

AUTOMATISER L'ANALYSE D'IMAGES DE TERRAIN AVEC L'INTELLIGENCE ARTIFICIELLE.

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LE GROUPE SII



Europe

Belgium – Czech Republic –
France – Germany –
Luxembourg – Poland –
Romania – Spain –
Switzerland – The
Netherlands

Africa

Morocco

Asia

India

America

Argentina – Canada –
Colombia - Chile



1979



8600



545M €



0 debts



18



74





BELGIUM

Business Critical Digital Solutions

CLIENTS



PLATFORMS



E-COMMERCE & DIGITAL MARKETING

Transform customer experience

- Omni-channel strategy
- E-commerce platforms
- Usability & Conversion
- Predictive marketing & Personalization
- Mobile commerce
- Connected store

PRODUCTIVITY & COLLABORATION

Transform the way we work

- Connect teams in real time
- Collaborative workspaces
- Content & document management
- Integration of data from multiple sources
- Central IT control and governance
- Secure access from anywhere to all information

ACTIONABLE INSIGHTS & SMART SOLUTIONS

Transform data into intelligent actions

- Advanced data analysis
- Machine learning
- Predictive analytics solutions
- Dashboard & Visualization
- Personalized customer experience
- Connected devices integration (IoT)

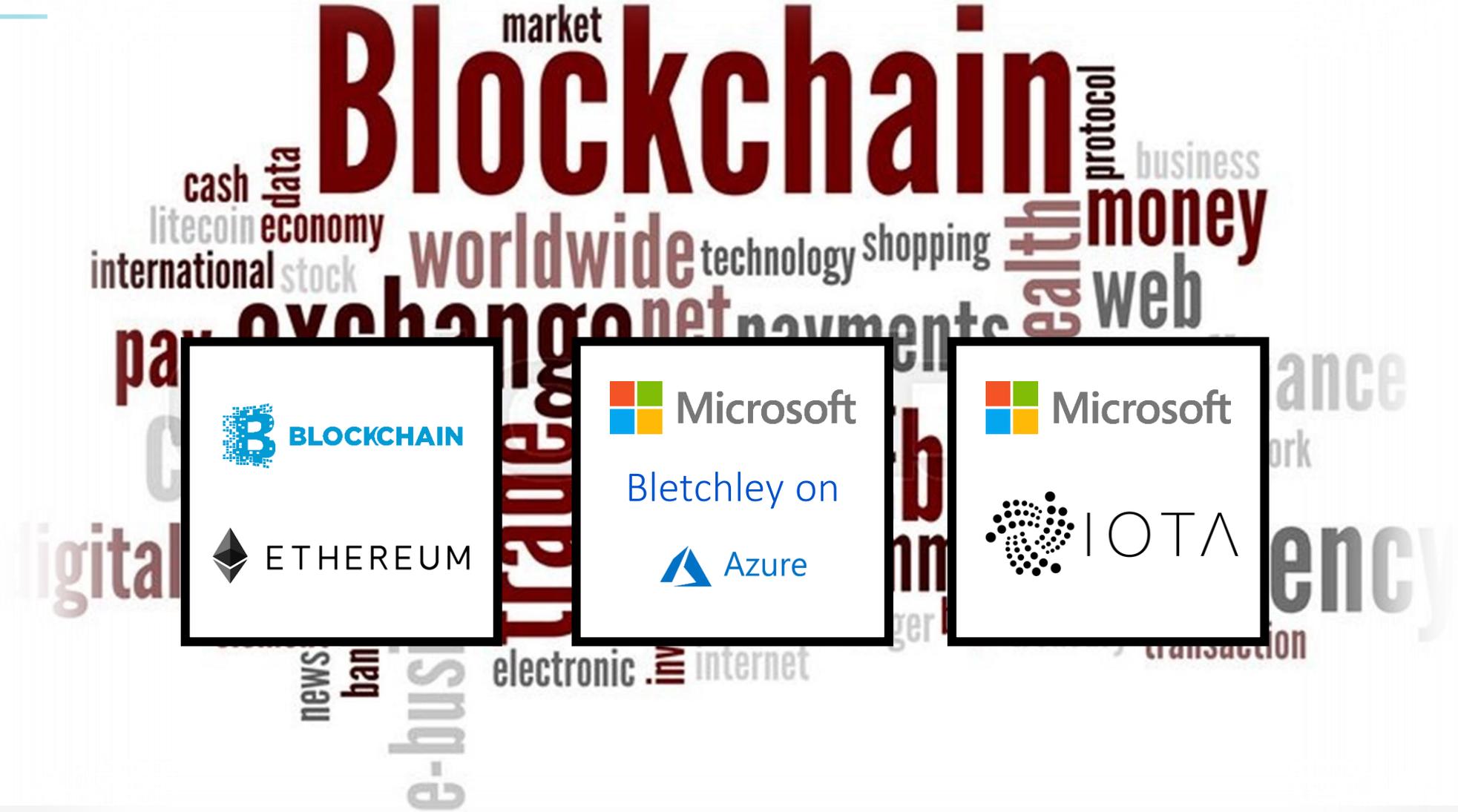
Consulting & outsourcing



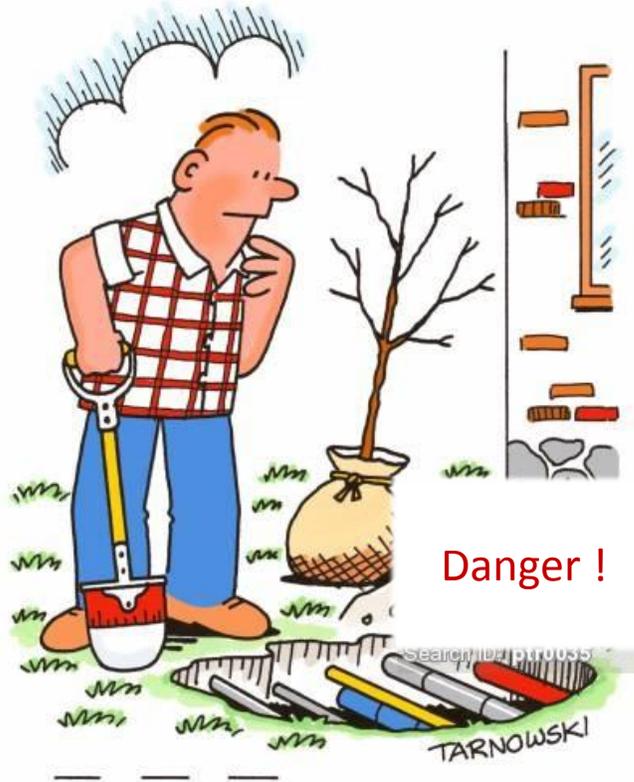
BELGIUM

Business Critical Digital Solutions

ACTIONABLE INSIGHTS & SMART SOLUTIONS – BLOCKCHAIN



CONTEXTE



CONTEXTE



SITUATION À NON RISQUE

- Activités agricoles normales



SITUATION À RISQUE

- Érosion
- Décoloration du terrain



SITUATION À RISQUE

- Activités agricoles anormales



SITUATION À RISQUE

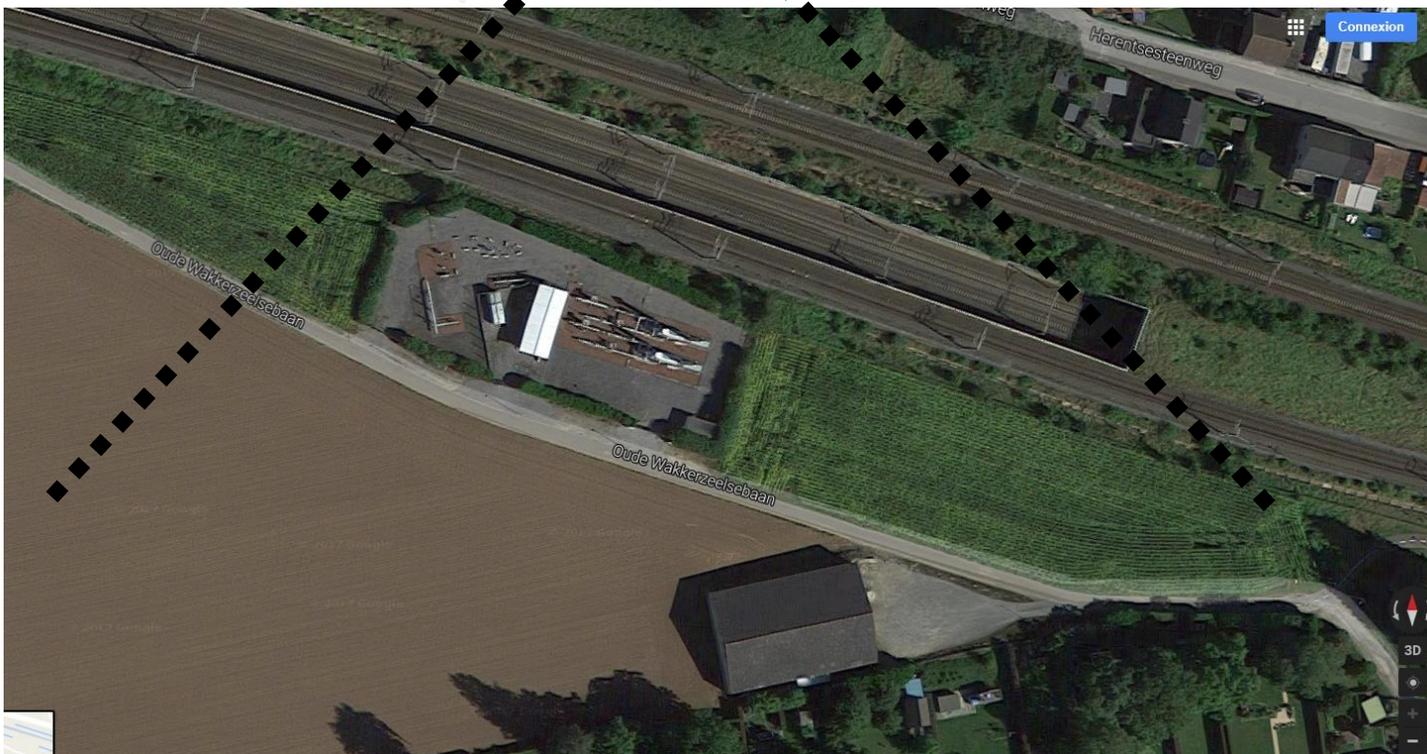
> Autres exemples



LES INSPECTIONS



ANALYSE DES IMAGES



Analyse visuelle des images



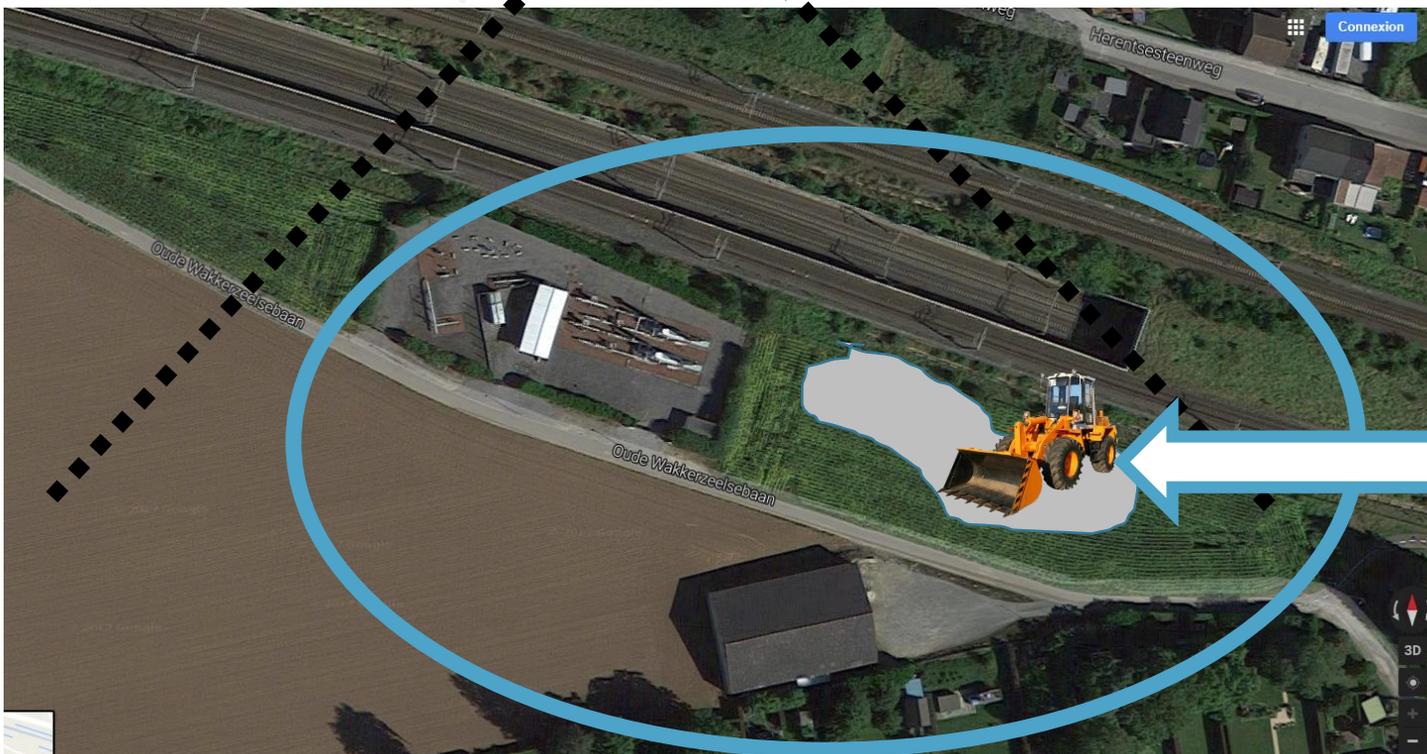
ANALYSE DES IMAGES : DÉTECTION D'ANOMALIES



ANALYSE DES IMAGES : DÉTECTION D'ANOMALIES



PHOTO

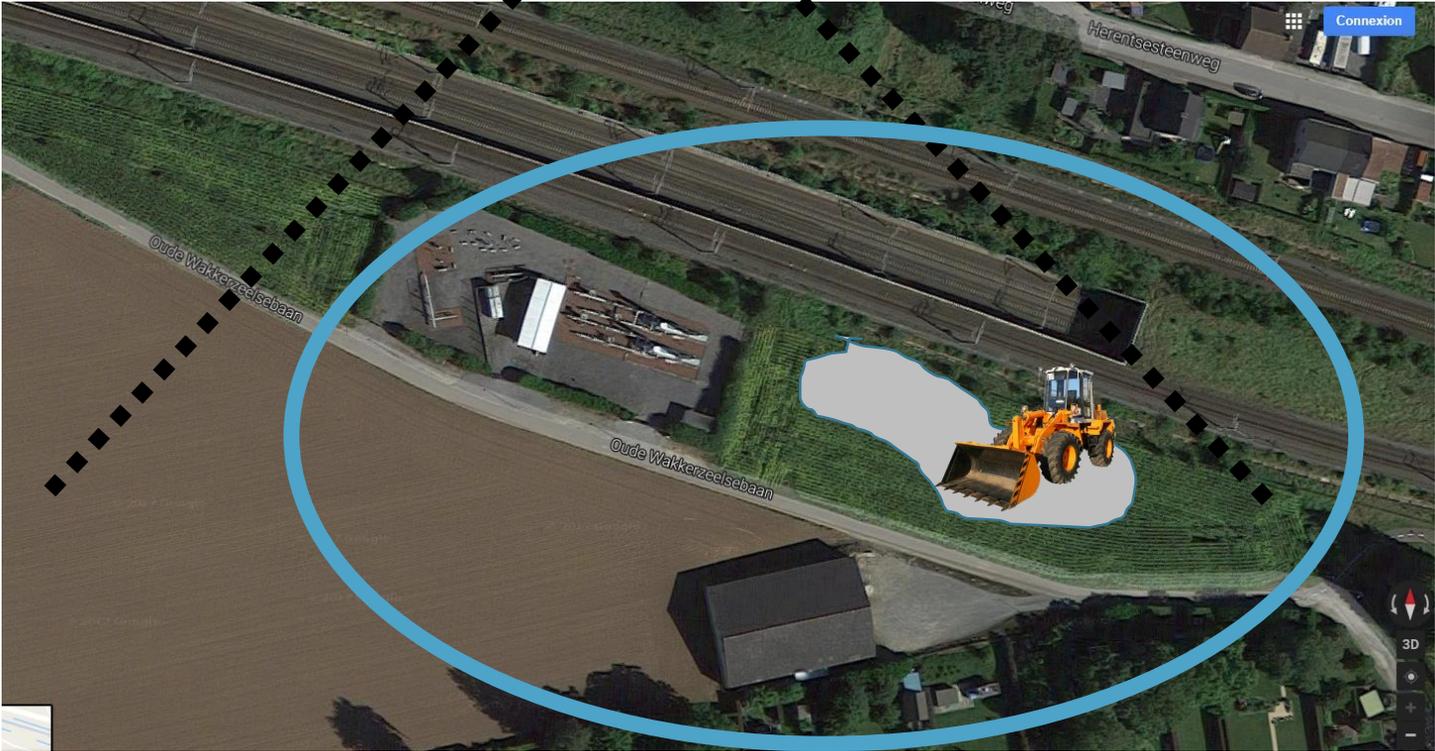


- Contact avec la société
- Vérification des demandes de permis
- Analyse du risque
- En cas de danger = envoyer l'équipe d'intervention

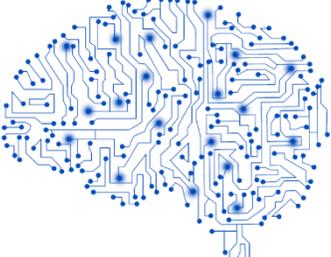


Equipe
d'intervention

UTILISER DE L'INTELLIGENCE ARTIFICIELLE



Intelligence artificielle



recommandations



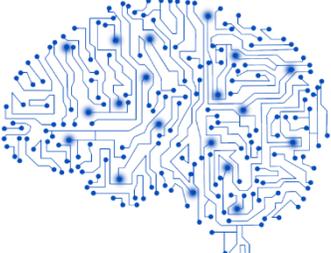
Contrôle final



BUT FINAL



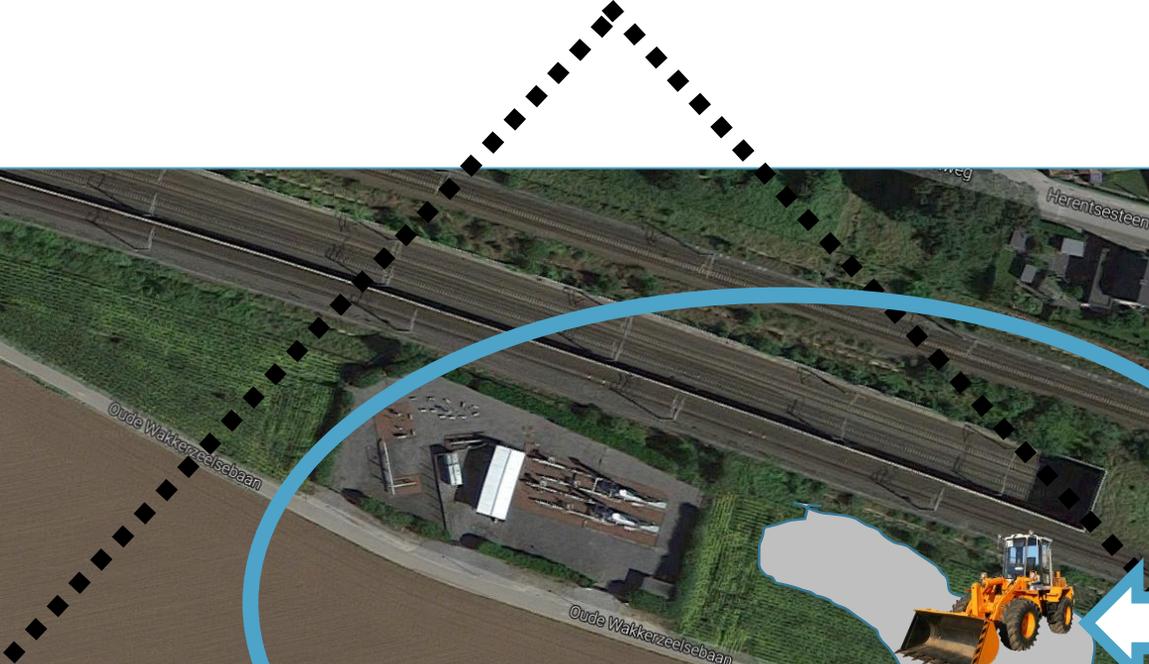
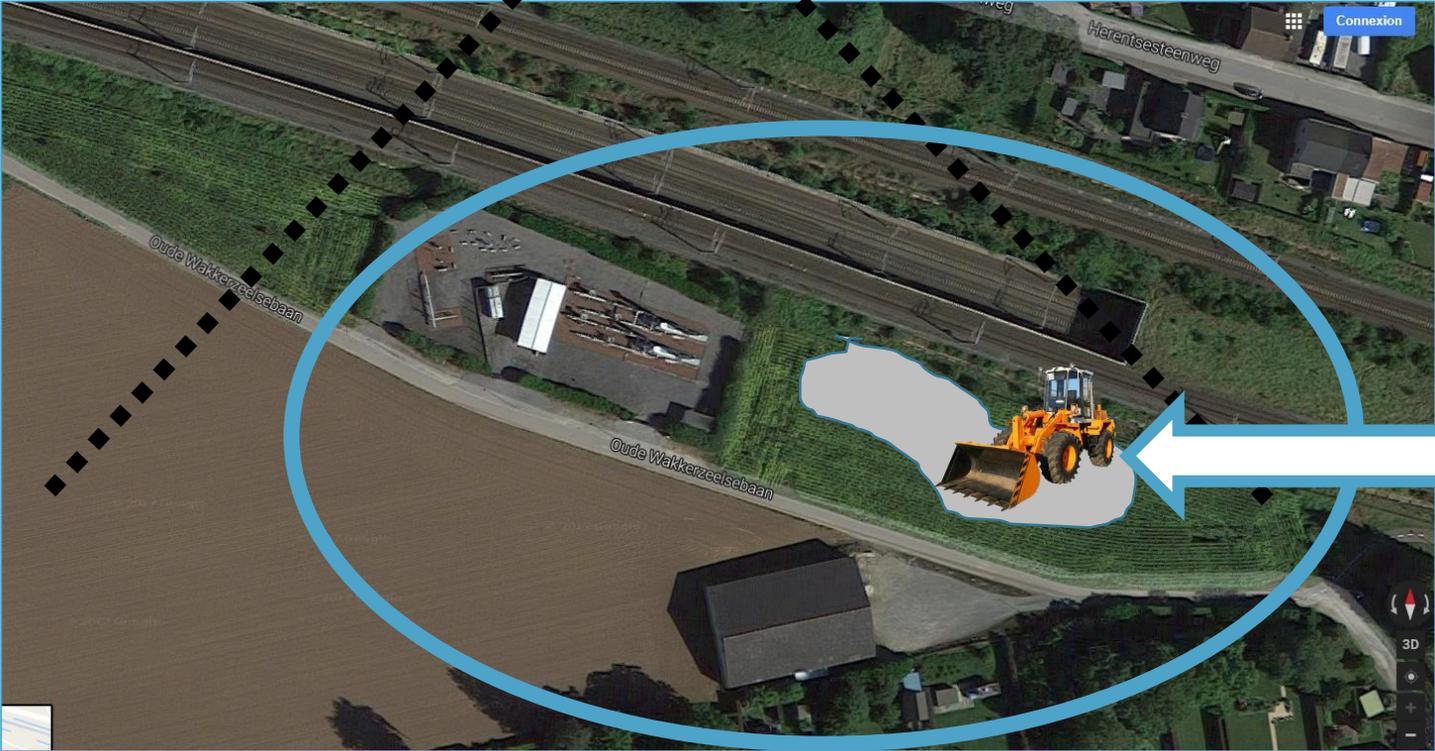
Intelligence artificielle



recommandations

A blue-bordered box containing the text "Intelligence artificielle" at the top, a stylized brain icon composed of blue circuit traces in the center, and the word "recommandations" at the bottom.

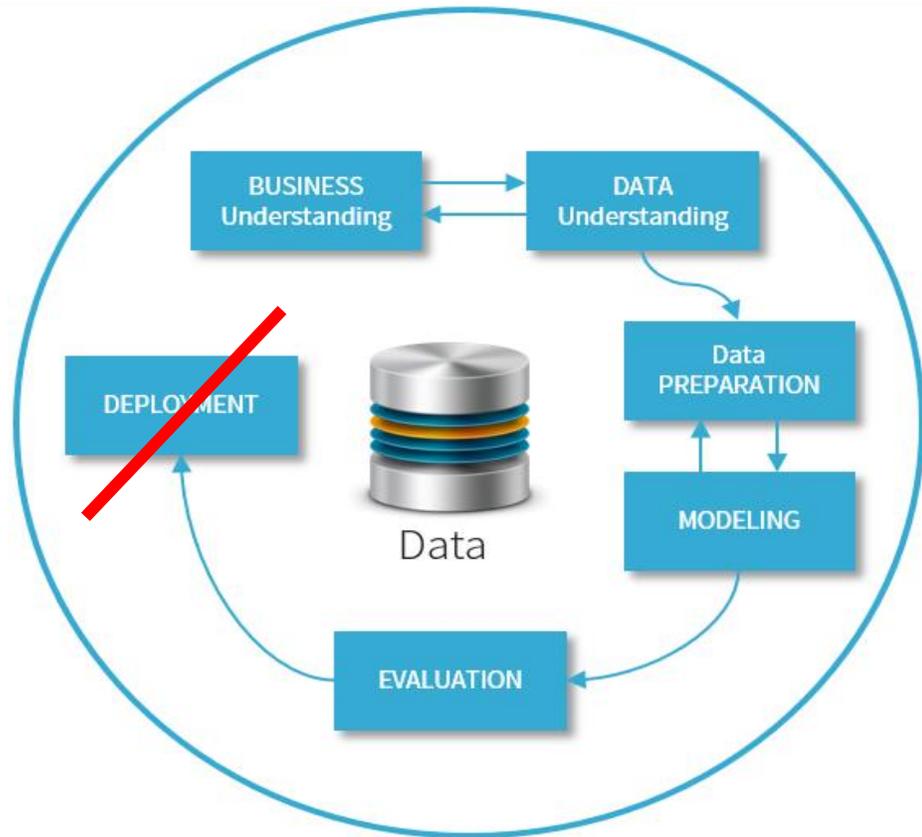
Equipe d'intervention



OBJECTIF DU PROOF OF CONCEPT

- Tester l'applicabilité de l'intelligence artificielle dans le contexte des activités du client
- Apprendre les concepts de I.A., machine learning, réseaux neuronaux
- Apporter de l'innovation

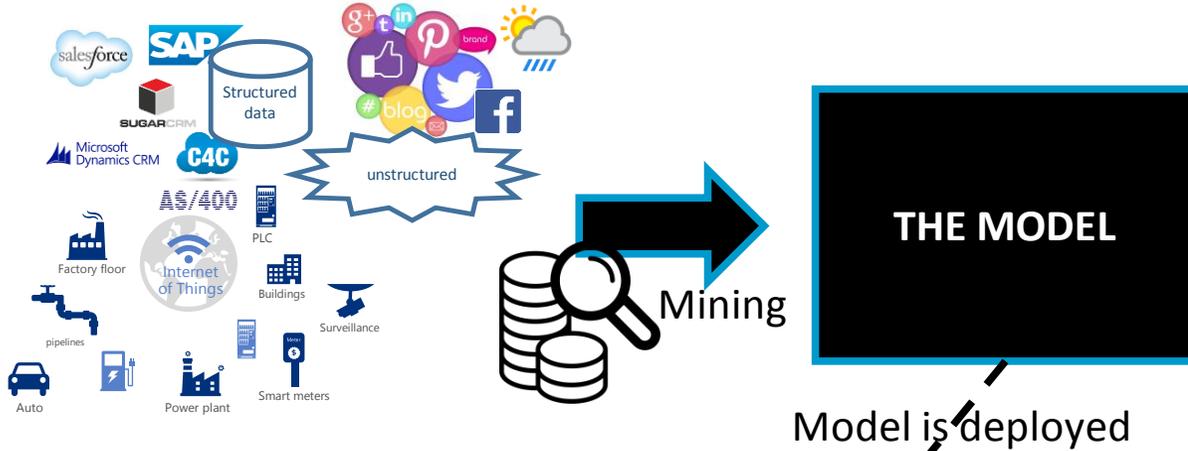
APPROCHE: LE CRISP* MODEL



- CRISP model = Cross Industry Standard Process model for data mining
- Nous avons parcouru toutes les étapes de ce processus

LE PROCESSUS DU DATA MINING

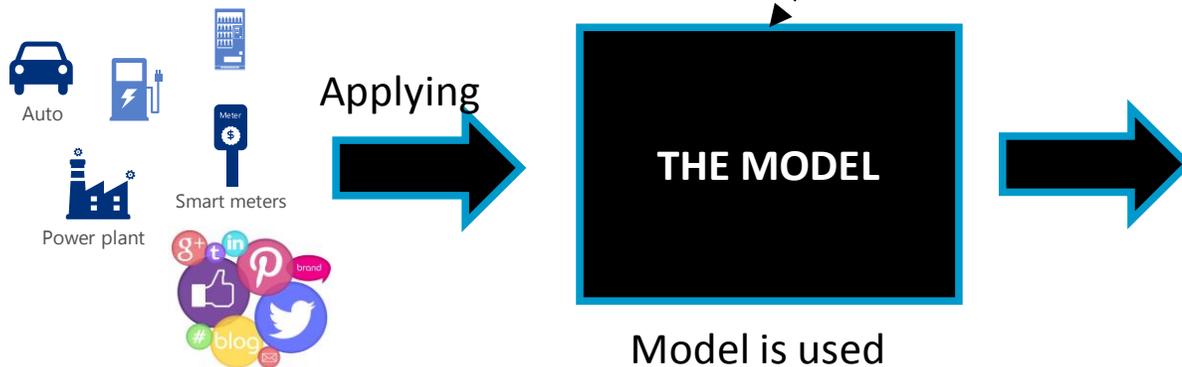
Historical data



Estimates the correlation, the logic, the probability, the causality, the occurrence,..... between the **TRAINING** data

Supervised data mining methods:
A specific purpose or target is set

New data



Generates the correlation, the logic, the probability, the causality, the occurrence,..... between the **NEW** data

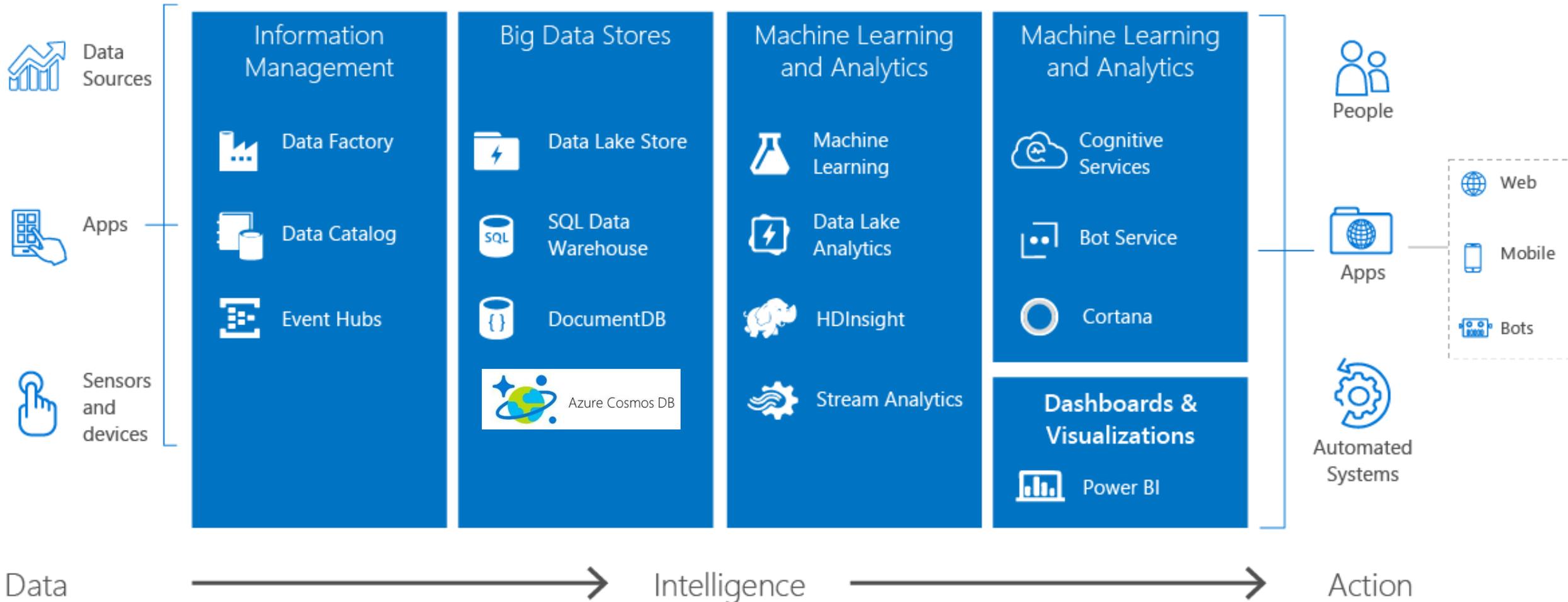
Unsupervised data mining methods:
No specific purpose or target is set

L'OUTIL CORTANA INTELLIGENCE



Data → Intelligence → Action

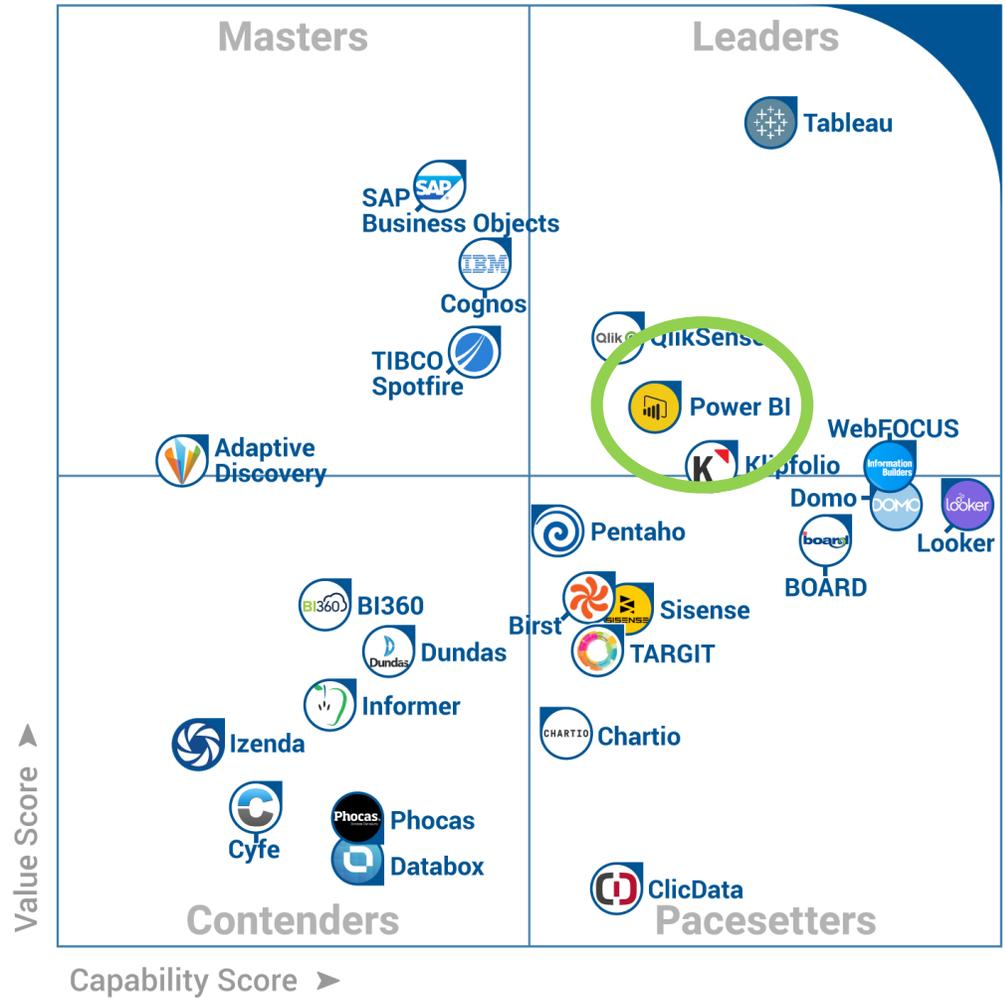
OUTIL CORTANA INTELLIGENCE - COMPOSANTS



AZURE EST UNE PLATEFORME OUVERTE



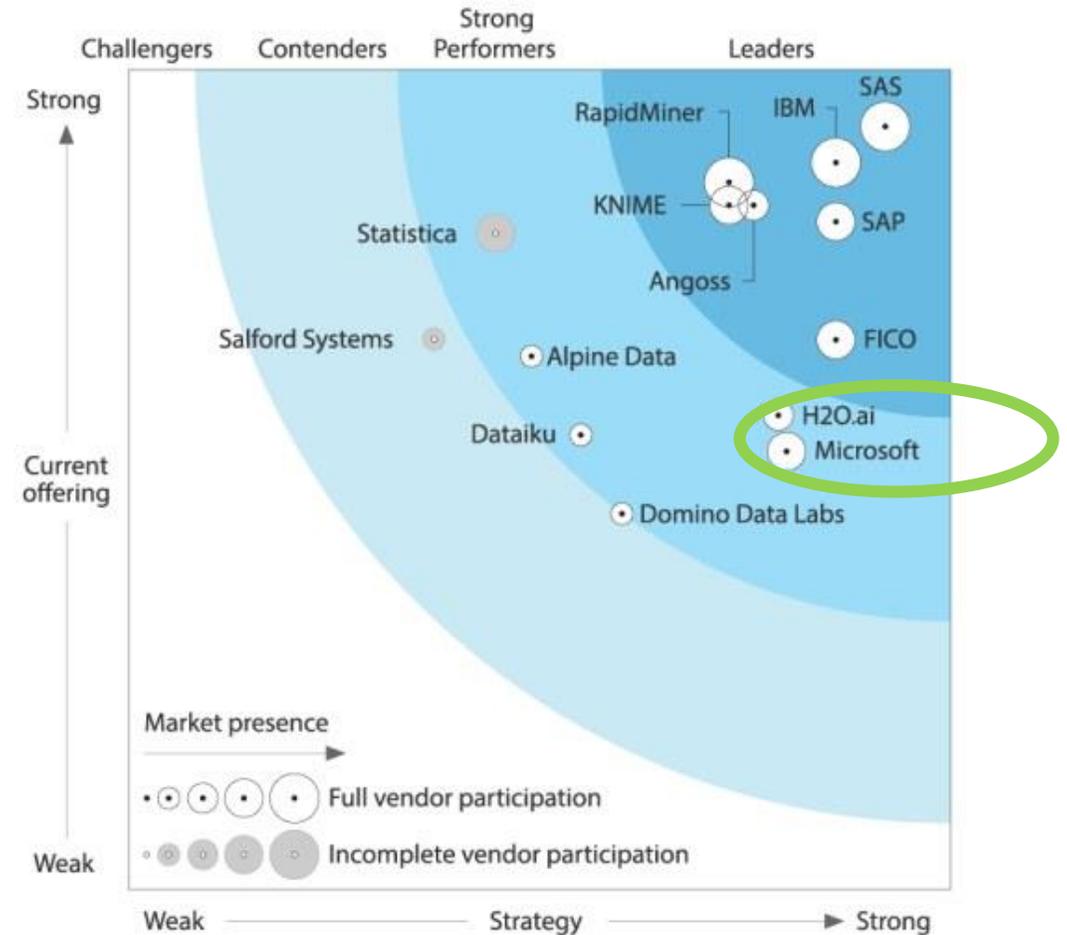
MAGIC QUADRANTS 2017



GARTNER & FORRESTER QUADRANT (2017)

Data science platforms

Figure 1. Magic Quadrant for Data Science Platforms



MICROSOFT AI PLATFORM

Azure AI Services

PRE-BUILT AI

Cognitive Services

CONVERSATIONAL AI

Bot Service

CUSTOM AI

Azure Machine Learning

Azure Infrastructure

AI ON DATA

Cosmos DB

SQL DB

SQL DW

Data Lake

Spark

DSVM

Batch AI

ACS

IoT Edge

AI COMPUTE

CPU, FPGA, GPU

Tools

CODING & MANAGEMENT TOOLS

VS Tools for AI

Azure ML Studio

Azure ML Workbench

Others (PyCharm, Jupyter Notebooks...)

DEEP LEARNING FRAMEWORKS

3rd Party

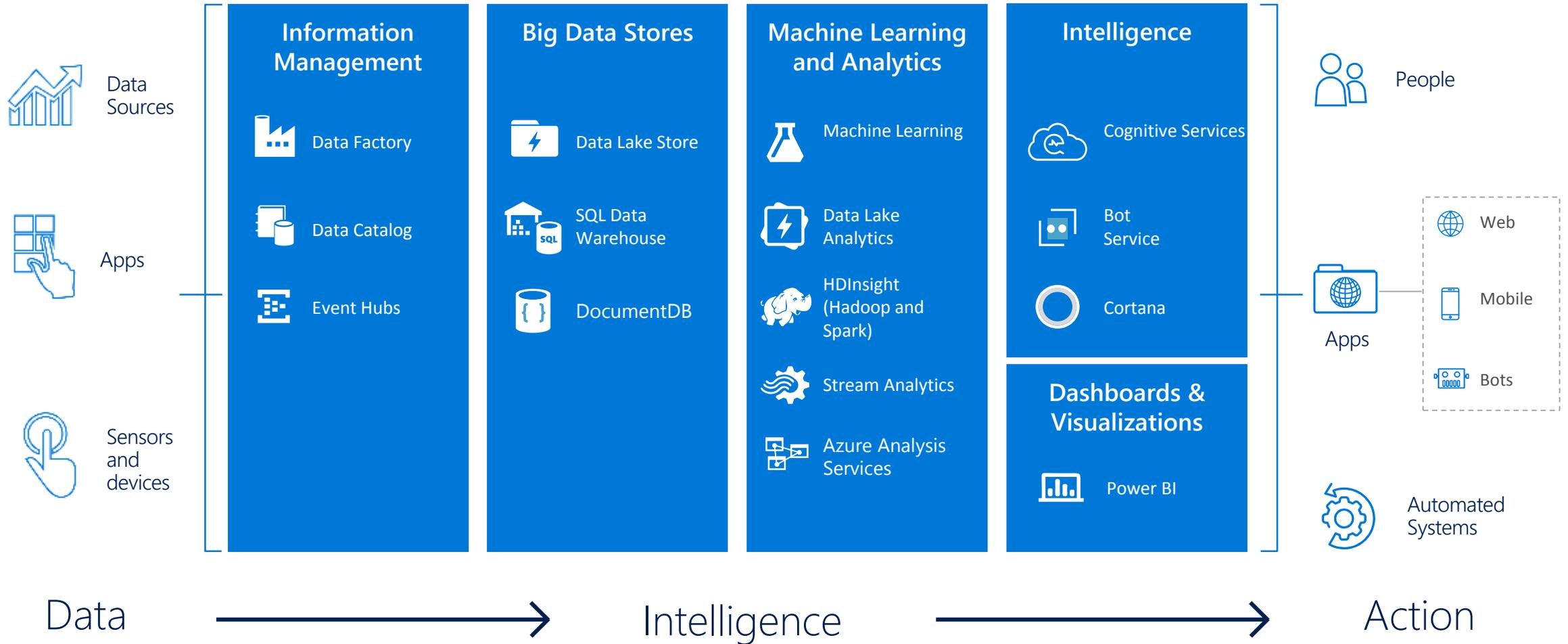
Cognitive Toolkit

TensorFlow

Caffe

Others (Scikit-learn, MXNet, Keras, Chainer, Gluon...)

EASILY TURN DATA INTO INTELLIGENT ACTION



Machine Learning and Analytics

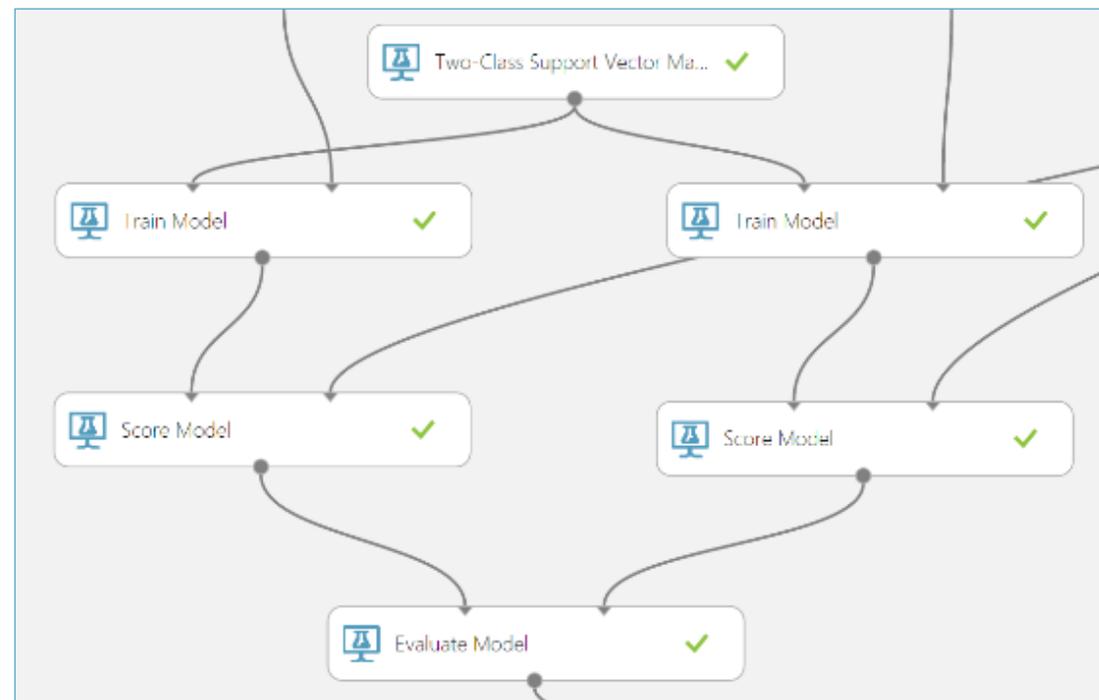
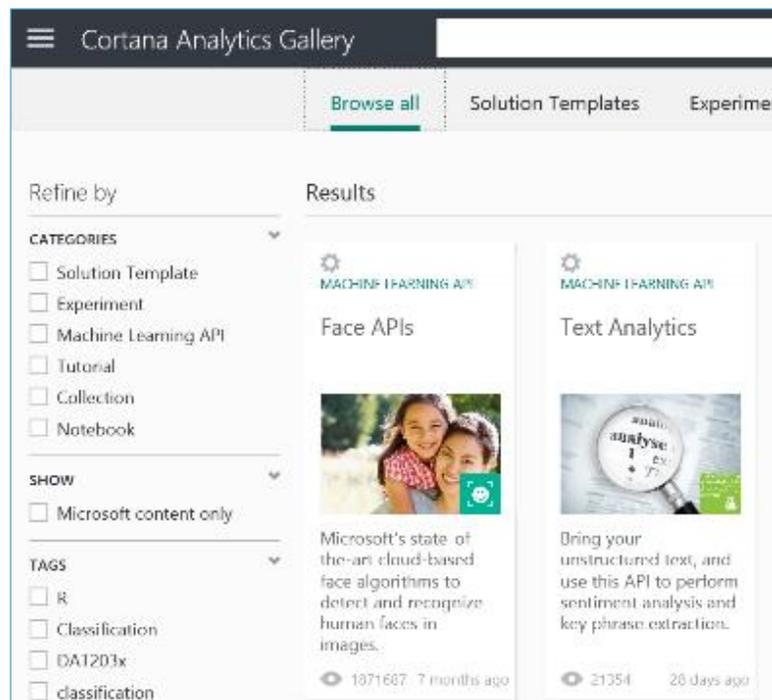
Machine Learning

Data Lake Analytics

HDInsight (Hadoop and Spark)

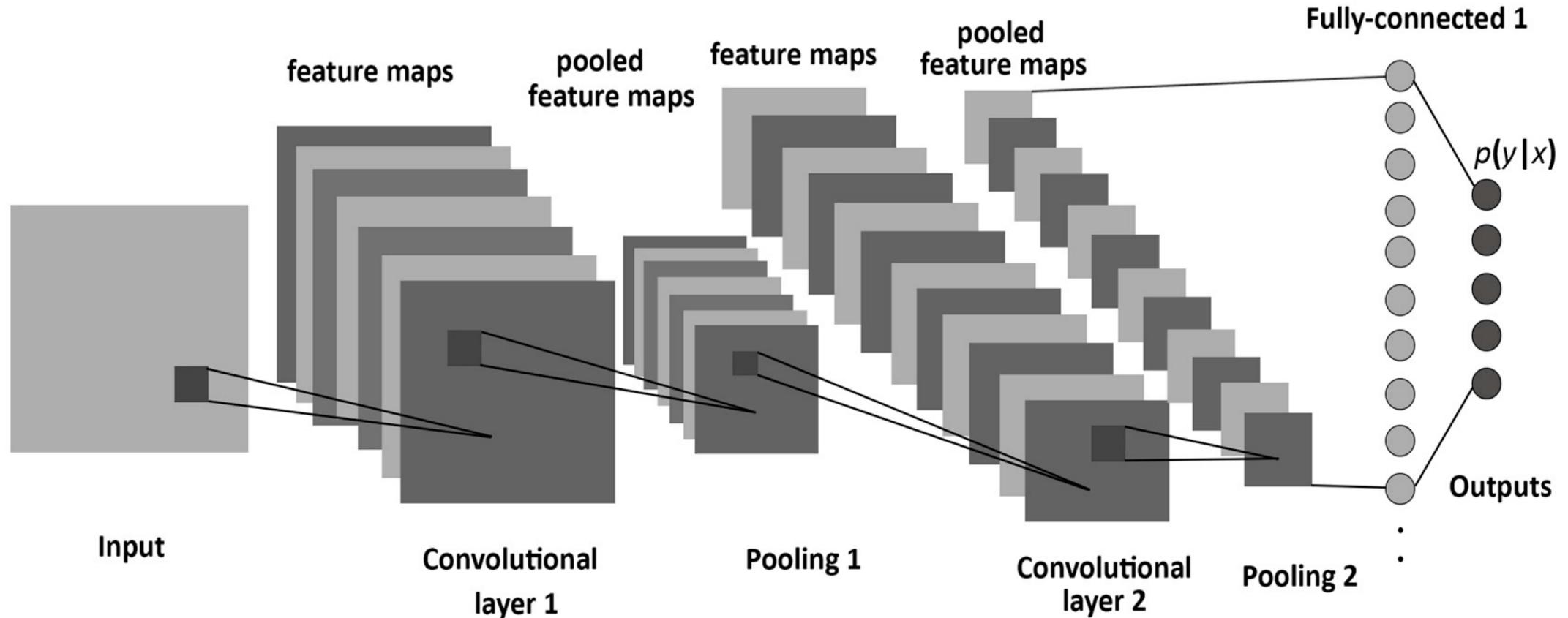
Stream Analytics

Azure Analysis Services

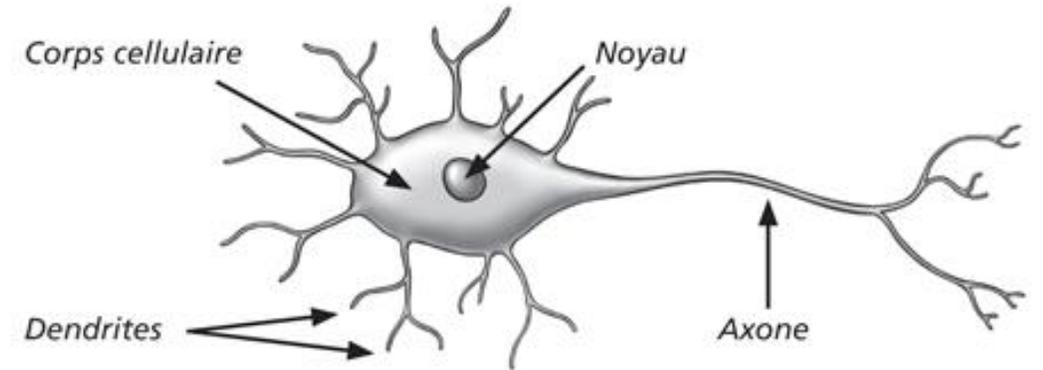
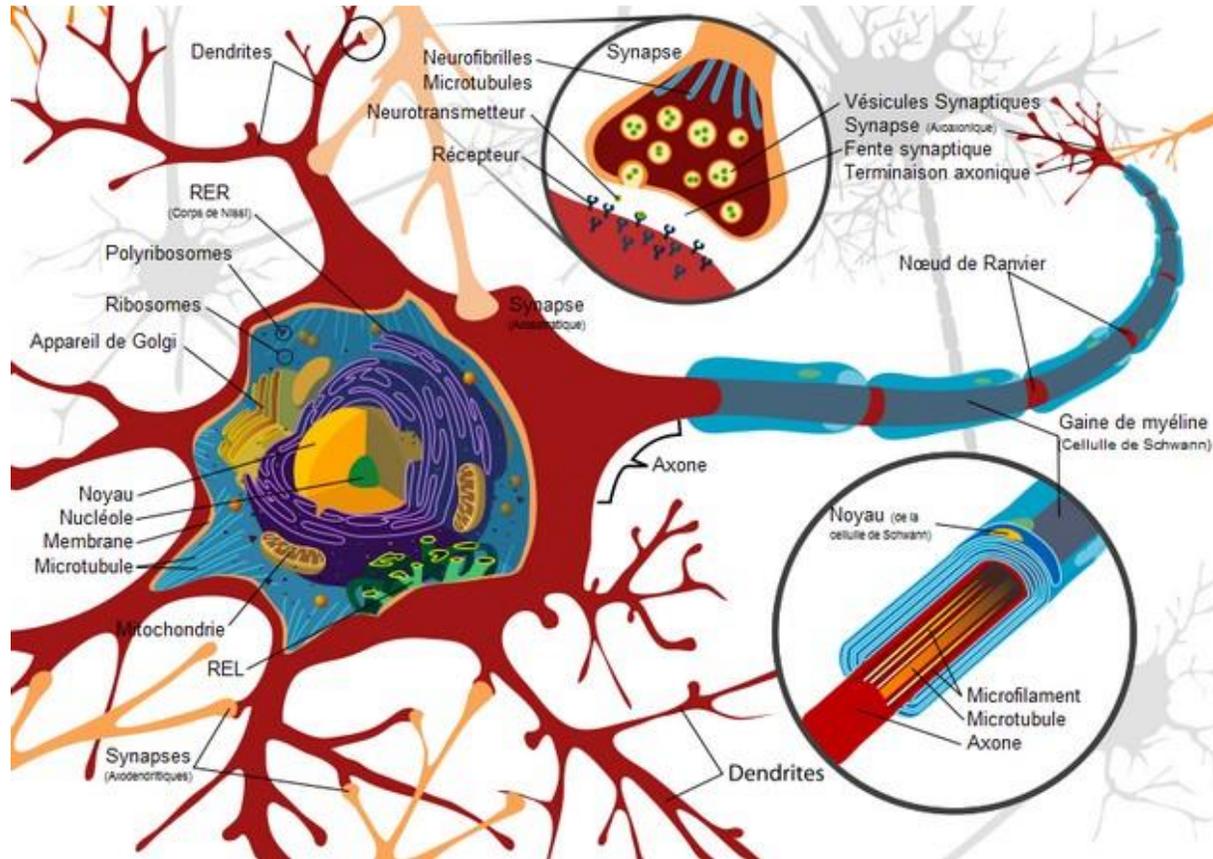


- Simple, scalable, cutting edge. A fully managed cloud service that enables you to easily build, deploy, and share predictive analytics solutions.
- Deploy in minutes. Azure Machine Learning means business. You can deploy your model into production as a web service that can be called from any device, anywhere and that can use any data source.
- Publish, share, monetize. Share your solution with the world in the Gallery or on the Azure Marketplace.

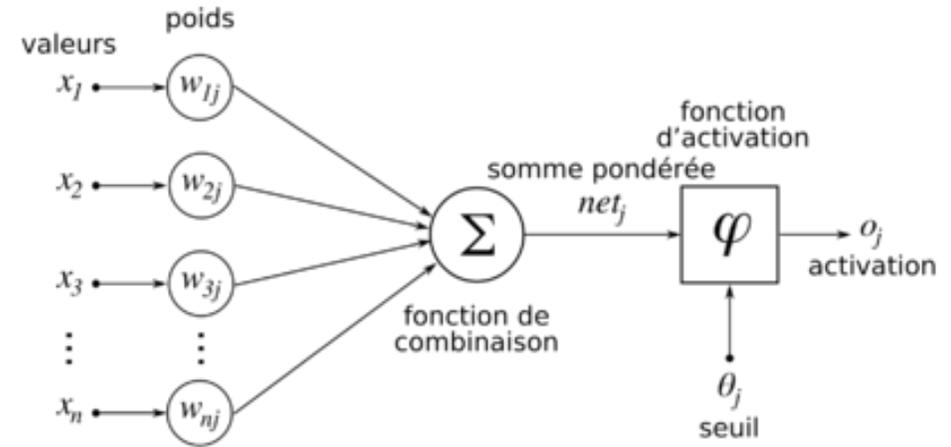
PRINCIPE DU (CONVOLUTIONAL) NEURAL NETWORK (CNN)



NEURONS DANS LE CERVEAU



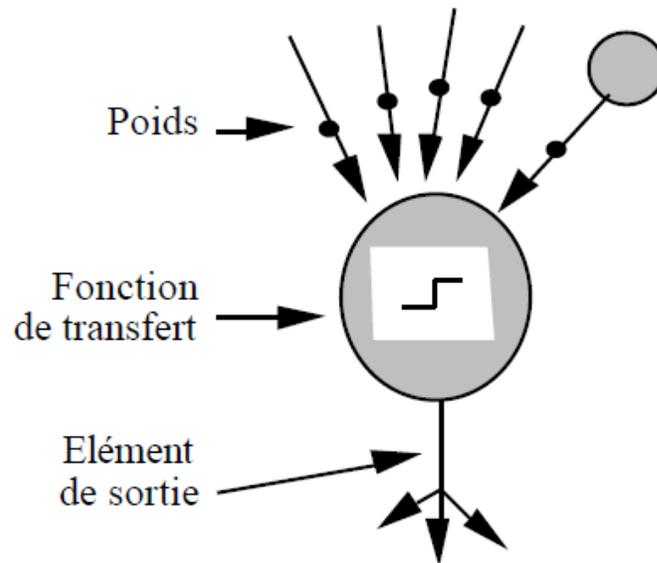
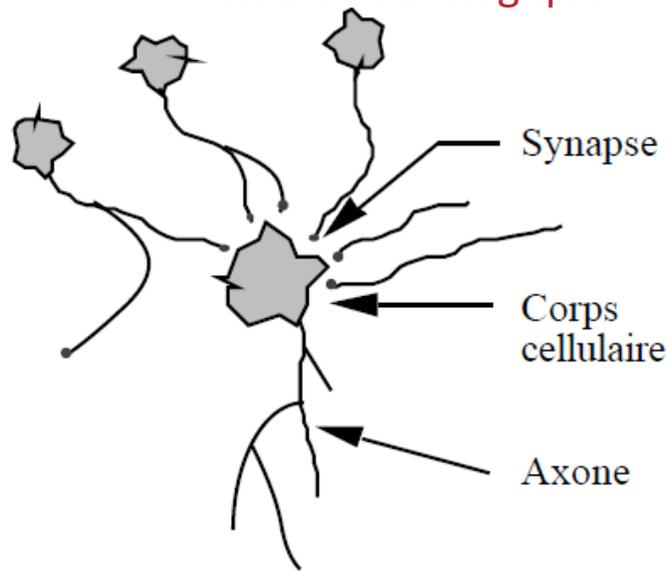
NEURONE ARTIFICIEL



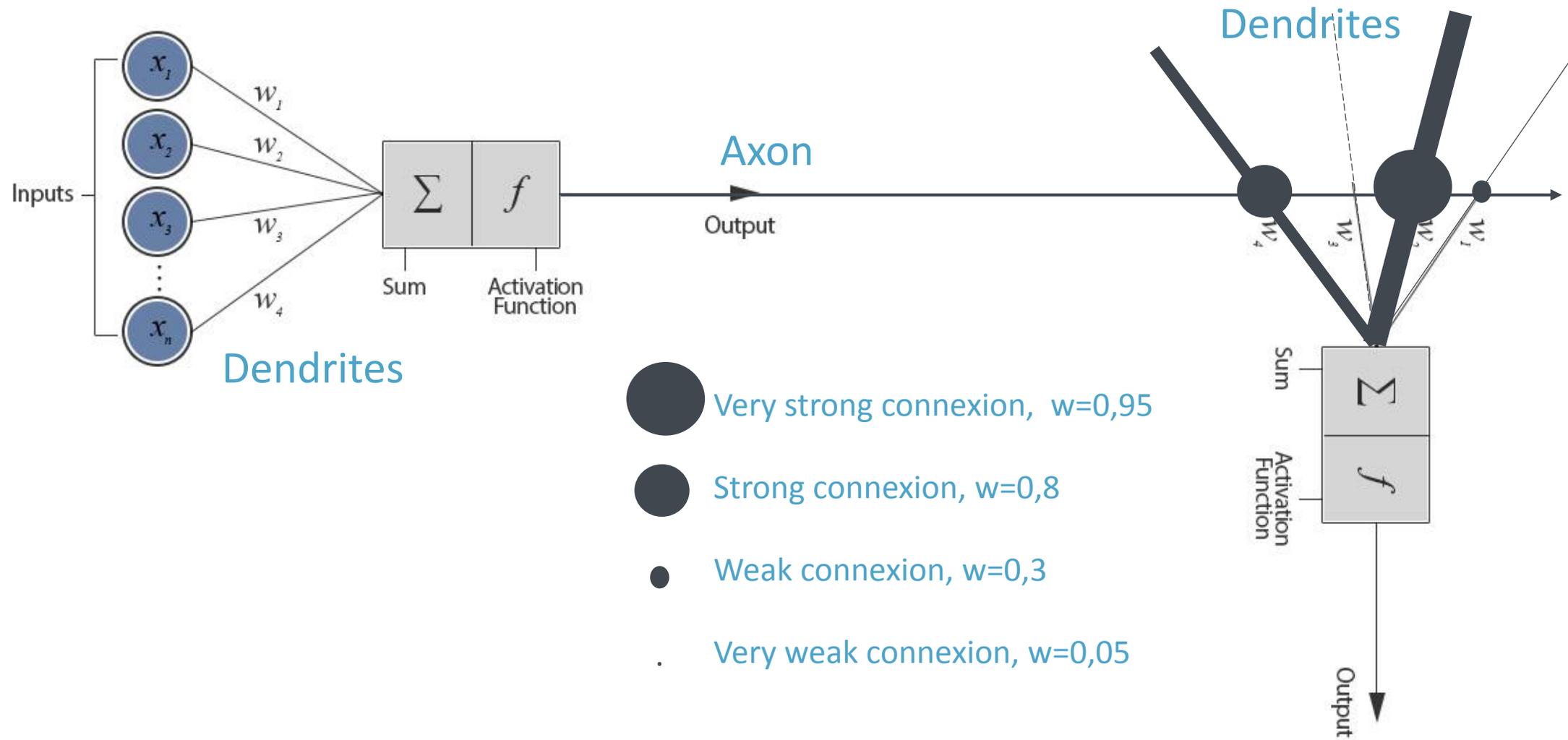
Neurone biologique

versus

Neurone artificiel



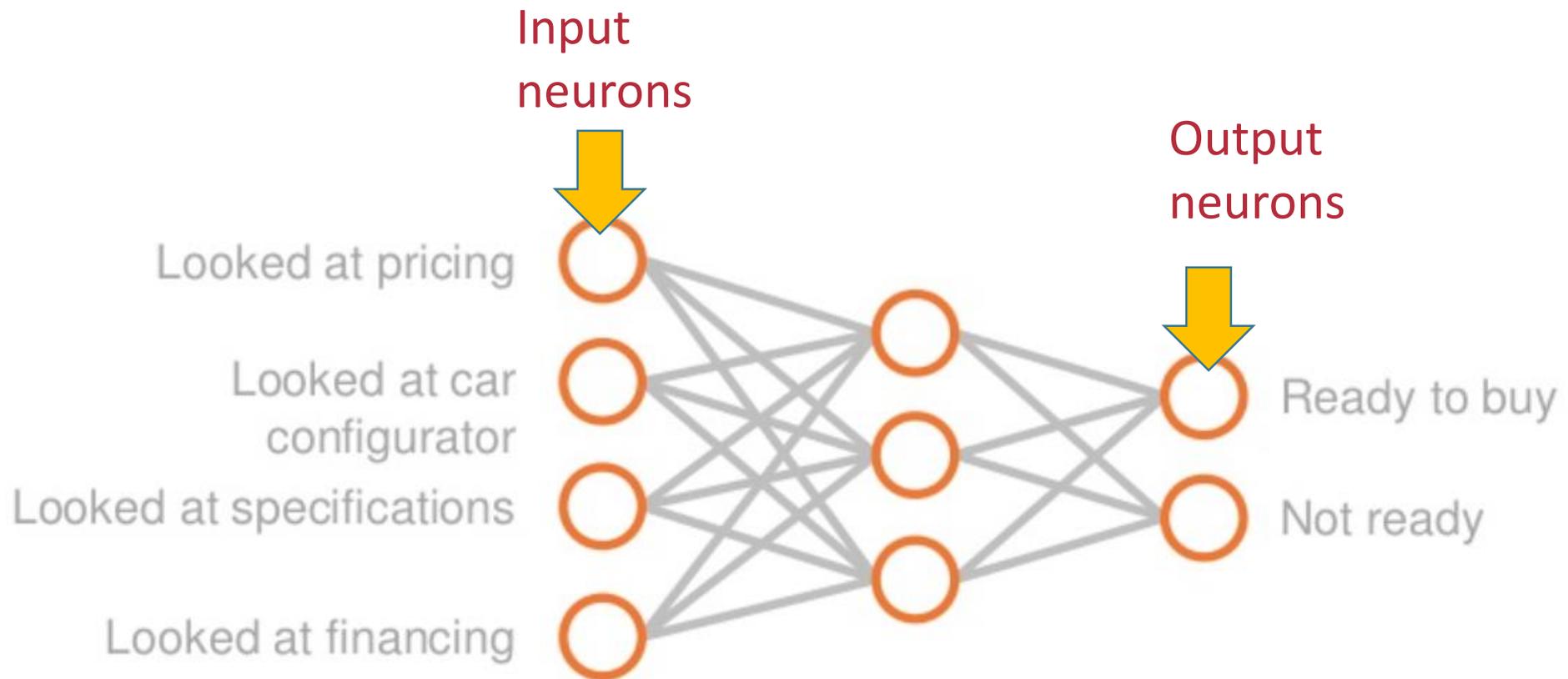
PASSER DE L'INFORMATION A TRAVERS LES NEURONES



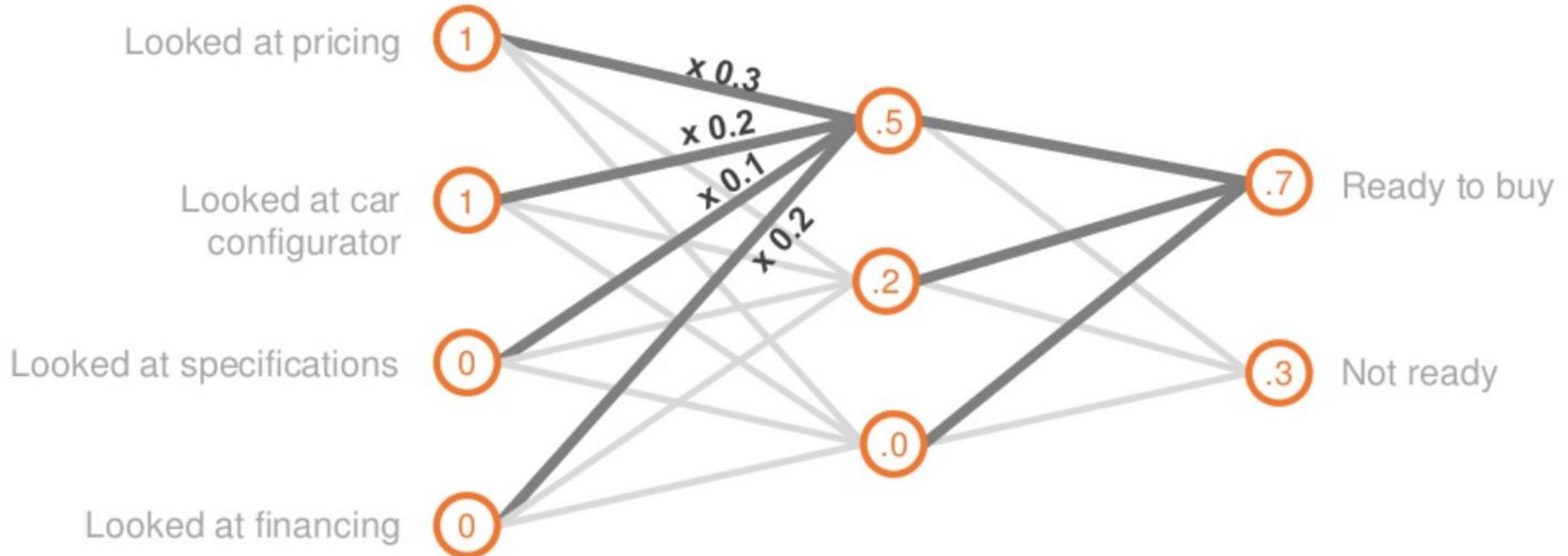
PRINCIPE DU RÉSEAU NEURONAL



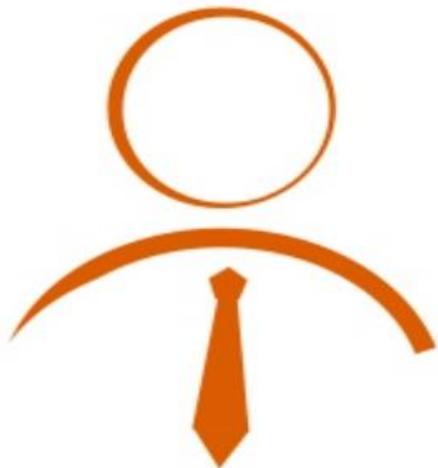
Profile



PRINCIPE DU RÉSEAU NEURONAL

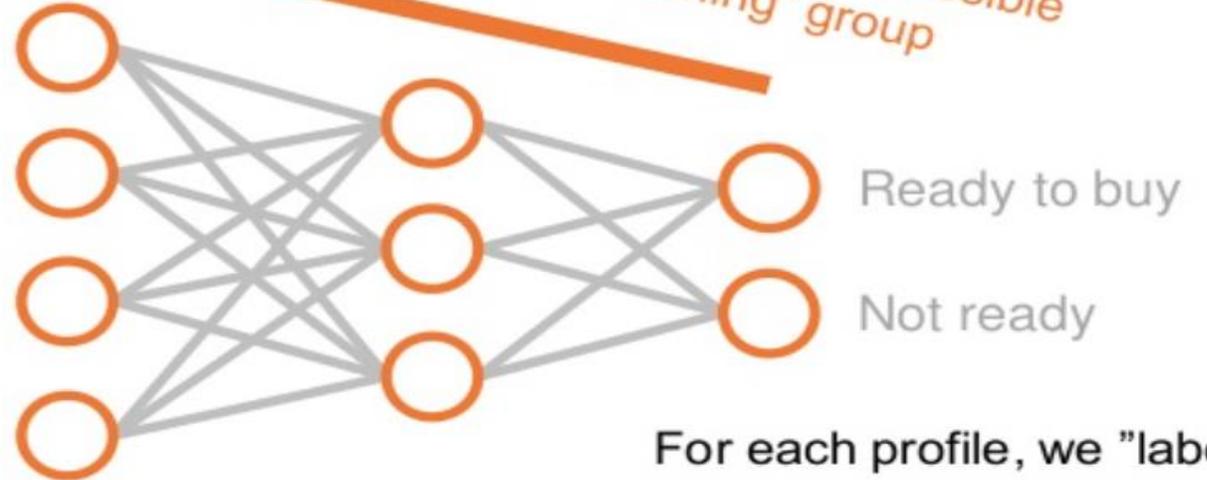


PRINCIPE DU RÉSEAU NEURONAL



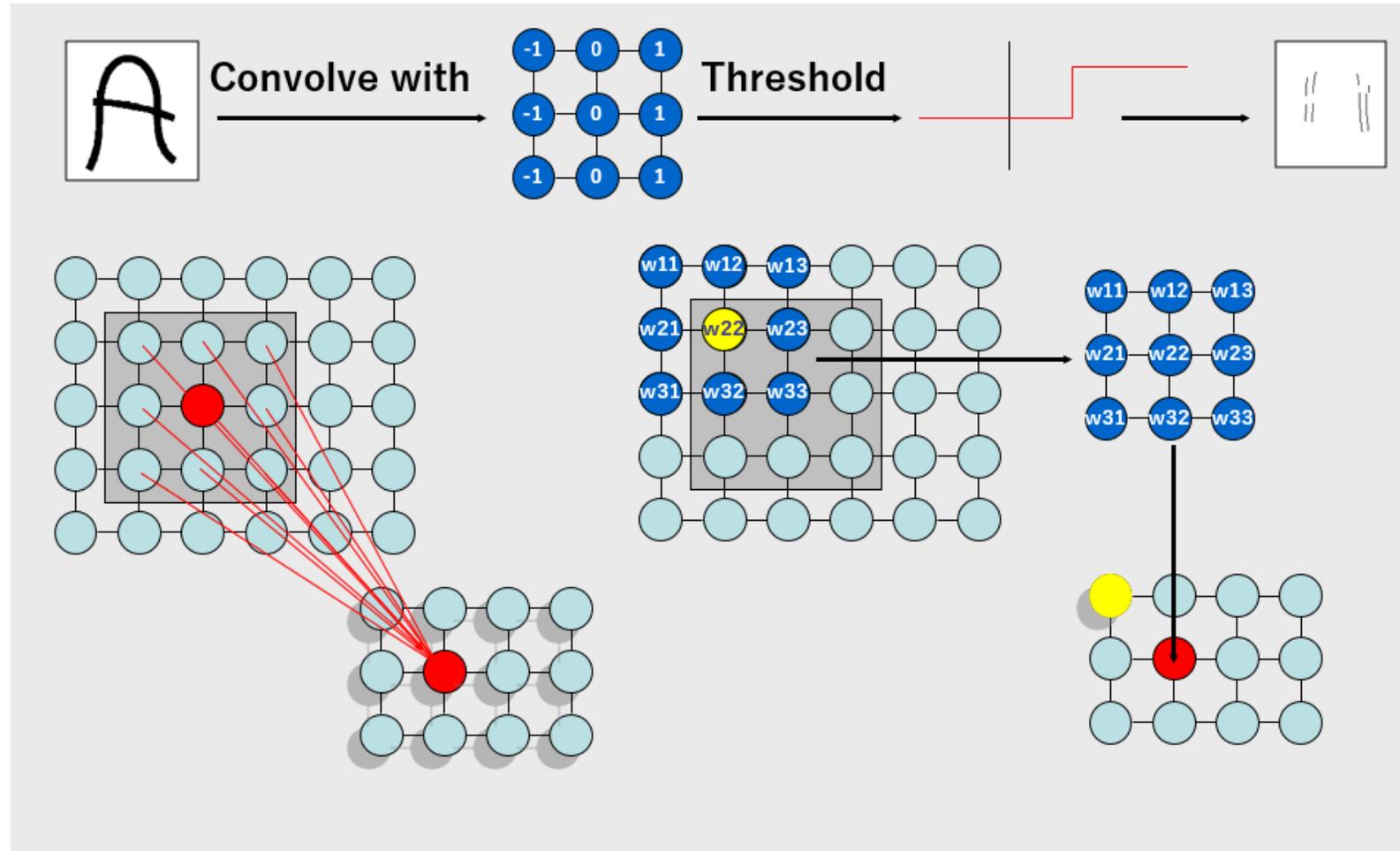
Thousands of profiles

Looked at pricing
Looked at car configurator
Looked at specifications
Looked at financing

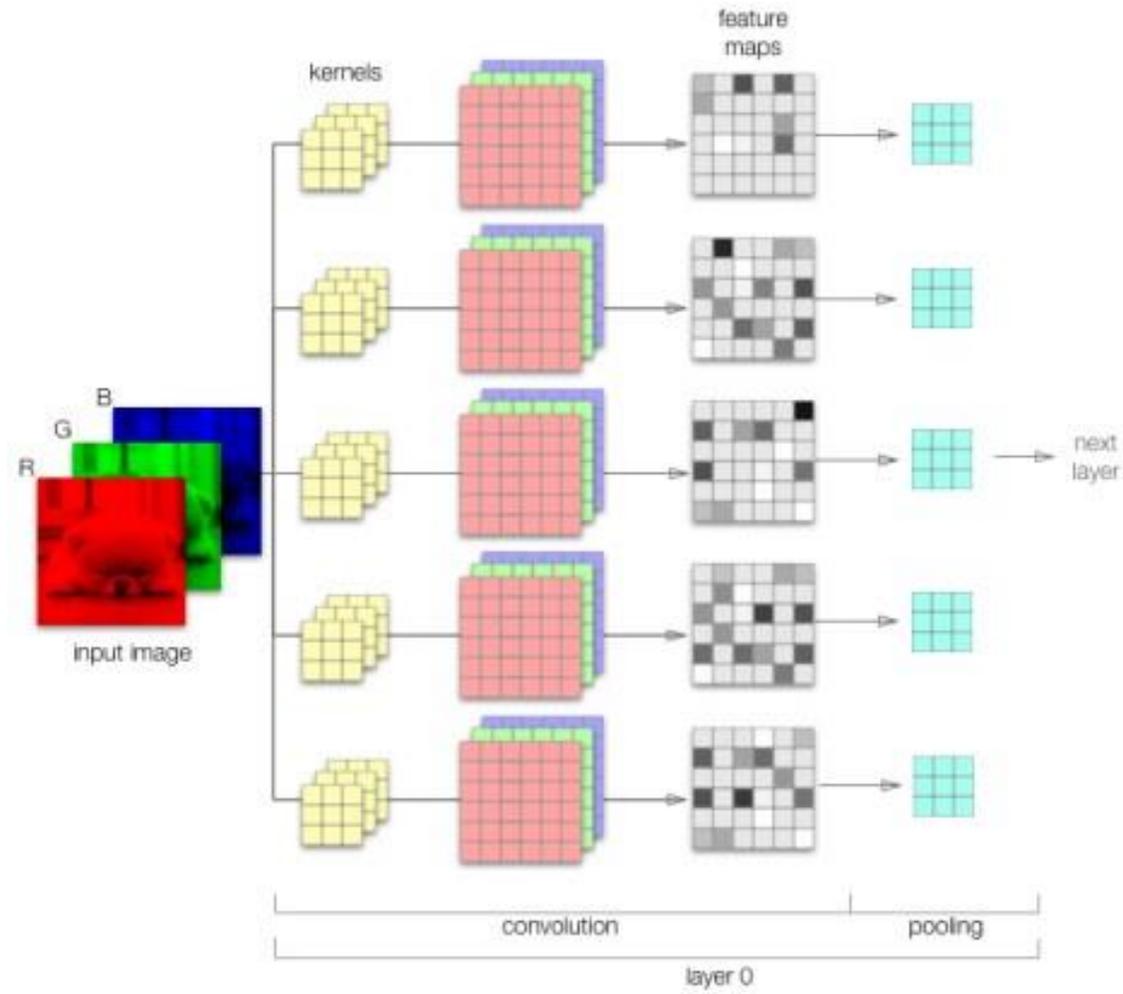


For each profile, we "label" it, telling the model if that person converted or not.

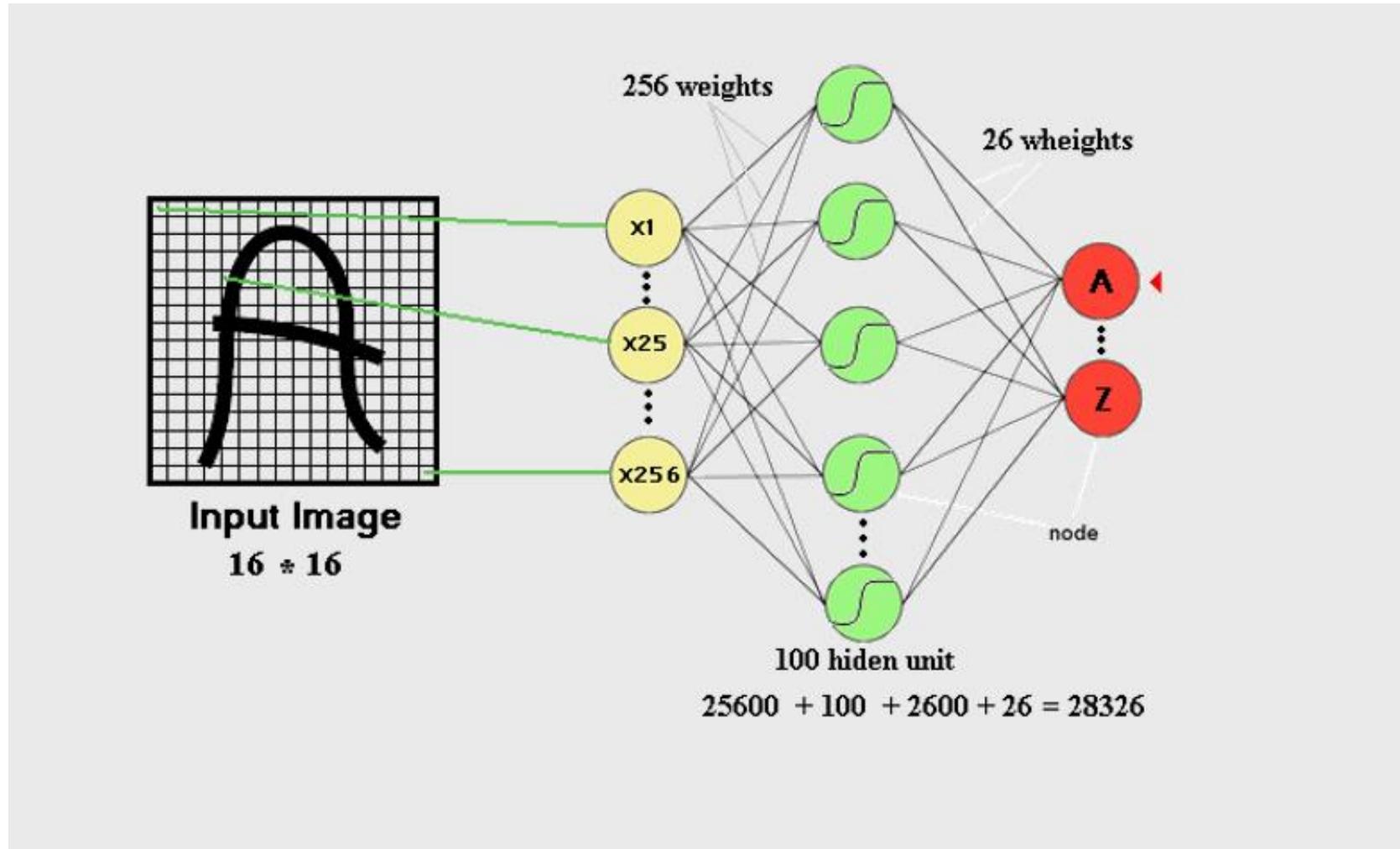
CONVOLUTION = SIMPLIFIER LA MATRICE VIA CALCULATIONS, D'OU LE CONVOLUTIONAL NEURAL NETWORK



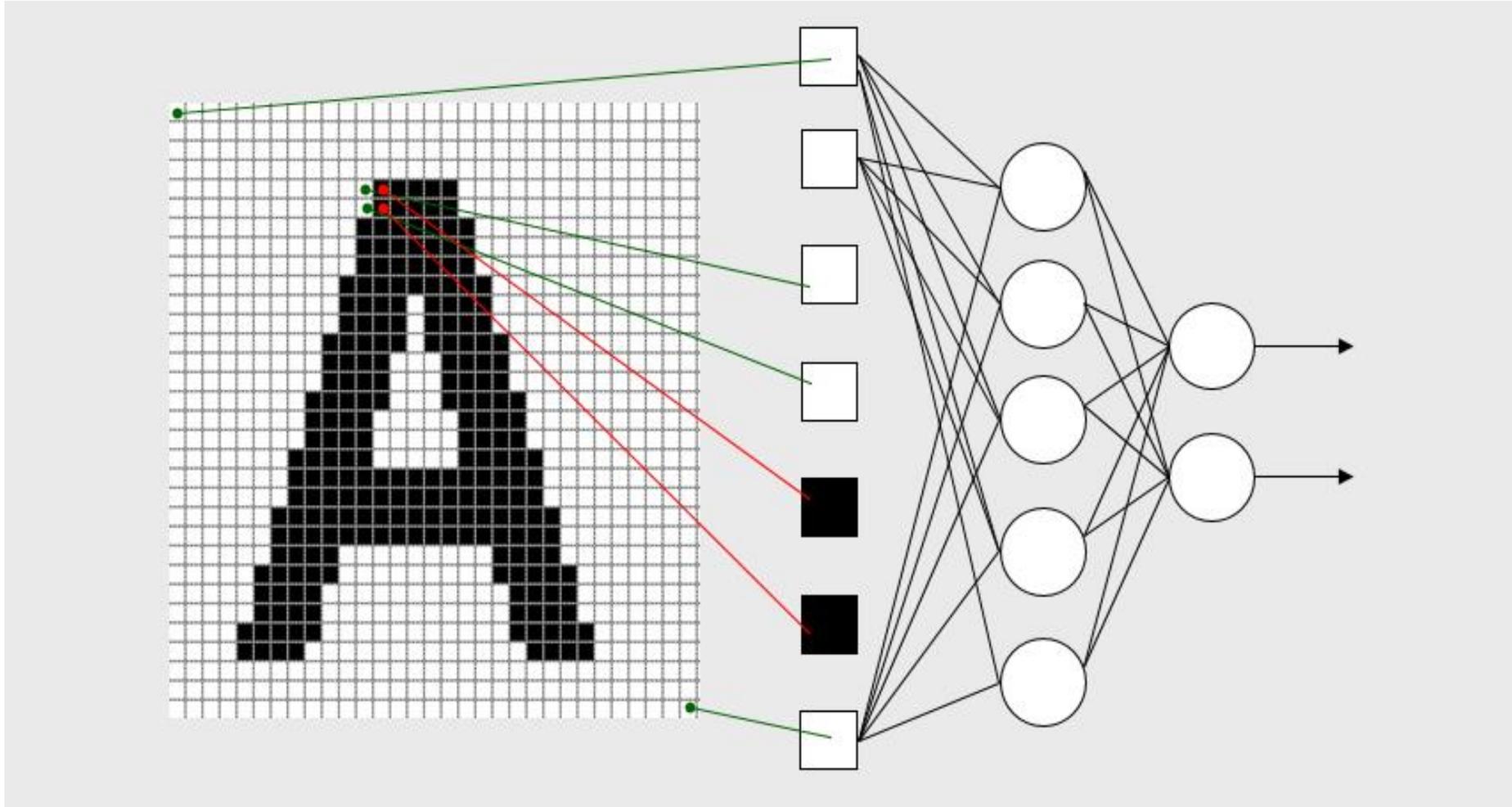
PHOTOS – CHAQUE PIXEL A 3 CARACTÈRES (R, G, B)



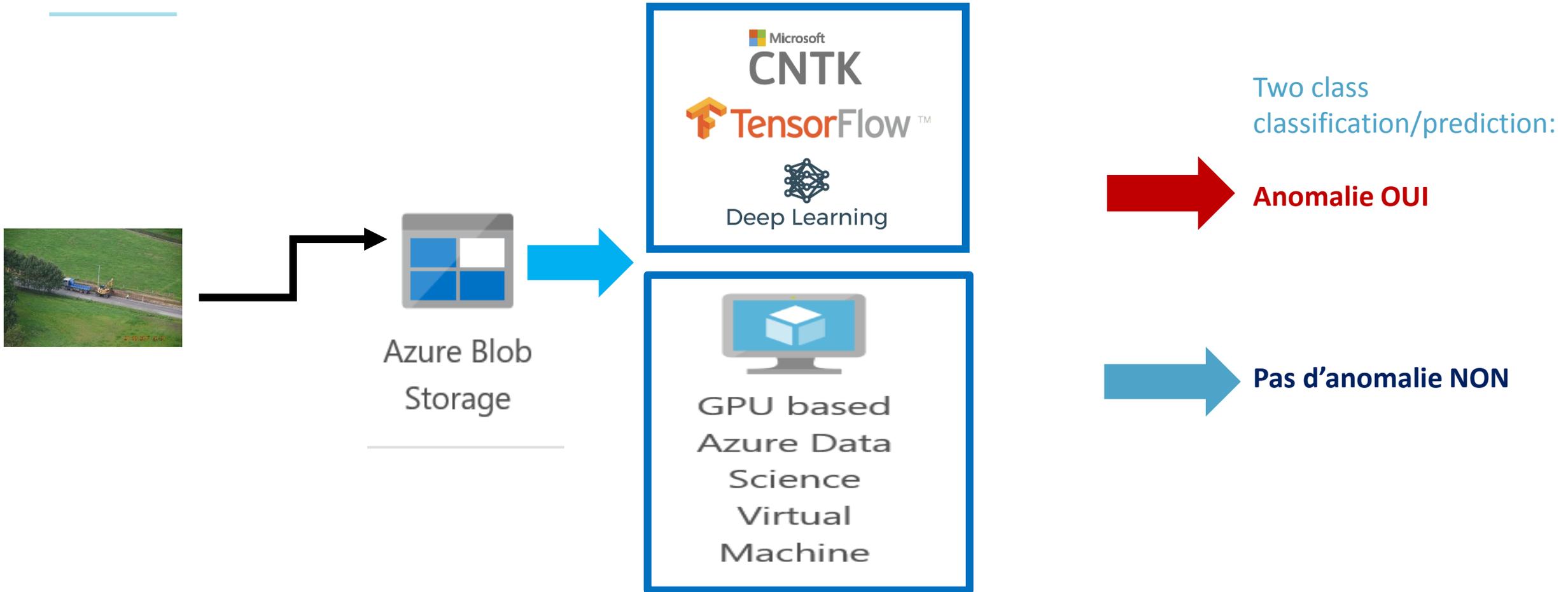
CHAQUE PIXEL = INPUT POUR L'INPUT INDIVIDUEL DES NEURONES



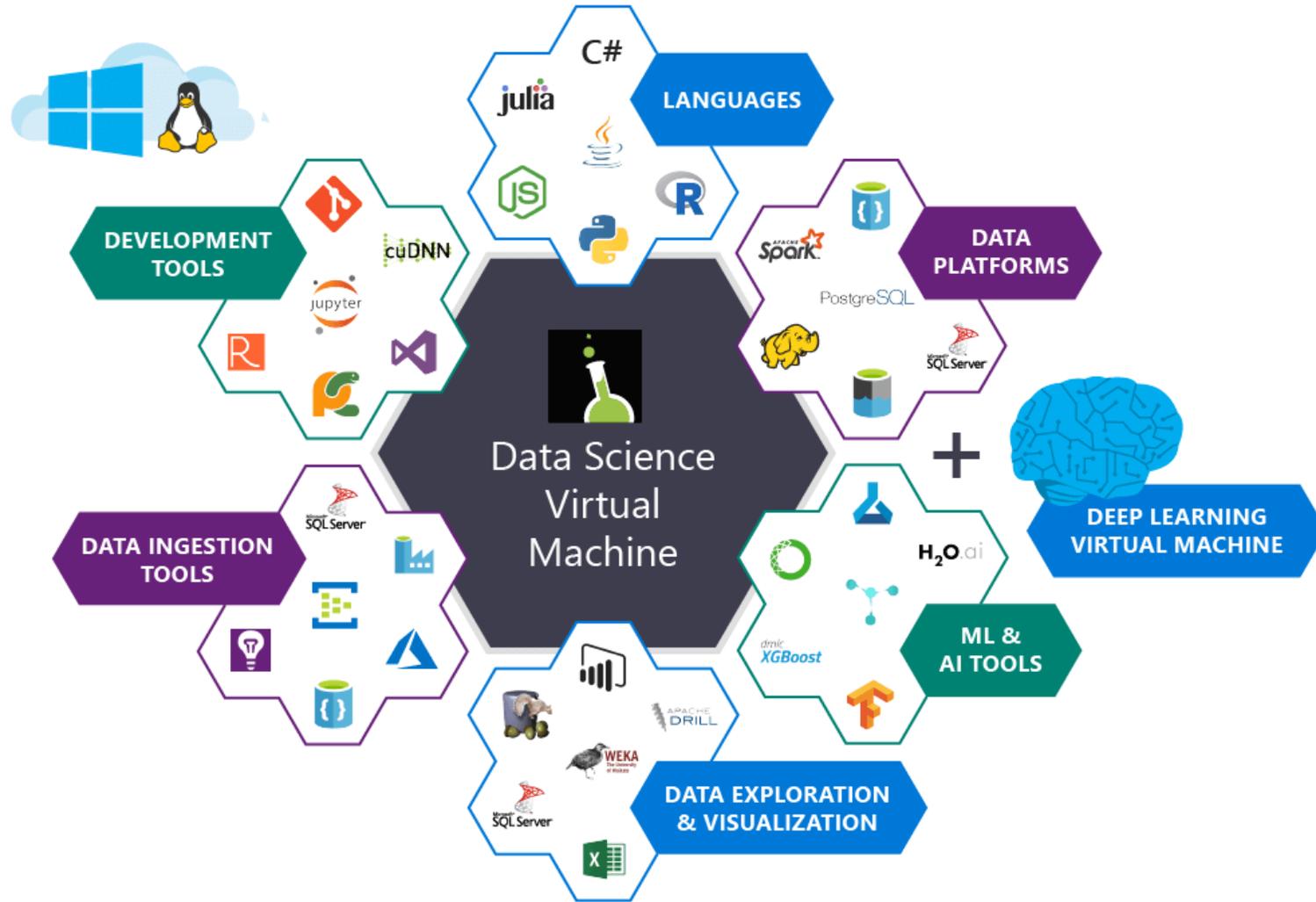
CHAQUE CARACTERISTIQUE DU PIXEL A UNE VALEUR



CONCEPT DU POC



AZURE GPU DATA SCIENCE VIRTUAL MACHINE



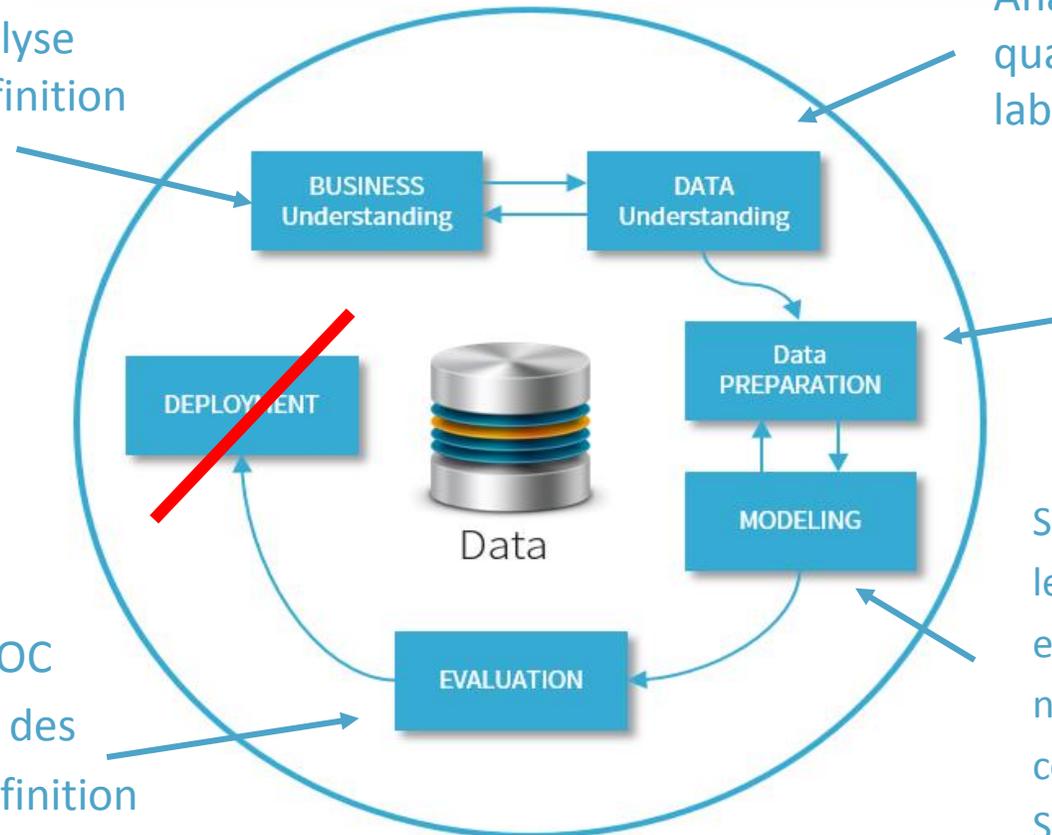
CONCEPT DU POC

- La machine virtuelle Science des données (DSVM) est une image de machine virtuelle personnalisée sur le cloud Microsoft Azure spécialement conçue pour la science des données. Elle inclut de nombreux outils de science des données populaires et d'autres outils sont préinstallés et préconfigurés afin d'accélérer la création d'applications intelligentes à des fins d'analyse avancée. Elle est disponible sur Windows Server et sur Linux.
- DSVM (Data Science Virtual Machine) a été conçu et configuré pour fonctionner dans une grande variété de scénarios. Vous pouvez faire évoluer ou réduire votre environnement en fonction des besoins de votre projet. Vous pouvez utiliser votre langage par défaut pour programmer les tâches de science des données. Vous pouvez installer d'autres outils et personnaliser le système en fonction de vos besoins exacts.

LES TACHES EXECUTÉES

Définition du scope, analyse du context business. Définition du “target” supervised learning.

Evaluation des résultats; ROC graph, AUC,.. Présentation des résultats. Conclusion et definition des next steps.



Analyse de données, vérification de la qualité du dataset, identification des labels, etc..

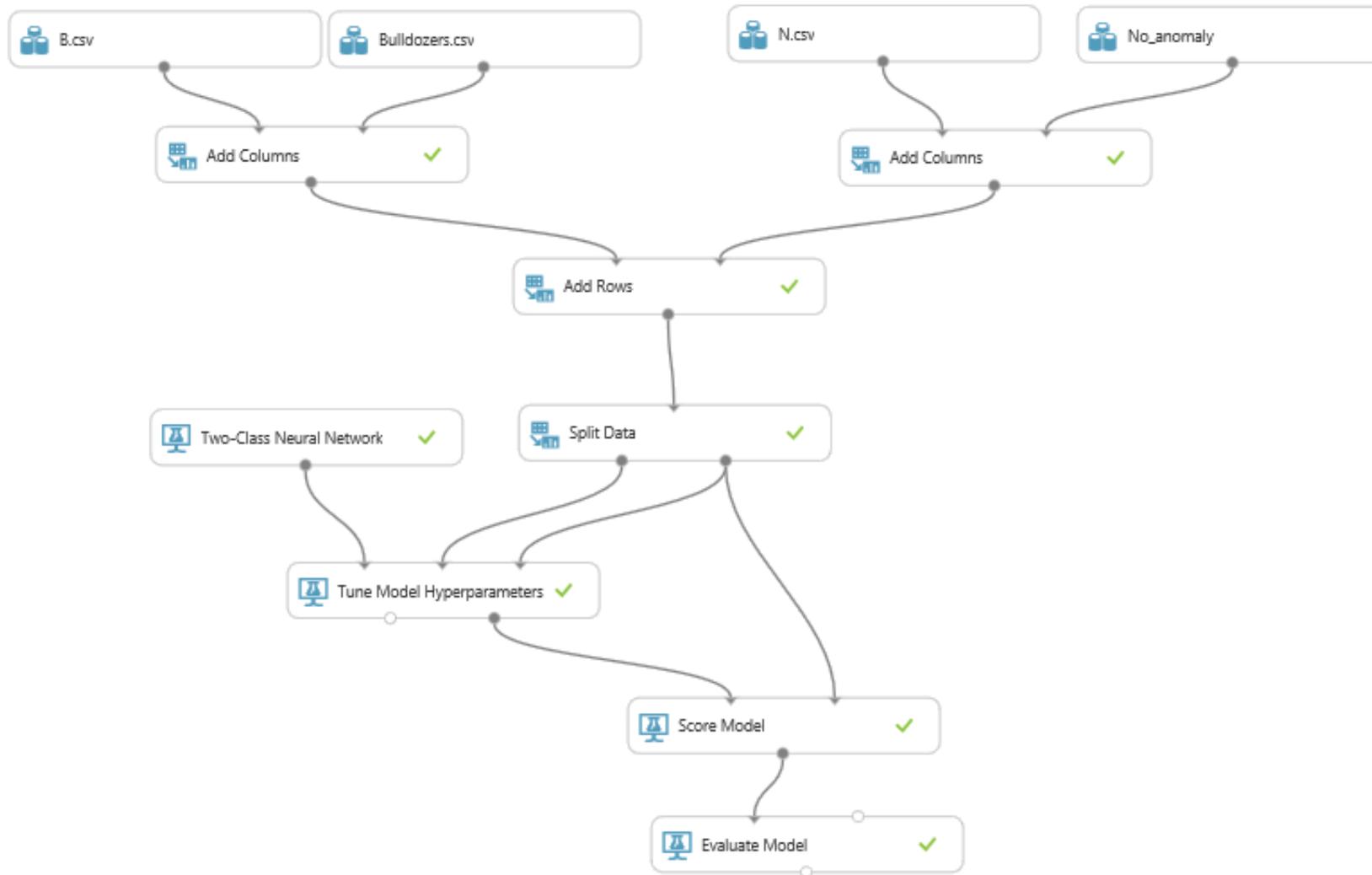
Processing des données, selection des features, traitement des images (cropping, etc..), nettoyage des données, etc..

Set up des réseau neuronaux, configuration deep learning, # combinaisons, parametrage, entraînement des modèles neuronaux, input neurons, output neurons, hidden layers, convolution, drop-out, pooling method,...
Setup du Azure Data science VM (GPU)
Sélection du deep learning framework (CNTK, TensorFlow) + tooling (Keras, Python,..)

PRÉ-TRAITEMENT DES IMAGES

- Classement en 6 catégories
 - Campagne ↔ industriel
 - Bulldozers ↔ grues ↔ pas d'anomalie
- Premier set de données (bulldozers en campagne)
 - 523 avec bulldozers
 - 567 sans anomalie
- Images trop lourdes
 - Besoin de couper et recadrer
 - Obtenir des images de 128 x 128 en couleur

RÉSEAU NEURONAL - AZURE MACHINE LEARNING



RÉSEAU NEURONAL - AZURE MACHINE LEARNING

- Entrée linéarisée
- Réseau de 100 neurones
- Meilleurs résultats:

Metrics

Overall accuracy	0.584098
Average accuracy	0.584098
Micro-averaged precision	0.584098
Macro-averaged precision	0.590184
Micro-averaged recall	0.584098
Macro-averaged recall	0.588

Confusion Matrix

		Predicted Class	
		B	N
Actual Class	B	67.3%	32.7%
	N	49.7%	50.3%

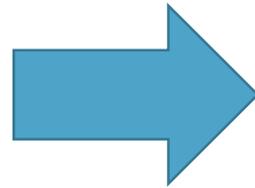
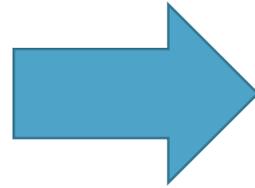
CONVOLUTIONAL NEURAL NETWORK SUR MACHINE GPU

> Résultats

> Après 50 itérations

TP : 94,4 %	FN : 5,6 %
FP : 8,4 %	TN : 91,6 %

CONVOLUTIONAL NEURAL NETWORK SUR MACHINE GPU



THANK YOU

