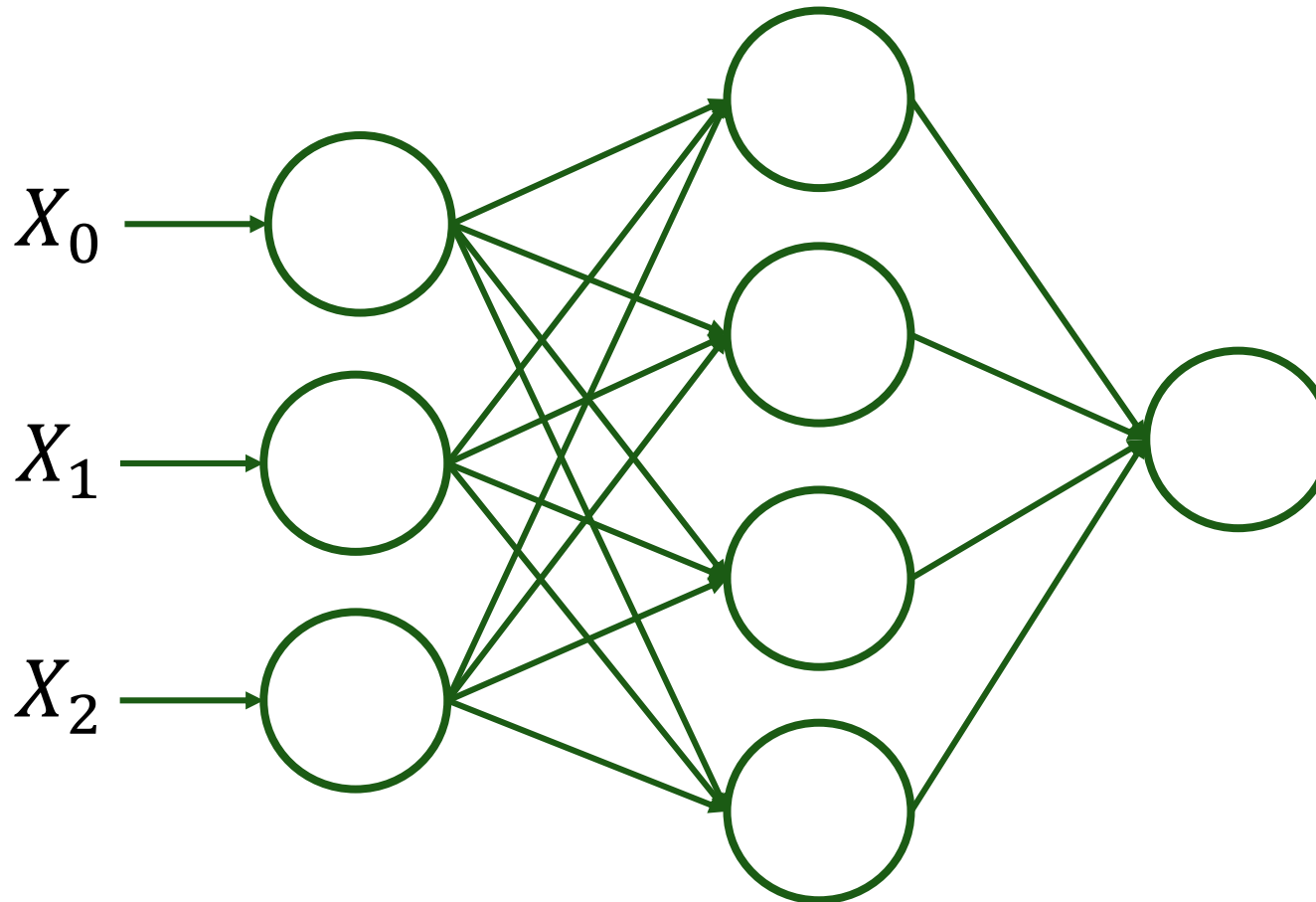


$$\sigma(x) = \frac{1}{1 + e^{-x}}$$



Machine Learning

Réseaux de neurones



16 poids

5 biais



21 paramètres

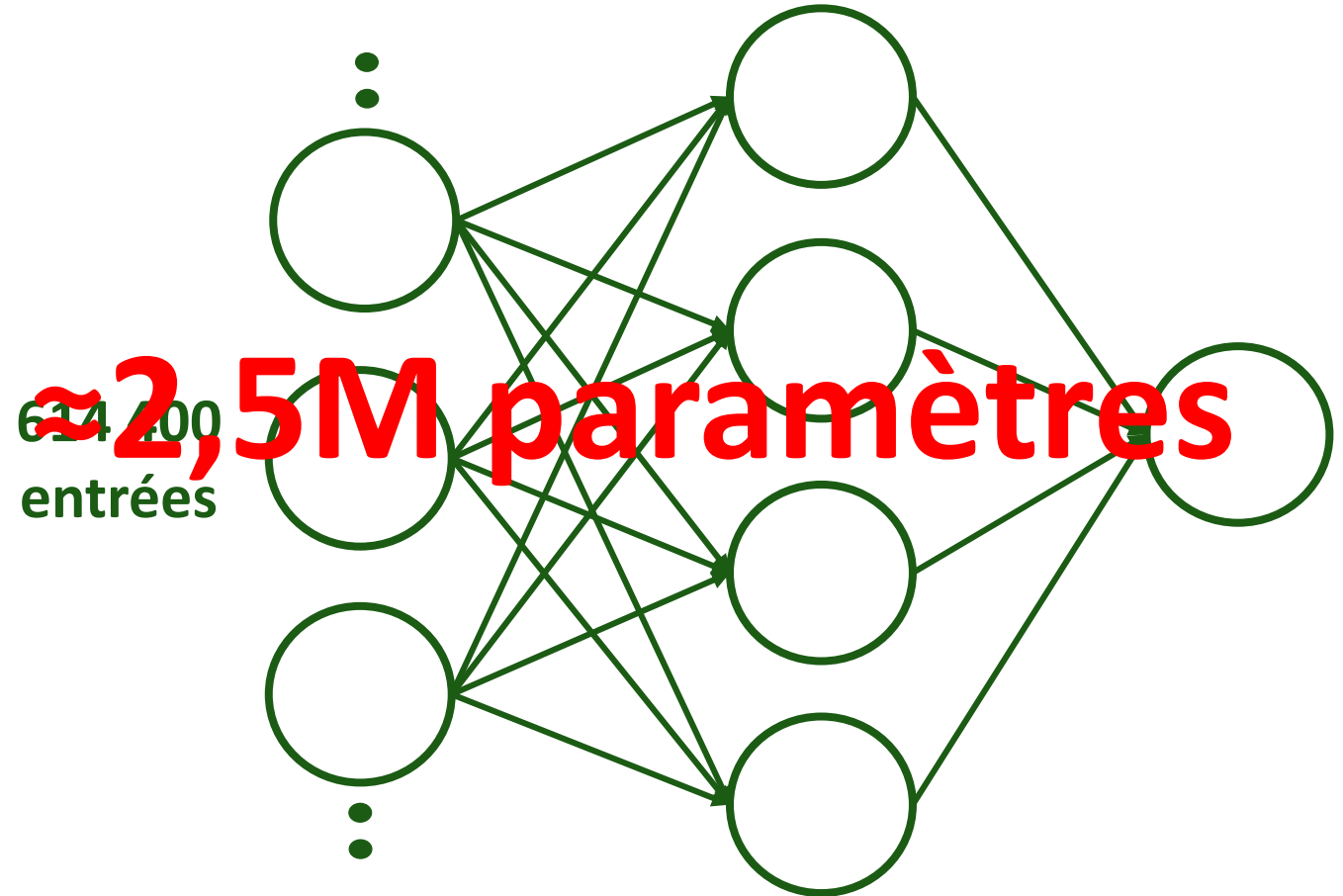
Machine Learning

Réseaux de neurones



640

960



Machine Learning

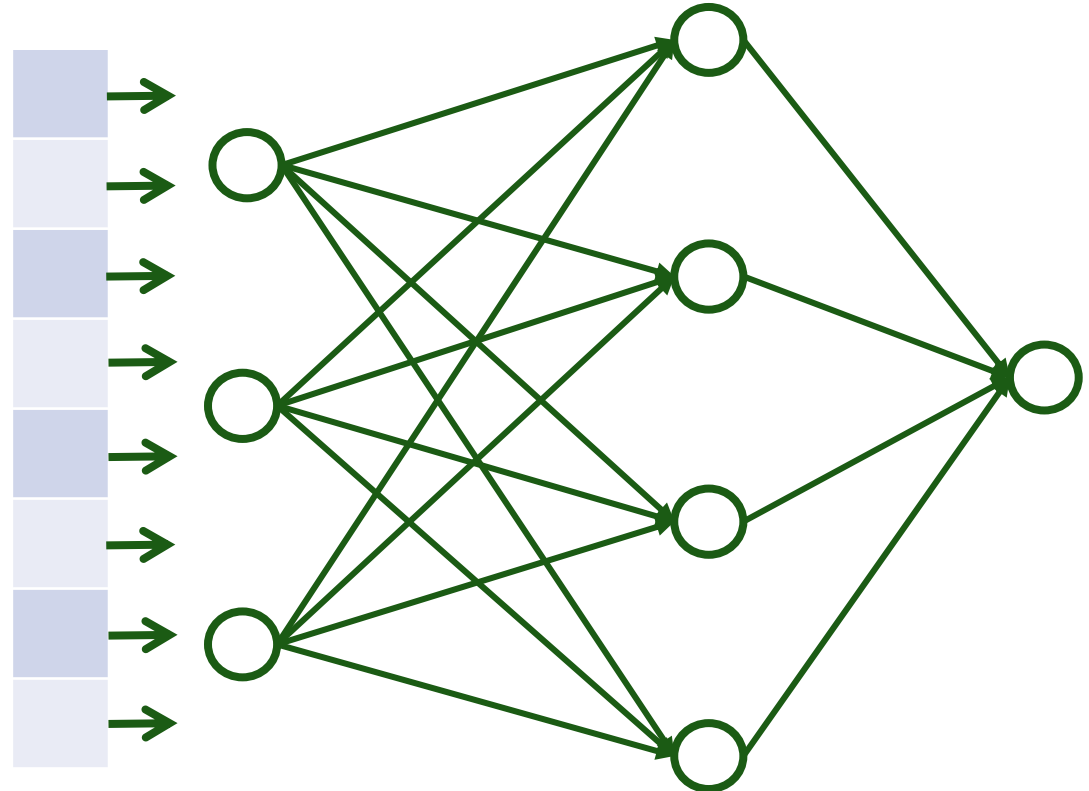
Reconnaissance d'images



Extraction de
caractéristiques

SURF
SIFT
HoG

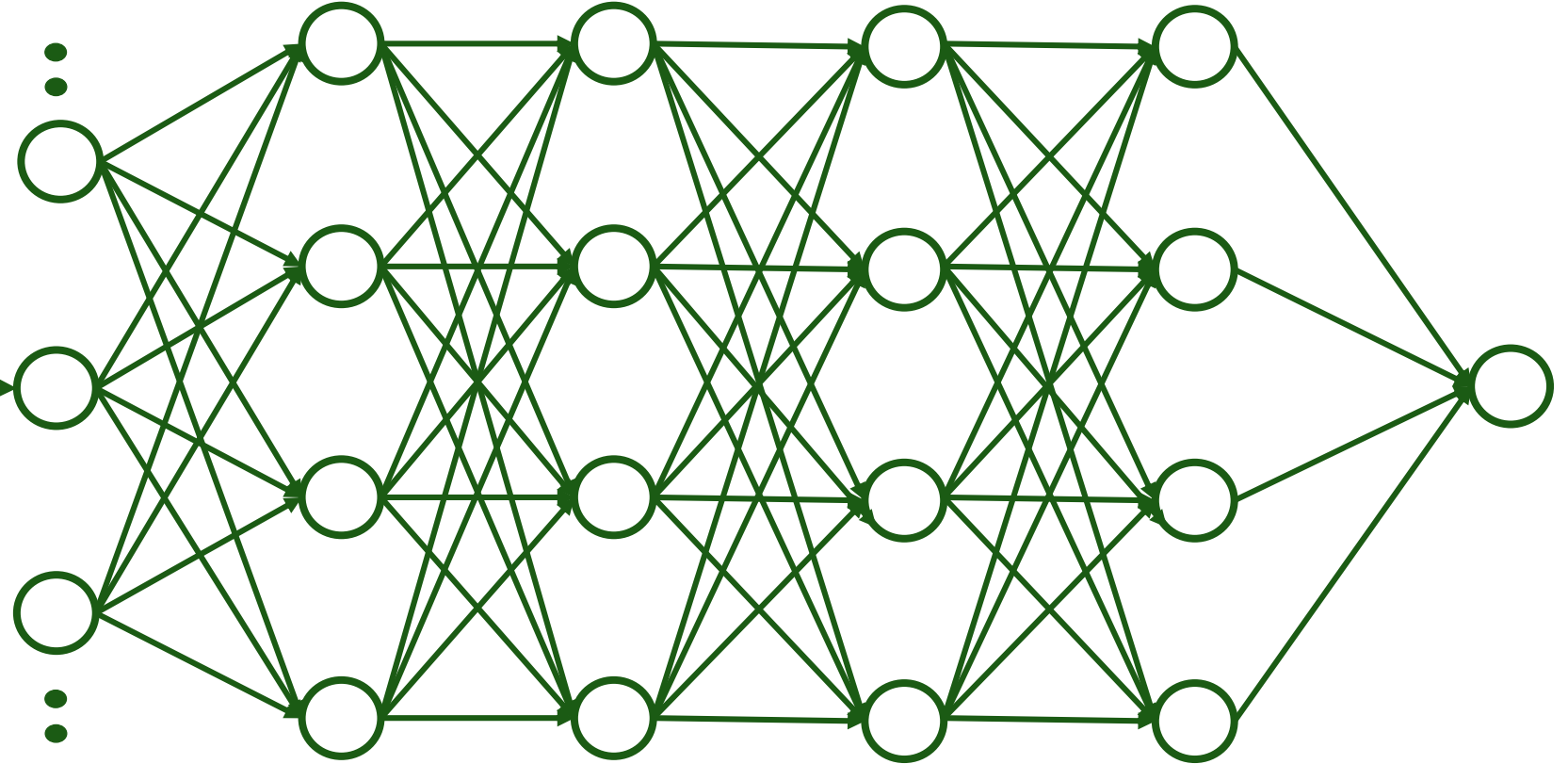
...



- Expertise métier
- Non généralisable

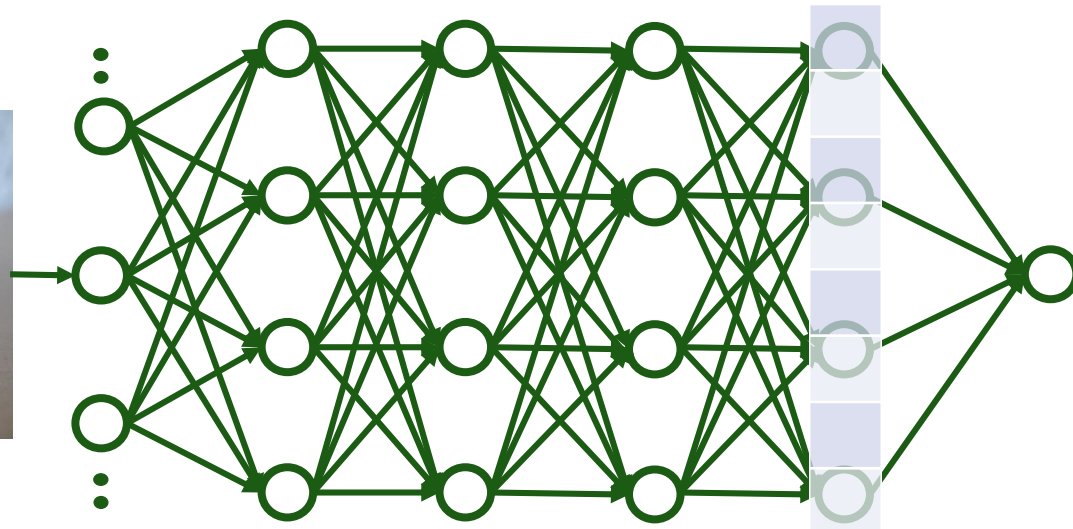
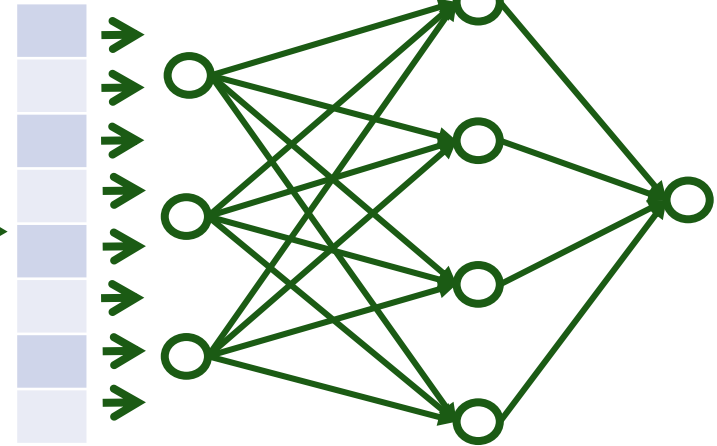
Deep Learning

Réseaux de neurones profonds



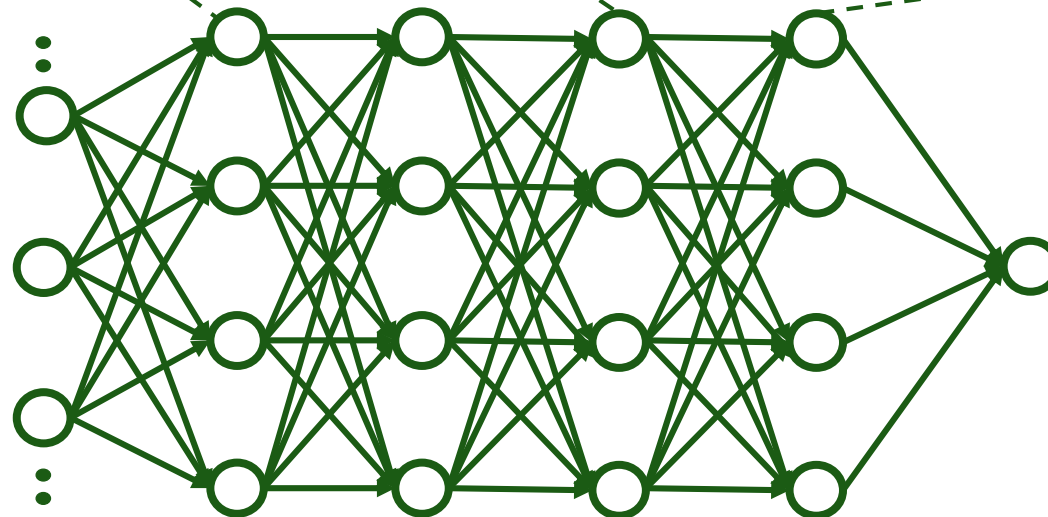
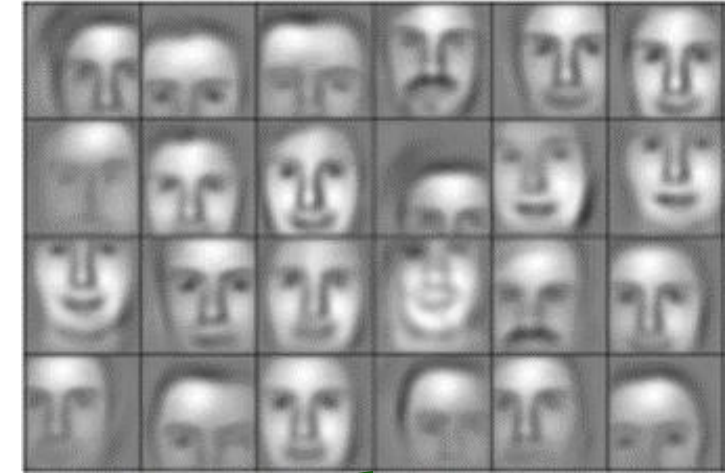
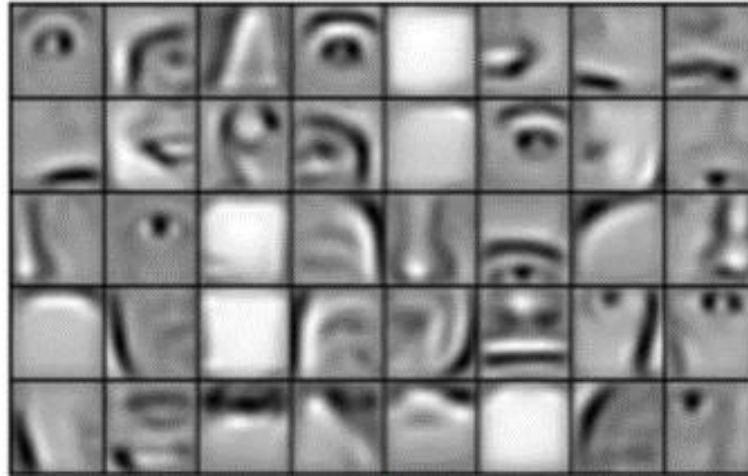
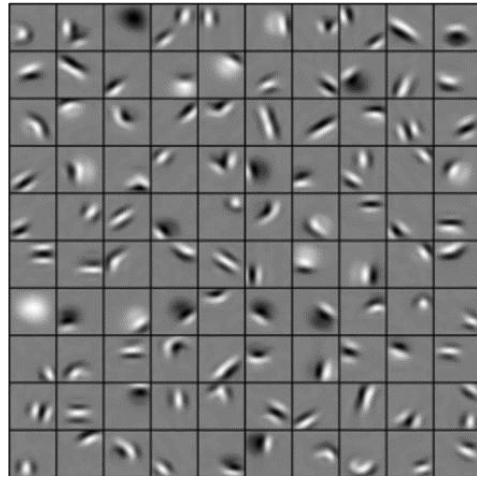
Deep Learning

Extraction de caractéristiques



Deep Learning

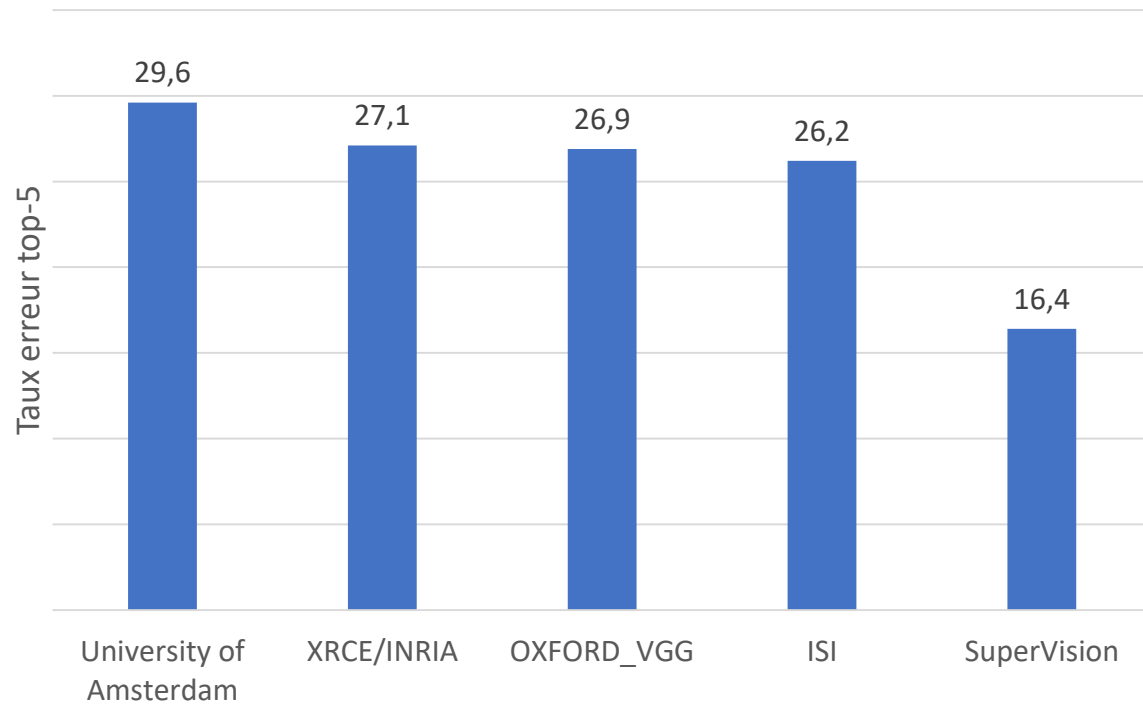
Extraction de caractéristiques



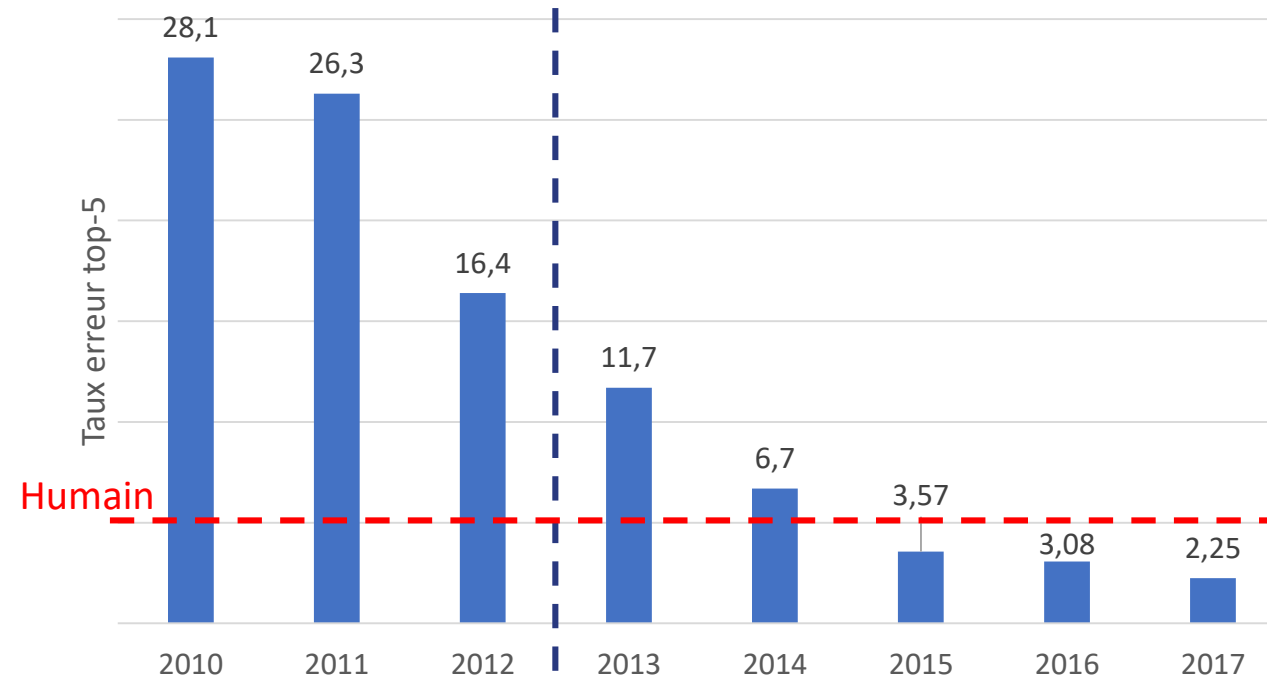
Deep Learning

Large Scale Visual Recognition Challenge

ILSVRC – 2012



ILSVRC



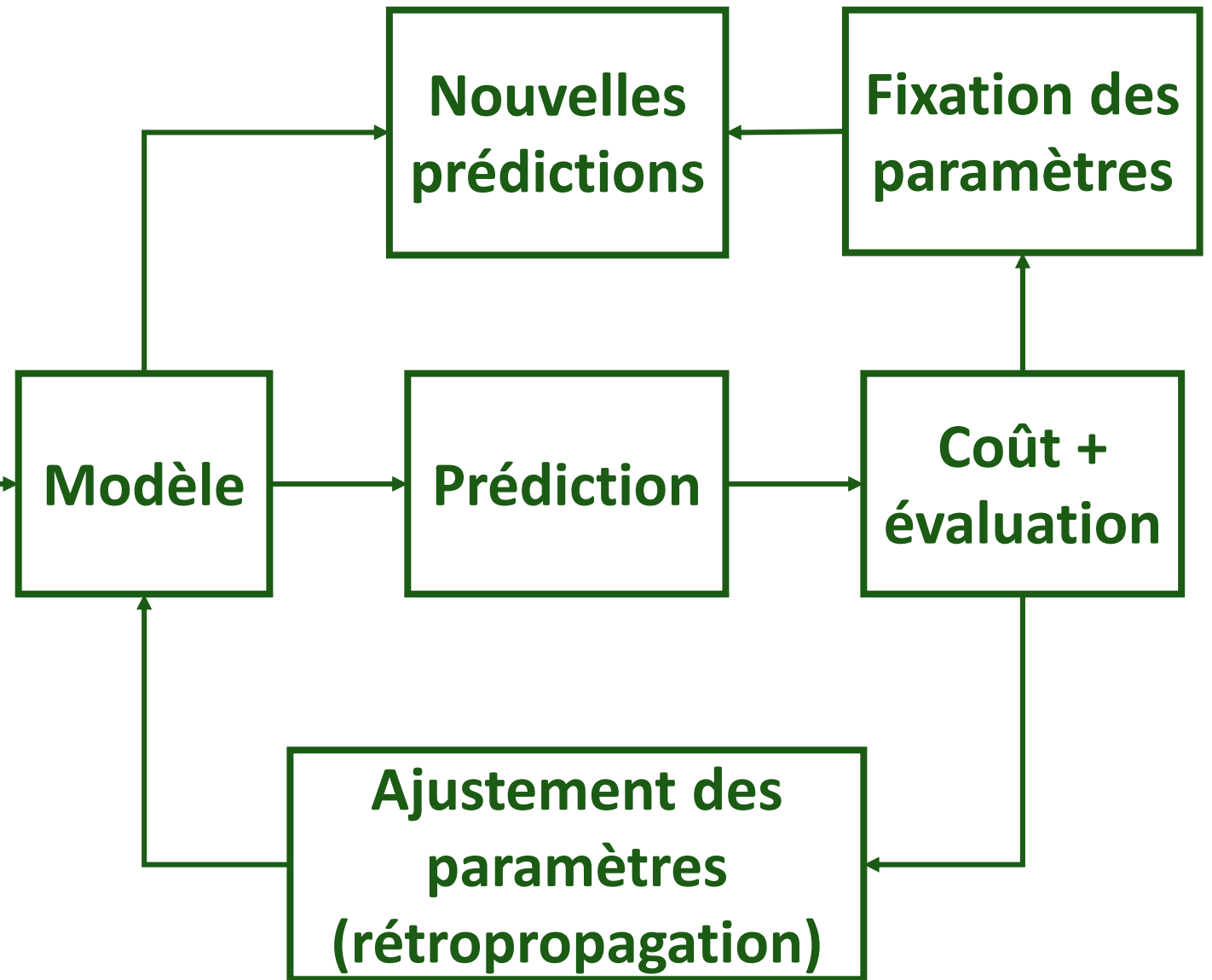
Deep Learning Apprentissage



Grosse base de données
d'images étiquetées

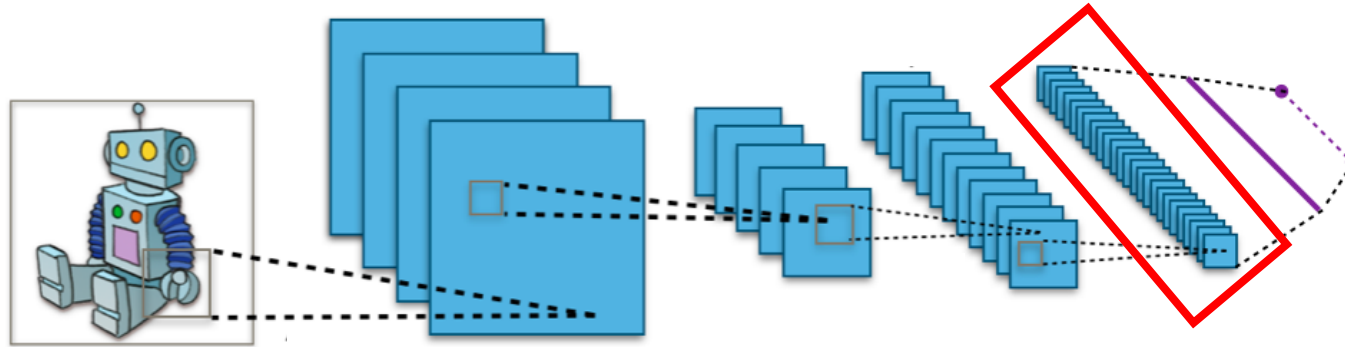


Puissants GPUs



Deep Learning

Réseaux de neurones convolutifs



1	1	1	0	0	1	0	1
0	1	1	1	0	0	1	1
0	0	1	1	1	0	0	0
0	0	1	1	0	0	1	0
1	1	0	1	1	1	0	0
1	0	1	0	0	1	1	0
0	1	0	0	0	1	0	1
1	1	1	0	1	0	1	0

$$\sigma \left(\sum_{i=0}^n W_i X_i + b \right)$$

0	1	1
1	1	0
0	0	1

Noyaux

4	4	3	2	1	2
3	4	3	2	3	2
1	4	5	3	0	1
4	3	2	3	4	2
2	2	3	3	2	3
3	2	1	1	4	2

Cartes de caractéristiques

Deep Learning

Exemples de tâches

- Classification
- Détection d'objets / de visages
- Segmentation sémantique
- Segmentation d'instance
- Coloration d'images
- Transfert de style
- Génération de légende



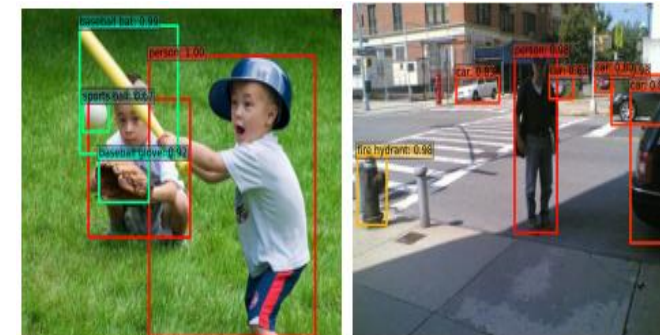
[Colorful Image Colorization, ECCV 2016](#)



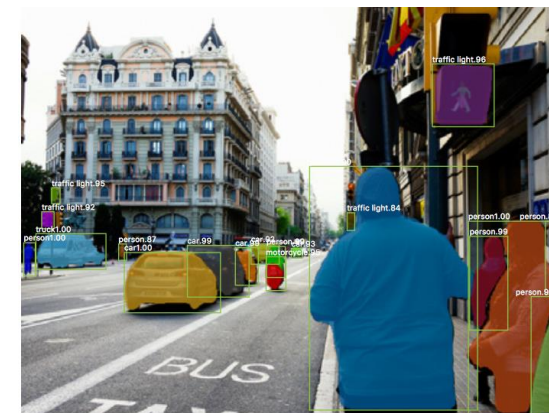
[ICNet for Real-Time Semantic Segmentation on High-Resolution Images, CoRR 2017](#)



[A Learned Representation for Artistic Style, CoRR 2016](#)



[SSD: Single Shot MultiBox Detector, ECCV 2016](#)



[Mask R-CNN, ICCV 2017](#)



[Show and Tell: A Neural Image Caption Generator, CVPR 2015](#)

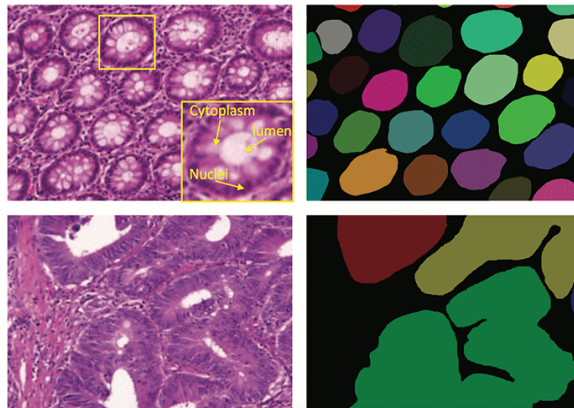
Deep Learning

Domaines d'application

- Robotique
- Sécurité/surveillance
- Contrôle qualité
- Diagnostic santé
- Réalité augmentée



[Real-Time Crowd Violence Recognition and Detection in Surveillance Videos](#)



[GPU-Powered Deep Learning Being Used to Speed Colon Cancer Diagnosis](#)



[Manufacturing Quality Control Using Deep Learning & Computer Vision](#)



MERCI DE VOTRE ATTENTION

Des questions ?

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Bibliographie

- Cours
 - Deep Learning Specialization – Andrew NG
 - Neural Network for Machine Learning – Geoffrey Hinton
- Livres
 - Artificial Intelligence: A Modern Approach – Stuart Russel & Peter Novig
 - Deep Learning – Ian Goodfellow, Yoshua Bengio, Aaron Courville
- Autres
 - L'apprentissage profond : une révolution en intelligence artificielle – Yann LeCun (Leçon inaugurale au Collège de France)