iBelieve 2020

Présent et Futur de l'IBM i

Evènement On-line 5 Nov

Que peut apporter l'IA et le Machine Learning aux applications IBM i ?

Boostez vos applications au Machine Learning

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Un évènement organisé par :

itheis & IBM

Avec :

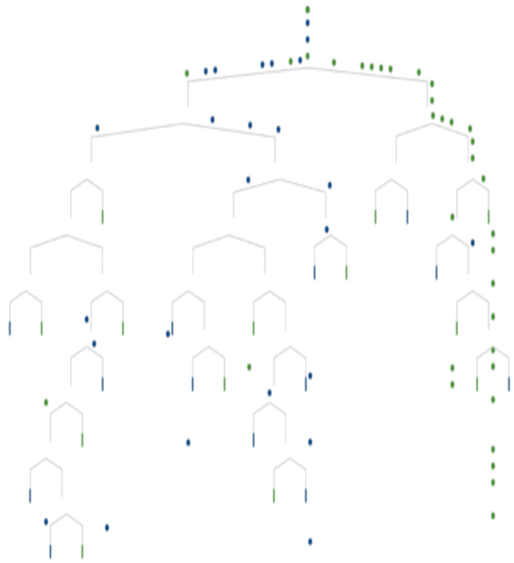
Agenda

Introduction à l'IA

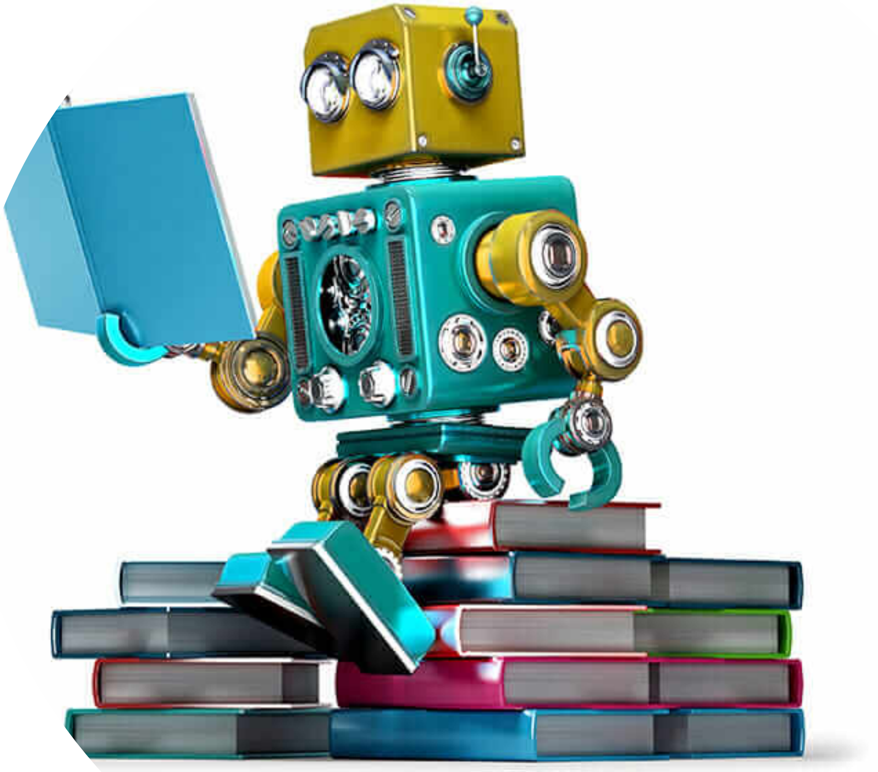
Cas d'usage et exemples

Solutions

Questions / Réponse, Aller plus loin…

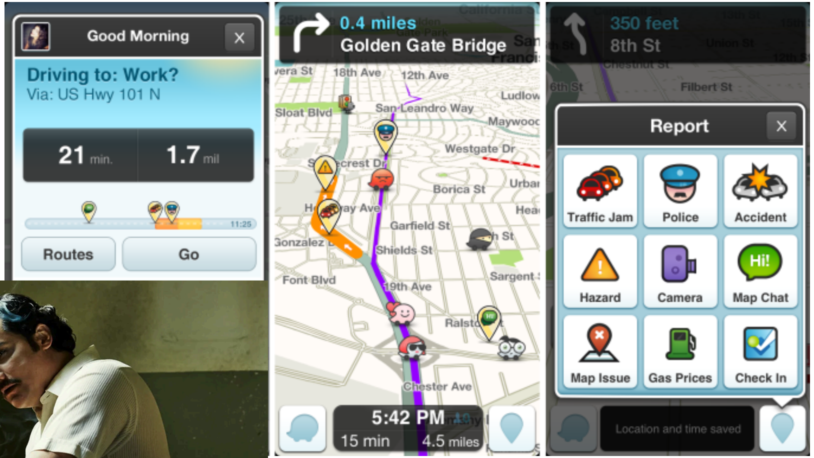


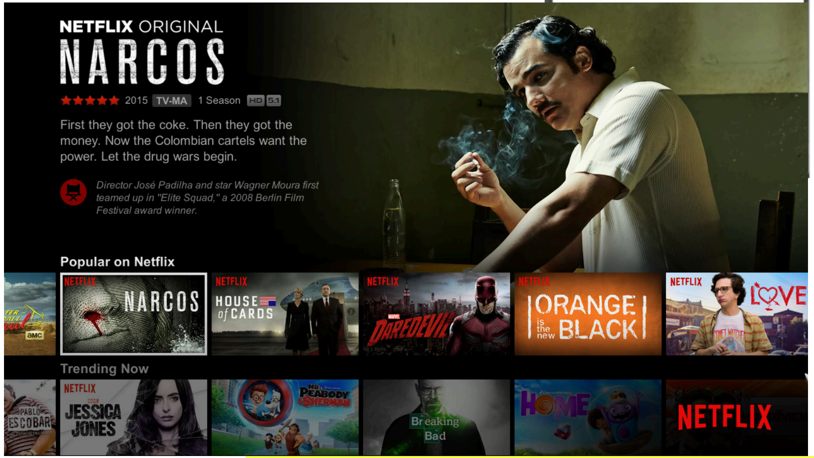
Introduction
Cas d’usage



Le Machine learning est partout …
et influence notre vie de tous les jours!

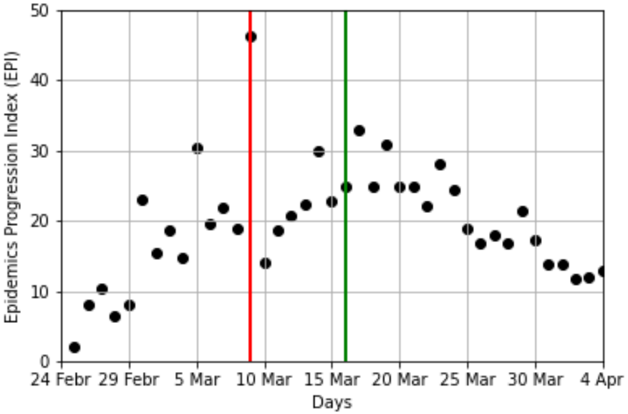
Netflix provides personalized movie recommendations



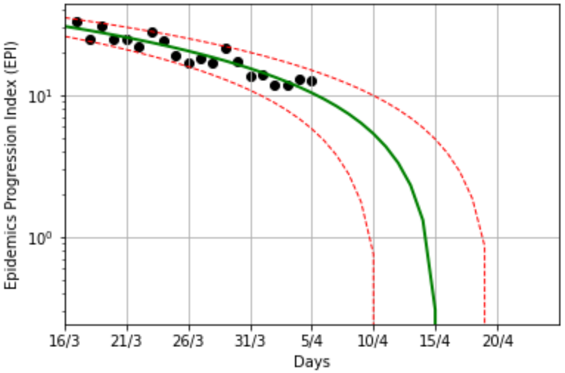


Waze provides a personalized driving experience for its users

Le Machine learning est partout …
et influence notre vie de tous les jours!



‘Epidemics Progression Index (EPI)’

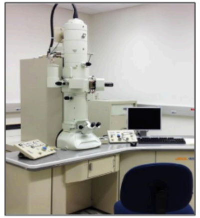


https://towardsdatascience.com/italian-covid-19-analysis-with-python-1bdb0e64d5ac

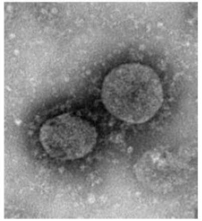
WW Dataset Johns Hopkins University
https://github.com/resCovid19/COVID-19

Le Machine learning est partout …
et influence notre vie de tous les jours!

Accelerating Cryo-EM for COVID-19 analysis with MIT-IBM



Cryo-EM Microscope



Raw Image

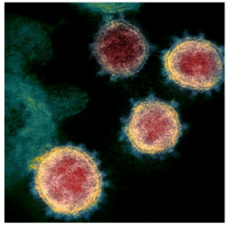


Image preprocessing

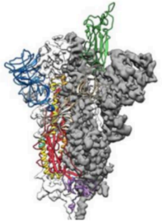


Image Analysis and Modeling

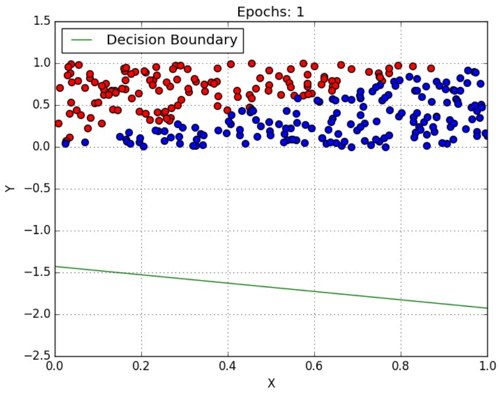
- The Best of Breed Microscopy (CRYO-EM) meets Best of Breed HPC Computing Platform
  - Cryo Electron Microscope - Duke University/NIH, Raleigh NC
  - PowerAI Supercomputer Satori - MIT, Cambridge/Holyoke MA
  - Need to move more than 1TB/day using - IBM Aspera

WORLD'S FASTEST SUPERCOMPUTER FINDS 77 POTENTIAL COVID-19 TREATMENTS

IT'S NOT A CURE, BUT IT'S A STEP IN THE RIGHT DIRECTION.

Machine Learning ?

Entrainement d’un modèle IA de classification



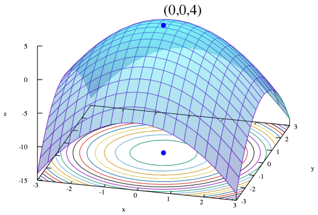
→ Faire parler les données
→ Apprendre des expériences passées
→ Une fois entrainé, se matérialise par un algorithme façonné

- Machine Learning : moyen d’automatisation en apprenant des données, sans programmer explicitement les règles.
- Etablit des relations de causalité dans les données, alors qu’on observe un phénomène complexe récurrent
- L’expertise métier est nécessaire en phase d’apprentissage pour sélectionner les données, les exemples, façonner l’algorithme, le modèle. Elle est nécessaire également pour surveiller et maintenir ces modèles.
- Le ML n’est pas nouveau (1950’s), mais la puissance de calcul, les librairies et Framework nécessaires sont maintenant disponibles et accessibles au plus grand nombre.
- Deep Learning (DL) : classe particulière d’algorithmes Machine Learning faisant appel à des algorithmes à base de réseau de neurones – très efficaces sur des phénomènes « complexes »
- L’AI se déploit proche des applications métiers, ou de manière embarquée (Edge computing)

Que peut apporter l'IA et le Machine Learning aux applications ?

Pourquoi booster dès à présent vos applications avec de l’IA ?

→ Afin de Personnaliser et Améliorer l’expérience client



→ Optimiser ses processus métier

→ Augmenter ses revenus / Faire plus ou mieux avec moins

Pourquoi booster dès à présent vos applications avec de l'IA ?

Aide à la décision , Optimisation

- Tableaux de bord plus riches et pertinents
- Détection d'un évènement à base d'images, de données structurées (fraude)
  ex: Classification, Scoring, Segmentation des clients, Maintenance prévisionnelle (predictive).
- Analyse Prescriptive, Optimisation des décisions en fonction de contraintes.

Expérience Utilisateur (UX)

Interface avec l'utilisateur par l'image, la voix, le texte. Ex: helpdesk, chabot (NLP),
Traitement plus rapide des demandes, amélioration continue de services et produits

Augmentation et automatisation

Taches répétitives sur des images, ou des documents.
Ex: Un médecin passerait des centaines d'heures à lire les publications utiles pour sa prise de décision: l'IA peut être utile pour l'aider.
On peut faire le parallèle pour tout métier.

Que peut apporter l'IA et le Machine Learning aux applications IBM i ?

- Oui, mais pourquoi est ce particulierement interessant sur IBM i?

→ L’IA utilise intensément les données métiers, et est utilisée par des applications “core business”

- *Data is the new Oil*

→ IBM i est la plateforme de choix pour héberger ses données métiers, il est pertinent que l’IA et l’aide à la decision soient au plus proche de ces données et des applications métiers, sur un système fiable et securisé.

Exemple 1 – Optimisation du Turnover

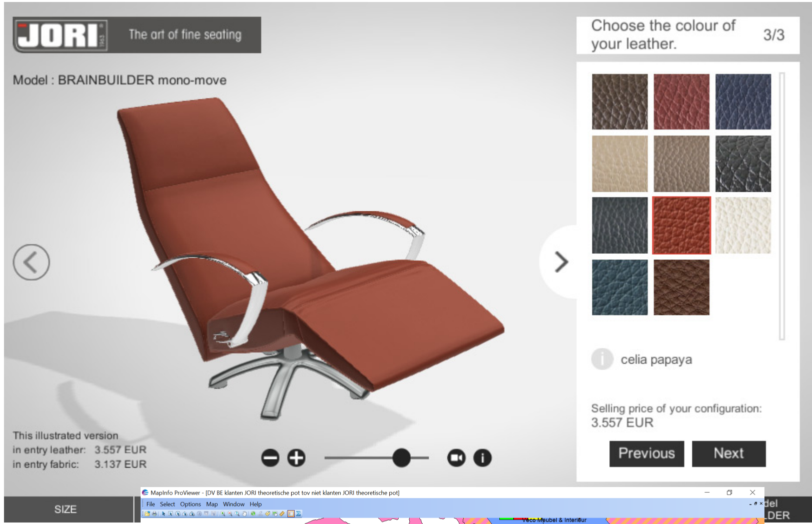
Avoir le bon produit dans le bon point de vente. Optimisation logistique, des stocks (Inventory Turnover)
Optimisation de la Supply Chain basée sur les habitudes et données des clients (CRM)
Solution: IBM i + Machine Learning with Driverless AI

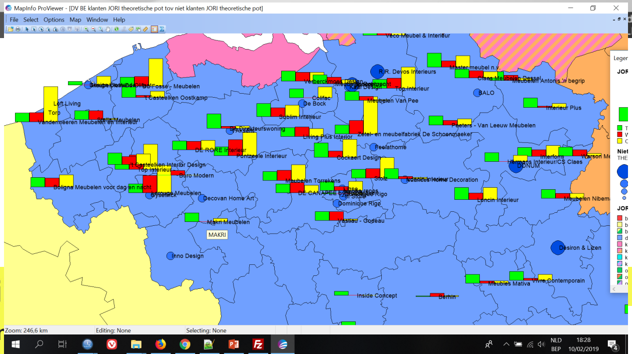
1/ Prediction du turnover (rotation des stocks) dans les points de ventes.

Il a été facile de valider le modèle car le client avait déja une formule basée sur le marché, la concurrence, et d'autres informations. H2O a trouvé une formule un peu différente mais tout aussi éfficace, automatiquement.

2/ Prediction des modeles de produits JORI doit fabriquer et livrer dans un point de vente donné

Améliorer la gestion des stocks dans les showrooms. Basé sur les données historiques accumulées





Résultats:
Turnover améliorer de 20 % juste en quelques mois.
JORI a décidé d'acquerir H2O sur IBM AC922 afin de faire plus de projets et tirer partie de ses données.

Exemple 2 – Prédiction de récolte

Estimation de récolte d'une année à l'autre, d'un trimestre à l'autre etc.

Résultat en tonnes (modèle de régression) par parcelle et type.

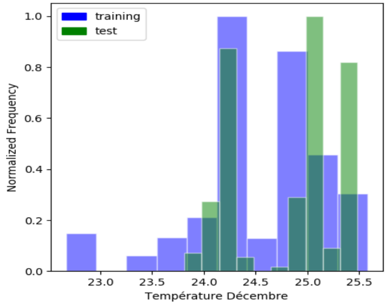
Basé sur des données historisées :
Données de capteurs, relevés par les ingénieurs et personnes sur le terrain.

Projet initié suite à une session de type 'Design Thinking' sur Montpellier : réflexions métier, apport de la technologie …

Résultat après 3 semaines de PoC:

- 185 modèles entrainés , scoré , évalués. Metric : RMSE
- Paramètres optimaux avec les modèles xgboost & LightGBM
- 2/3 semaines pour atteindre la précision Accuracy > 92% comparable à l'expertise actuelle, mais encore améliorable.

Solution: IBM i + Machine Learning avec H2O Driverless AI



Exemple 3 - CRM Augmenté par de l’IA sur IBM i

Scoring client afin d’évaluer le risque d’attrition

La **prédiction de l’attrition** (« **churn** » en anglais) est l’un des cas d’usages les plus fréquents de la **data-science**. Elle conduit t à l’instauration d’un **score prédictif** qui sert déclencher des **actions marketings et commerciales**.

Customer Relationship Management - IBM i + Machine Learning Driverless AI MOJO Scoring Pipeline

Customers Dashboard

RESET

SCORING

REFRESH

CUSTOMERID	GENDER	STREAMI...	CONTRACT	PAPERLE...	PAYMENT...	MONTHL...	TOTALCH...	CHURN?
7590-VHVEG	Female	No	Month-to-mon...	Yes	Electronic check	29.85	29.85	
5575-GNVDE	Male	No	One year	No	Mailed check	56.95	1889.50	
3668-QPYBK	Male	No	Month-to-mon...	Yes	Mailed check	53.85	108.15	
7795-CFOCW	Male	No	One year	No	Bank transfer (...	42.30	1840.75	
9237-HQITU	Female	No	Month-to-mon...	Yes	Electronic check	70.70	151.65	
9305-CDSKC	Female	Yes	Month-to-mon...	Yes	Electronic check	99.65	820.50	
1452-KIOVK	Male	Yes	Month-to-mon...	Yes	Credit card (au...	89.10	1949.40	
6713-OKOMC	Female	No	Month-to-mon...	No	Mailed check	29.75	301.90	
7892-POOKP	Female	Yes	Month-to-mon...	Yes	Electronic check	104.80	3046.05	?
6388-TABGU	Male	No	One year	No	Bank transfer (...	56.15	3487.95	
9763-GRSKD	Male	No	Month-to-mon...	Yes	Mailed check	49.95	587.45	
7469-LKBCI	Male	No internet ser...	Two year	No	Credit card (au...	18.95	326.80	
8091-TTVAX	Male	Yes	One year	No	Credit card (au...	100.35	5681.10	
0280-XJGEX	Male	Yes	Month-to-mon...	Yes	Bank transfer (...	103.70	5036.30	
5129-JLPIS	Male	Yes	Month-to-mon...	Yes	Electronic check	105.50	2686.05	
3655-SNQYZ	Female	Yes	Two year	No	Credit card (au...	113.25	7895.15	
8191-XWSZG	Female	No internet ser...	One year	No	Mailed check	20.65	1022.95	
9959-WOFKT	Male	Yes	Two year	No	Bank transfer (...	106.70	7382.25	
4190-MFLUW	Female	No	Month-to-mon...	No	Credit card (au...	55.20	528.35	
4183-MYFRB	Female	No	Month-to-mon...	Yes	Electronic check	90.05	1862.90	
8779-QRDMV	Male	No	Month-to-mon...	Yes	Electronic check	39.65	39.65	
1680-VDCWW	Male	No internet ser...	One year	No	Bank transfer (...	19.80	202.25	

Initial CRM

No Customer Churn risk estimate

Exemple 3 - CRM Augmenté par de l'IA sur IBM i

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Customer Relationship Management - IBM i + Machine Learning Driverless AI MOJO Scoring Pipeline

Customers Dashboard

RESET

SCORING

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5575-GNVDE	Male	No	One year	No	Mailed check	56.95	1889.50	0.26
3668-QPYBK	Male	No	Month-to-mon...	Yes	Mailed check	53.85	108.15	0.37
7795-CFOCW	Male	No	One year	No	Bank transfer (...	42.30	1840.75	0.39
9237-HQITU	Female	No	Month-to-mon...	Yes	Electronic check	70.70	151.65	0.44
9305-CDSKC	Female	Yes	Month-to-mon...	Yes	Electronic check	99.65	820.50	0.27
1452-KIOVK	Male	Yes	Month-to-mon...	Yes	Credit card (au...	89.10	1949.40	0.23
6713-OKOMC	Female	No	Month-to-mon...	No	Mailed check	29.75	301.90	0.18
7892-POOKP	Female	Yes	Month-to-mon...	Yes	Electronic check	104.80	3046.05	0.30
6388-TABGU	Male	No	One year	No	Bank transfer (...	56.15	3487.95	0.17
9763-GRSKD	Male	No	Month-to-mon...	Yes	Mailed check	49.95	587.45	0.15
7469-LKBCI	Male	No internet ser...	Two year	No	Credit card (au...	18.95	326.80	0.23
8091-TTVAX	Male	Yes	One year	No	Credit card (au...	100.35	5681.10	0.34
0280-XJGEX	Male	Yes	Month-to-mon...	Yes	Bank transfer (...	103.70	5036.30	0.19
5129-JLPIS	Male	Yes	Month-to-mon...	Yes	Electronic check	105.50	2686.05	0.13
3655-SNQYZ	Female	Yes	Two year	No	Credit card (au...	113.25	7895.15	0.20
8191-XWSZG	Female	No internet ser...	One year	No	Mailed check	20.65	1022.95	0.13
9959-WOFKT	Male	Yes	Two year	No	Bank transfer (...	106.70	7382.25	0.46
4190-MFLUW	Female	No	Month-to-mon...	No	Credit card (au...	55.20	528.35	0.17
4183-MYFRB	Female	No	Month-to-mon...	Yes	Electronic check	90.05	1862.90	0.52
8779-QRDMV	Male	No	Month-to-mon...	Yes	Electronic check	39.65	39.65	0.15
1680-VDCWW	Male	No internet ser...	One year	No	Bank transfer (...	19.80	202.25	0.35

CRM Augmenté avec de l'IA

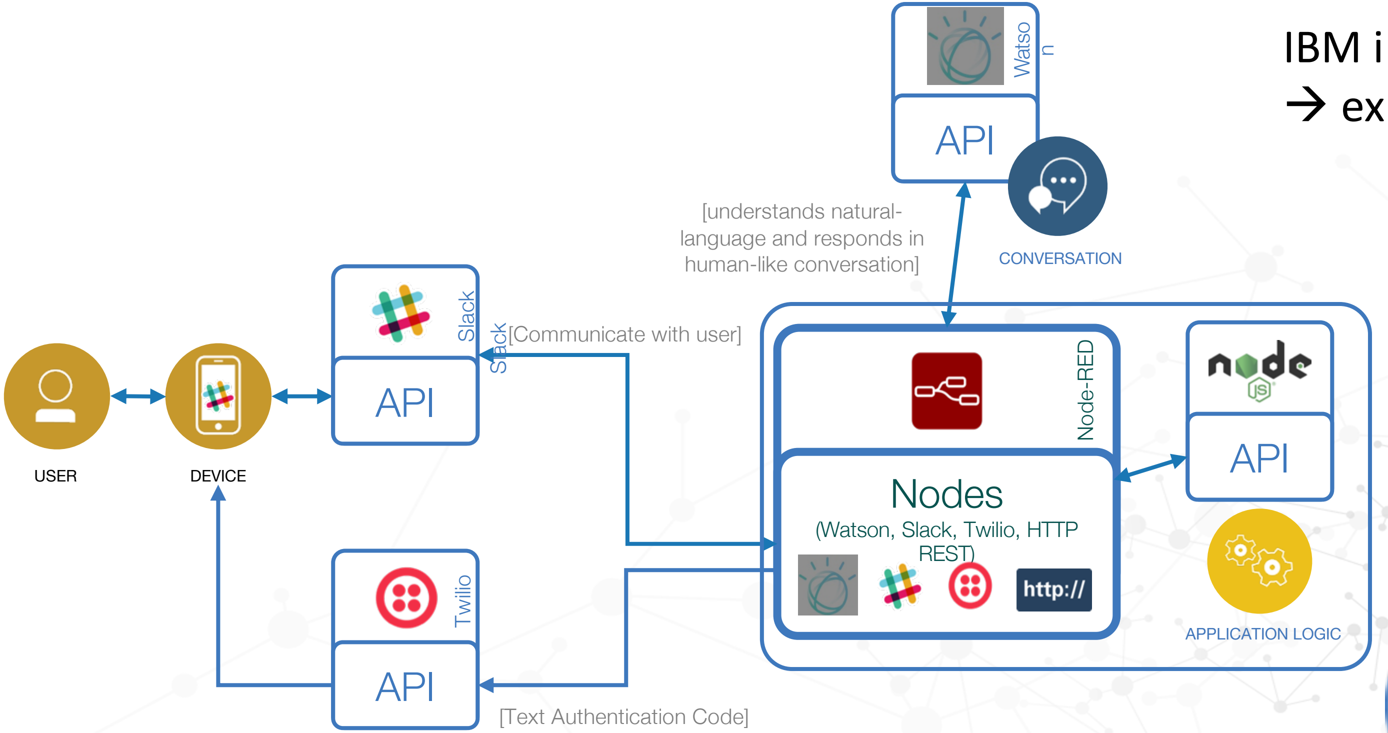
Customer Churn risk estimate

Exemple 4 – Interface avec l’utilisateur

- ✓ **Scenarios: support Helpdesk, etc.**
- ✓ **Watson comprends votre besoin (intentions), et déclenche des actions sur l’ERP, le CRM, l’application**
- ✓ **Permet de mieux adresser ses clients**

Exemple 4 – Interface avec l'utilisateur

Chabot (Assistant) intégré au Back-end IBM i



IBM i Customer Stories

→ ex: Robertet

Exemple 5 : Decision Optimization

“La meilleure décision n’est pas celle qui apparaît spontanément”

Transformez la prise de décision métier avec le pouvoir de résoudre des problèmes complexes en utilisant une technologie d’optimisation des décisions, en tenant compte des contraintes commerciales et en trouvant rapidement la meilleure solution possible parmi des millions d’alternatives.

IBM CPLEX

Un zoo, des bus, des enfants et l’optimisation

Avec des mots	En OPL	En Python / DoCplex

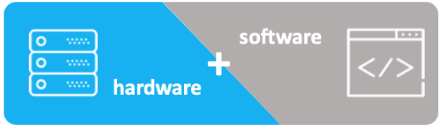
300 enfants vont au zoo de Vincennes et l’école peut louer des cars de 40 et 30 places qui coûtent respectivement 500 € et 400 €. Combien louer de bus de chaque taille pour payer le moins cher ?

 	
	int nbKids=300;
	float costBus40=500;
	float costBus30=400;
	
	dvar int+ nbBus40;
	dvar int+ nbBus30;
	
	minimize
	costBus40*nbBus40
	+nbBus30*costBus30;
	
	subject to
	{
	40*nbBus40+
	nbBus30*30
	>=nbKids;
	}
		from docplex.mp.model import Model
		
		mdl = Model(name='buses’)
		
		nbbus40 =
		mdl.integer_var(name='nbBus40')
		nbbus30 =
		mdl.integer_var(name='nbBus30’)
		
		mdl.add_constraint(nbbus40*40 +
		nbbus30*30 >= 300, 'kids’)
		
		mdl.minimize(nbbus40*500 +
		nbbus30*400)
		
		mdl.solve()
		
		print(nbbus40.solution_value);
		print(nbbus30.solution_value);

https://www.linkedin.com/pulse/loptimisation-faire-plus-avec-moins-un-zoo-des-bus-et-alex-fleischer-1/

Relax…Tout ce dont vous avez besoin est disponible sur IBM i

It’s about co-optimized



which *just work* for Machine Learning,

Le choix des outils – 3 grandes tendances

1. Prêt à l'usage – personnalisation simple

Réentrainement de modèles possible avec ses données.

Ex: Intégration d'API Watson (Chatbot , Traitement de l'image standardisé, etc.)

2. ML Assisté : Auto ML

Cousu main accéléré et assisté, sous licence.

- H2O Driverless AI
- IBM Watson Studio / CLPEX Optimization Studio / Cloud Pak for Data

3. Libraries Data Science

Créer ses propres modèles cousus main, controle total, gratuits ou sous licence.

- ML/DL : **Scikit learn, R**, Rstudio, H2O-3 , PyTorch, TensorFlow, Caffe , **Chainer** …
- Apache Spark, Nvidia CUDA, KubeFlow, IBM Snap ML, Appliances (Nvidia, IBM AC922…), OpenCE, etc.

1_Prêt à l'usage – Exemple IBM Watson API

Travail sur ;

- Langage naturel, traduction, ton
- Documents (annotations..)
- images
- Voix

Integration via REST API ou via data connector Db2 for I

Disponible sur IBM Cloud, sur tous les Cloud (public, privé)

Watson Assistant
IBM • Services •
AI / Machine Learning
Watson Assistant lets you build conversational interfaces into any application, device, or channel.
Lite • Free • IAM-enabled

Watson Knowledge Catalog
IBM • Services •
AI / Machine Learning
Discover, catalog, and securely share enterprise data.
Lite • Free • IAM-enabled

Watson OpenScale
IBM • Services •
AI / Machine Learning
IBM Watson OpenScale is an enterprise-grade environment for AI infused applications that provides enterprises...
Lite • Free • IAM-enabled

Watson Studio
IBM • Services •
AI / Machine Learning
Embed AI and machine learning into your business. Create custom models using your own data.
Lite • Free • IAM-enabled

Voice Agent with Watson
IBM • Services •
AI / Machine Learning
Create a cognitive voice agent that uses Watson services to speak directly with customers using natural language over...
Lite • Free • IAM-enabled

Custom Vision Model for Core ML with Watson
IBM • Software •
AI / Machine Learning
Create Apple Core ML Models using the Watson Visual Recognition service to process and tag images locally.
Starter kits

Machine Learning
IBM • Services •
AI / Machine Learning
IBM Watson Machine Learning - make smarter decisions, solve tough problems, and improve user outcomes.
Lite • Free • IAM-enabled •
Service Endpoint Supported

Personality Insights
IBM • Services •
AI / Machine Learning
The Watson Personality Insights derives insights from transactional and social media data to identify psychological...
Lite • Free • IAM-enabled

Knowledge Studio
IBM • Services •
AI / Machine Learning
Teach Watson the language of your domain.
Lite • Free • IAM-enabled

Compare and Comply
IBM • Services •
AI / Machine Learning
Process governing documents to convert, identify, classify, and compare important elements
Lite • Free • IAM-enabled

Natural Language Understanding Node.js App
IBM • Software •
AI / Machine Learning
Collection of APIs that can analyze text to help you understand its concepts, entities, keywords, sentiment, and can...
Starter kits • IBM Kubernetes Service •
Red Hat OpenShift

Visual Recognition Node.js App
IBM • Software •
AI / Machine Learning
Use deep learning algorithms to analyze images that can give you insights into your visual content.
Starter kits • IBM Kubernetes Service •
Red Hat OpenShift

Annotator for Clinical Data
IBM • Services •
AI / Machine Learning
Analyze text to extract medical codes and concepts such as diseases, lab values, medications, procedures and more.
Lite • Free • IAM-enabled •
Service Endpoint Supported

Master Data Management
IBM • Services •
AI / Machine Learning • Analytics •
Databases • Mobile
IBM Master Data Management (MDM) a fully cloud native SaaS offering, offers critical capabilities to manage your...
Lite • Free • IAM-enabled • Beta

Discovery
IBM • Services •
AI / Machine Learning
Add a cognitive search and content analytics engine to applications.
Lite • Free • IAM-enabled

Language Translator
IBM • Services •
AI / Machine Learning
Translate text, documents, and websites from one language to another. Create industry or region-specific translations...
Lite • Free • IAM-enabled

Natural Language Understanding
IBM • Services •
AI / Machine Learning
Analyze text to extract meta-data from content such as concepts, entities, emotion, relations, sentiment and more.
Lite • Free • IAM-enabled

Natural Language Classifier
IBM • Services •
AI / Machine Learning
Natural Language Classifier uses advanced natural language processing and machine learning techniques to...
Free • IAM-enabled

Speech to Text
IBM • Services •
AI / Machine Learning
Low-latency, streaming transcription

Text to Speech
IBM • Services •
AI / Machine Learning
Synthesizes natural-sounding speech from text.

Tone Analyzer
IBM • Services •
AI / Machine Learning
Tone Analyzer uses linguistic analysis to detect three types of tones from communications: emotion, social, and...

Visual Recognition
IBM • Services •
AI / Machine Learning
Find meaning in visual content! Analyze images for scenes, objects, and other content. Choose a default model off the...

Domain Name Registration
IBM • Services • Developer Tools
IBM Cloud offers domain registration services complete with dedicated support staff, knowledgeable customer service,...

2_ ML Assisté : Auto ML

Exemple avec H2O Driverless AI

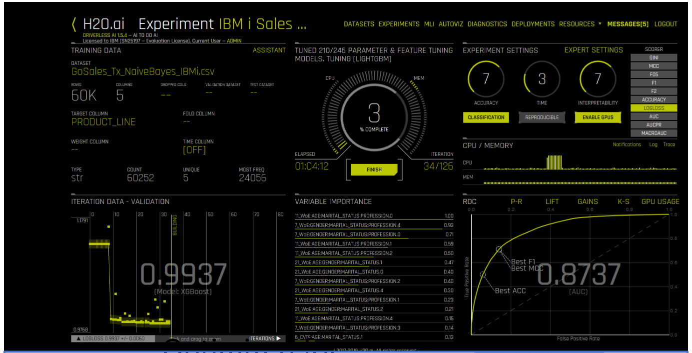
H2O.ai

You Tube
http://ibm.biz/PowerVUG

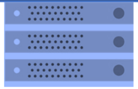
Une Solution simple et abordable :
- → "Expert Data Scientist in a Box"
- → Months down to Hours
- → Explainability & Transparency

1 **Extract CRM data**

2 **Import & Visualize Data**
Create & Test Models



Optimized for
Power9 Servers



3 **Model Export**

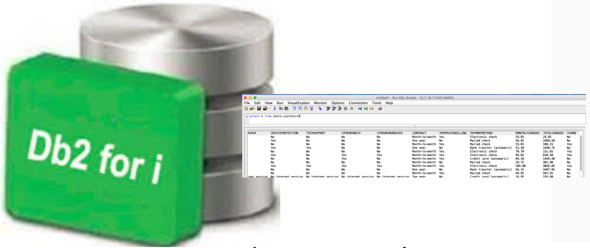
python Java

Recommendation Engine
Scoring Pipeline

4 **Augment IBM i Applications**
Model Inference

for Business

5 **Monitor Models**
& Iterate



Customer Relationship Management - IBM i + Machine Learning Driverless AI MOJO Scoring Pipeline

RESET
SCORING
REFRESH

Customer Dashboard

CUSTOM...	GENDER	STREAMI...	CONTRACT	PAPERLE...	PAYMENT...	MONTHL...	TOTALCH...	CHURN?
0002-ORFBO	Female	Yes	One year	Yes	Mailed check	65.60	593.30	0.21
0003-MKNFE	Male	No	Month-to-mon...	No	Mailed check	59.90	542.40	0.26
0004-TLHLJ	Male	No	Month-to-mon...	Yes	Electronic check	73.90	280.85	0.37
0011-IGKFF	Male	Yes	Month-to-mon...	Yes	Electronic check	98.00	1237.85	0.39
0013-EXCHZ	Female	Yes	Month-to-mon...	Yes	Mailed check	83.90	267.40	0.44
0013-MHZWF	Female	Yes	Month-to-mon...	Yes	Credit card (au...	69.40	571.45	0.27
0013-SMEOE	Female	Yes	Two year	Yes	Bank transfer (...	109.70	7904.25	0.23

Business Database   Business Application

2_ ML Assisté : Auto ML

Demo: CRM Augmenté par de l'IA sur IBM i

Scoring client afin d'évaluer le risque d'attrition

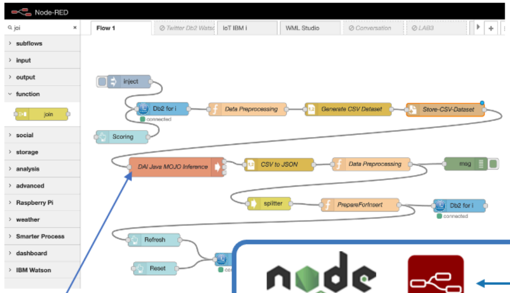


Fig. Node-RED Prototyping - CRM dashboard

Java MOJO Scoring Pipeline
Invoked from the Node.js app

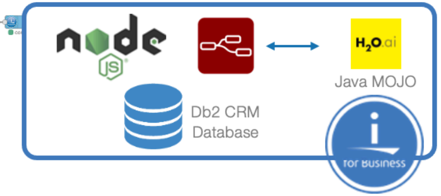


Fig. **Application CRM survitaminée**
avec integration d'un scoring
Pipeline temps réel (Java MOJO)
Intégration ILE ←→ PASE

Précision du modèle de scoring : 84%

Manuellement, avec connaissance ML de base : 0.79%

Driverless AI : Feature Engineering digne d'un maitre

Time to market : de mois à quelques jours

Les solutions Auto ML accélérées permettent de créer des modèles de grande qualité digne d'un expert mondial (Grandmaster) très rapidement avec seulement les bases du Machine Learning.

Avec Driverless AI, Le modèle ainsi façonné peut s'executer sur IBM i au plus proche des données et applications critiques

Auto ML: IBM propose Driverless AI , Watson Studio

3_ Libraries Data Science sur IBM i

Stratégie Open Source sur IBM i

→ Integration & Web

- API Management , Web Services,
- Web Development
- Accès Database

→ Cloud / Automatisation

- Openstack, Cloudinit, Terraform , Ansible

→ **Data Science , Analyse des données**

Data Science sur IBM i

- Packages RPM “Data Analytics & Data Science”
- Complètent les fonctions Db2
- Liste qui s’enrichit régulièrement ☺

  Numpy, Pandas : Data Processing

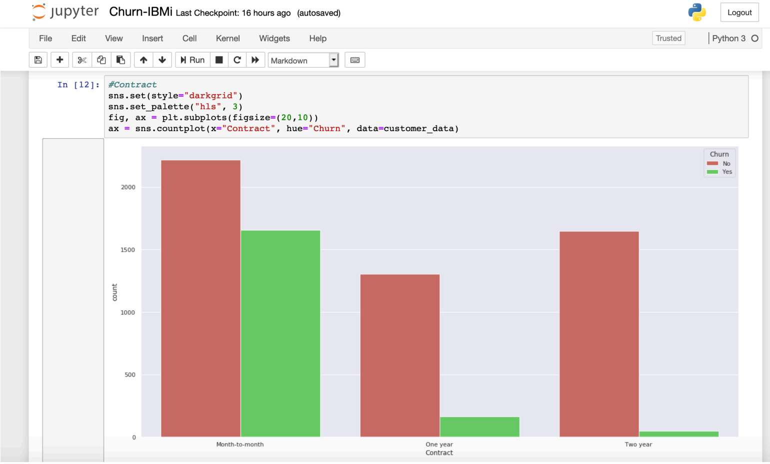
  Scipy, Scikit-Learn

  IPython : interactive Python

  NLTK : Natural Language Processing

  Matplotlib, Jupyter : Data Visualization

  R Language (Interpreter, Runtime)



- Utile dans chaque phase d’un projet ML :

→ Préparation & Visualisation, Dashboard , Modeling, Validation…

→ L’execution d’un modele predictif sur IBM i intégrée à une application IBM i (RPG, Db2, Node.js)

Data Science sur IBM i : Scikit-learn

https://scikit-learn.org

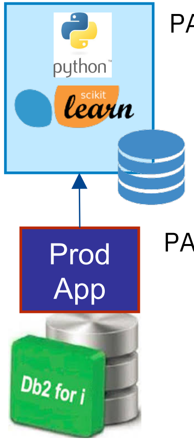
- Outil simple et efficace pour du data mining / data analysis
- Accessible à tous, réutilisable dans divers contextes
- Repose sur les librairies NumPy, SciPy, matplotlib
- Open source depuis 2010 – INRIA
- Utilisable commercialement - BSD license
- Plus souvent utilisé avec panda (manipulation de données - dataframe)

MADE IN FRANCE

- Cours en Français ? http://cedric.cnam.fr/vertigo/Cours/ml/tpIntroductionScikitLearn.html

Intégration d'un modèle avec vos applications métiers

1. Entrainement et validation modèle (IBM i ou pas)
2. Chargement du modèle depuis l'IFS
3. Scoring (Inference) sur IBM i (PASE)
4. Integration de modèle dans l'application



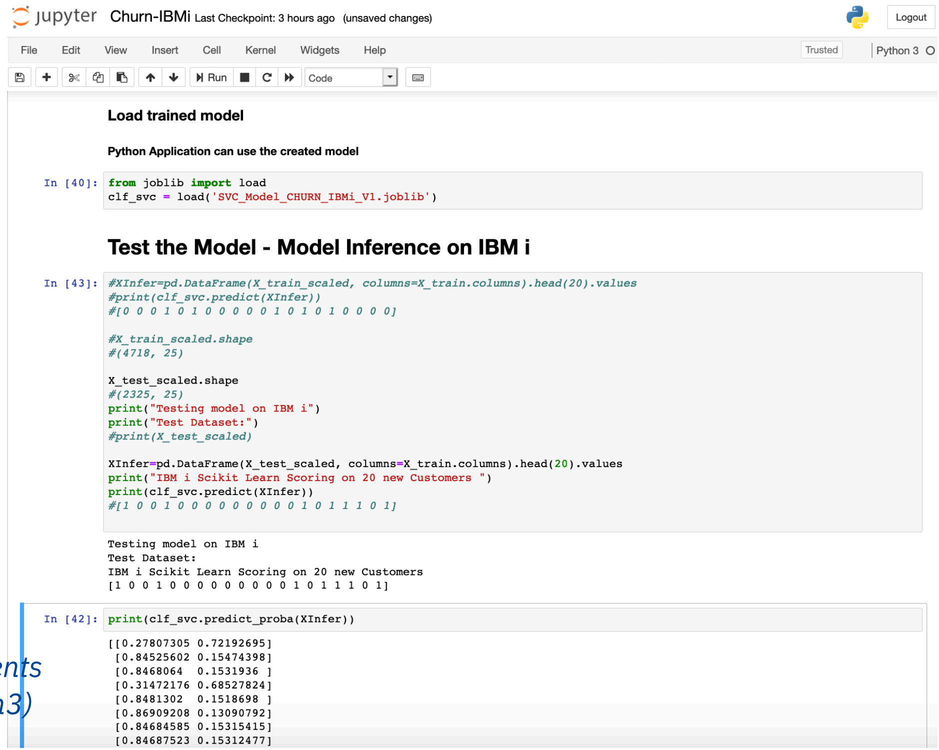
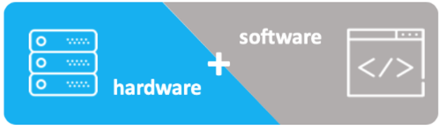


Fig. Scoring 20 clients dans PASE (Python3)

Pour aller plus loin?

It's about co-optimized



which *just work* for Machine Learning,

Boostez vos application avec de l'IA

→ **Demonstration (video Common France)**

Customer Churn : Supervised model – classification with Scikit-Learn

https://vimeo.com/417096708

- Do it Yourself: Install yum packages and git clone
  - https://github.com/bmarolleau/firstdemo-scikitlearn-ibmi/

for Business

Boostez vos application avec de l'IA

→ Exemples, solutions (Watson APIs, Watson Studio, H2O) : Mon blog GitLab

→ Watson / WML
https://www.ibm.com/cloud/machine-learning

→ Decision Optimization & CPLEX Community Edition
https://www.ibm.com/analytics/decision-optimization
https://www.ibm.com/account/reg/fr-fr/signup?formid=urx-20028

→ Une discussion ou un atelier sur le sujet? Contactez moi!

Machine learning sur IBM i

10.7.19.71:8889/notebooks/scikit-learn-lab/Churn-IBMi.ipynb

jupyter Churn-IBMi Last Checkpoint: Last Thursday at 4:19 PM (autosaved)

Logout

File Edit View Insert Cell Kernel Help Trusted Python 3

Run Markdown

Machine Learning on IBM i with Scikit Learn, pandas (0.22) and Db2 for i

Original notebook: https://github.com/IBM/customer-churn-prediction/blob/master/notebooks/customer-churn-prediction.ipynb

In [1]:
```
%pwd
```

Out[1]: '/home/scikit-learn-lab'

In [9]:
```
# Dowload the original dataset if necessary
#!wget https://community.watsonanalytics.com/wp-content/uploads/2015/03/WA_Fn-UseC_-Telco-Customer-Churn.csv  --no-chec
```

Load Dataframe from Db2

In [2]:
```
import ibm_db_dbi as dbi
import pandas as pd

# Telco Churn dataset from a CRM datasource - here Db2 for i in CHURN/CUSTCHURN2 7044 records

sql="SELECT * from CHURN.CUSTCHURN3"
pd.set_option('display.max_columns', 30)
try:
    conn = dbi.connect()
    df_fromdb2 = pd.read_sql(sql, conn)
    df_fromdb2
    df_fromdb2.info()
```

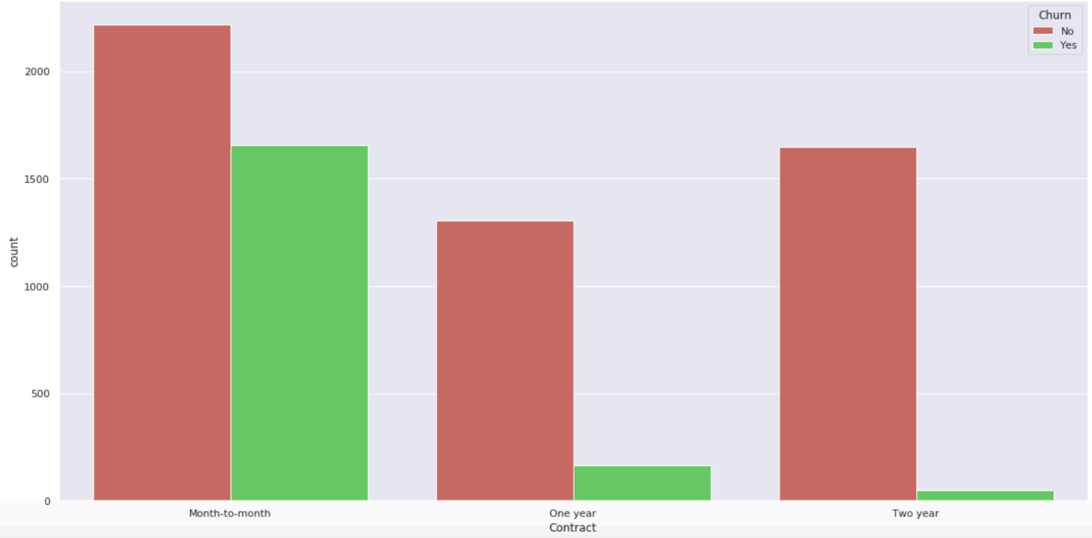
Machine learning sur IBM i

jupyter Churn-IBMi Last Checkpoint: 16 hours ago (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

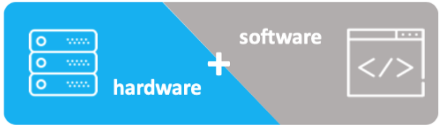
Run Markdown

In [12]:
```
#Contract
sns.set(style="darkgrid")
sns.set_palette("hls", 3)
fig, ax = plt.subplots(figsize=(20,10))
ax = sns.countplot(x="Contract", hue="Churn", data=customer_data)
```



Merci !

It's about co-optimized



which *just work* for Machine Learning,

Solutions IBM : Data Science/ML/DL

Data Engineer

Structured Data
Tabular data: IoT/Logs/Database
Acceleration & **AutoML** with Driverless AI

WML
All use cases
Program your models w/ Open source
& **Accelerated** HW . Scale w/o limit

Vision/Acoustic
Retail/Inspection
/Security, Quality...

WML
All use cases
Data Science Cockpit
AutoML

	Open Source Libraries AIX / IBM i	H2O.ai Driverless AI	Open-CE	WML-A	Visual Insights	WML Studio
Description	ML on IBM i /AIX No GPU, runs on CPUs Traditional datasets, Relevant for Model **Inference** (production) Enrichable with Watson Services	Auto Machine learning Simplified deployment,, automatic pipelines, model "explainability", end to end automation **Inference:** i for Business, AIX	Free, Easy to install High Performance DL LMS (Large Model) DDL (Distributed) TensorFlow, PYTORCH, Chainer	Enterprise Solution for Deep Learning – Advanced Features : DDL 4+ Nodes... HPC Job Scheduler	Ready to use Deep Learning with Video tools Train/Infer/Edge	Collaborative ML/DL WML dev & deployment AutoAI Use WMLCE if installed Can Use WML-A plugin
Support	Avaialable from IBM	H2O L 1-3	Available from IBM	IBM L 1-3 Included	IBM L1-3 Included	Available from IBM
Environments Server Technologies	AIX , IBM i, Linux	x86, IC/AC922, LC9xx	x86/AC922/ IC922	x86/AC922/ IC922	x86/AC922/ IC922	x86/AC922/ IC922
PaaS / SaaS IBM Cloud	Power Virtual Server	BYOL / AC922 IBM Cloud	Yes	No	Trial only	Watson Studio
MultiCloud (PAK) Private Cloud	On Prems / Cloud	Yes	Yes CP4D	Yes CP4D	Yes	Yes CP4D
	python, scikit learn, jupyter, R, IBM Watson	docker	docker, kubernetes	Apache Spark, kubernetes	kubernetes	Apache Spark, kubernetes, jupyter, IBM Watson

Cloud Paks – Pre-integrated for cloud use cases

Today, IBM offers clients the first five Cloud Paks…

*Reduce dev time up to 84%**	*Make data ready for AI in days*	*Eliminate 33% of integration cost*	*Reduce manual processes up to 80%**	*Reduce IT op expense by up to 75%**
Cloud Pak for Applications	**Cloud Pak for Data**	**Cloud Pak for Integration**	**Cloud Pak for Automation**	**Cloud Pak for Multicloud Management**
Developer & DevOps Tools; Modernization Toolkit; Frameworks and Runtimes	Organize; Analyze; Collect; Infuse	API Lifecycle; Messaging and Events; App and Data Integration	Content; Operational Intelligence; Workflow and Decisions	Multicluster; App and Infrastructure; Security and Compliance Management
Container platform and operational services — Red Hat OpenShift	Container platform and operational services — Red Hat OpenShift	Container platform and operational services — Red Hat OpenShift	Container platform and operational services — Red Hat OpenShift	Container platform and operational services — Red Hat OpenShift

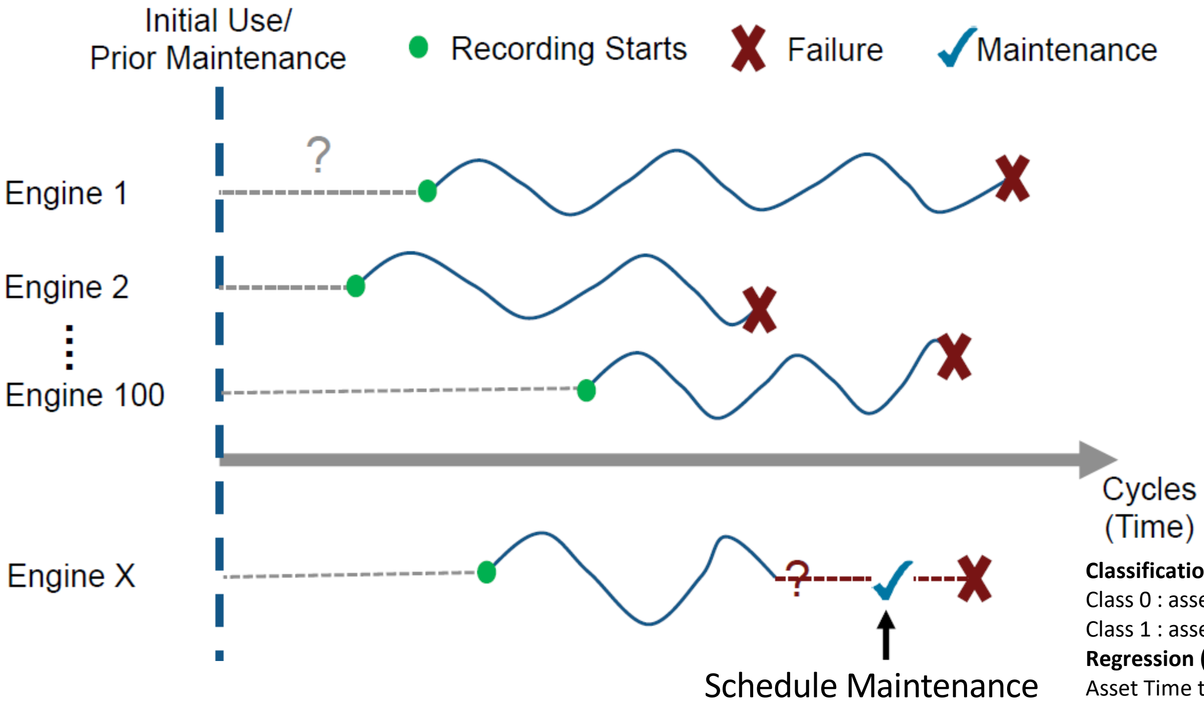
IBM Cloud · aws · Azure · Google Cloud · Edge · Private · Systems

IBM Cloud

Exemple: Maintenance Prévisionnelle

DONNEES HISTORIQUES EN ENTRAINEMENT

DONNEES LIVE EN PRODUCTION



Classification:

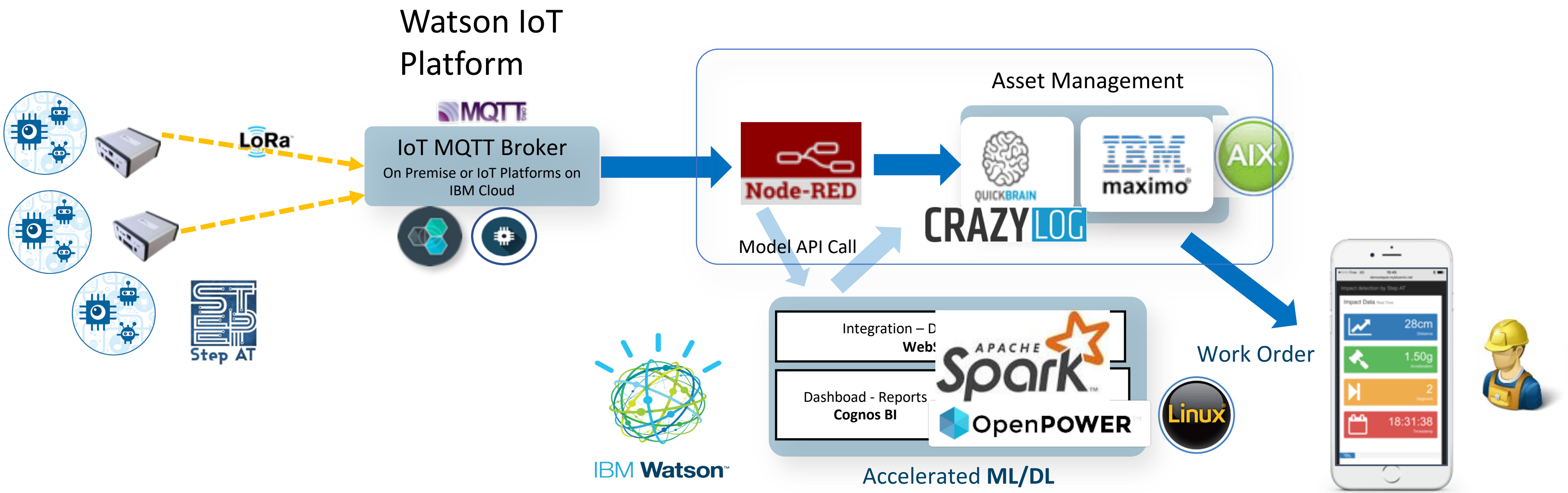
Class 0 : asset will fail within the next 15 cycles

Class 1 : asset won‘t fail within the next 15 cycles

Regression (prediction):

Asset Time to failure = 18 cycles

Example: Predictive Maintenance

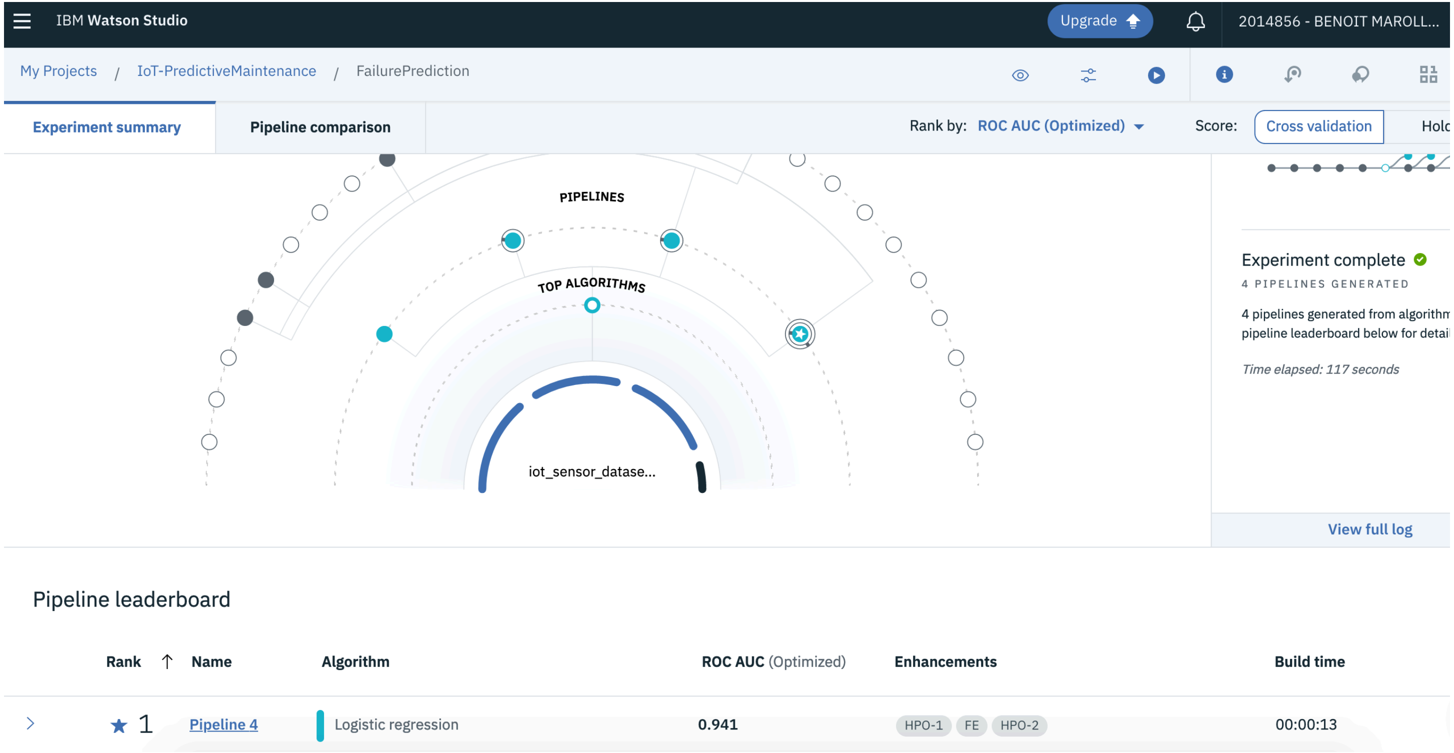


Accelerated **ML/DL**

- IBM Watson Studio
and/or IBM Watson Machine Learning (WML)
and/or H2O Driverless AI
- OpenPOWER – AC922 WML-CE & GPU Accelerators

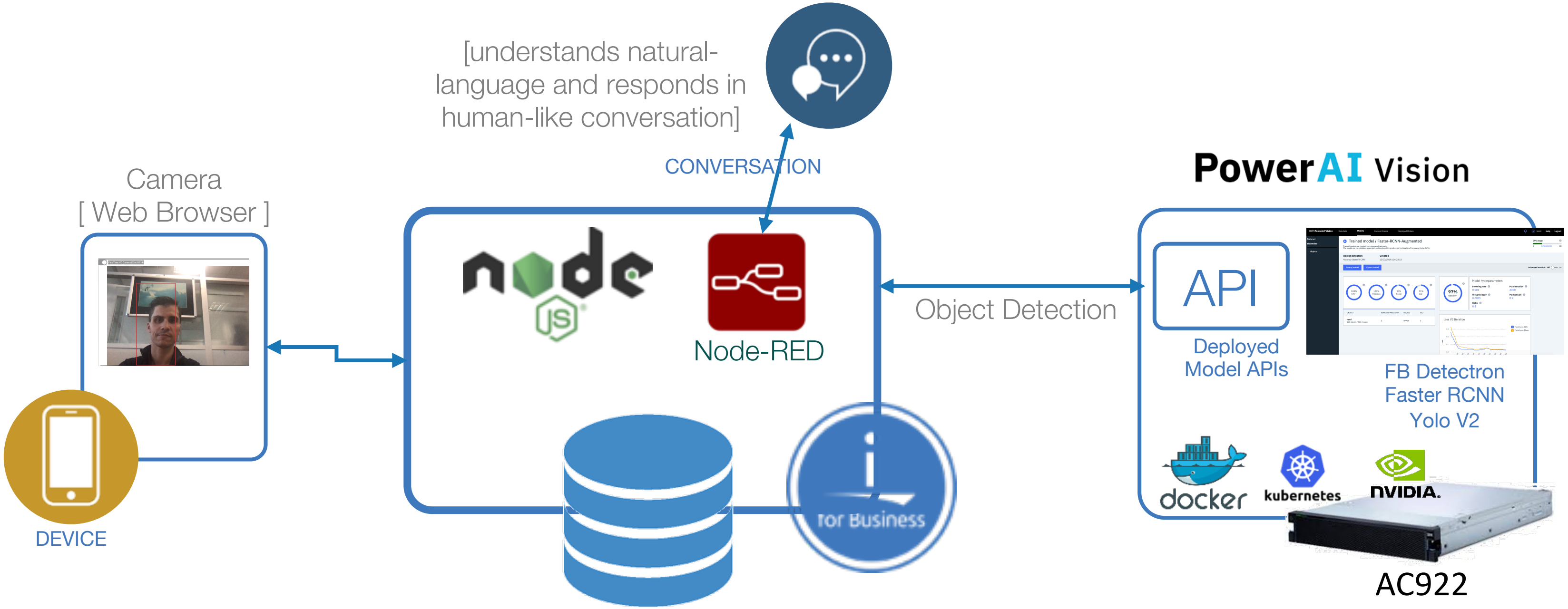
POWER9

Example: Predictive Maintenance
with Watson Studio



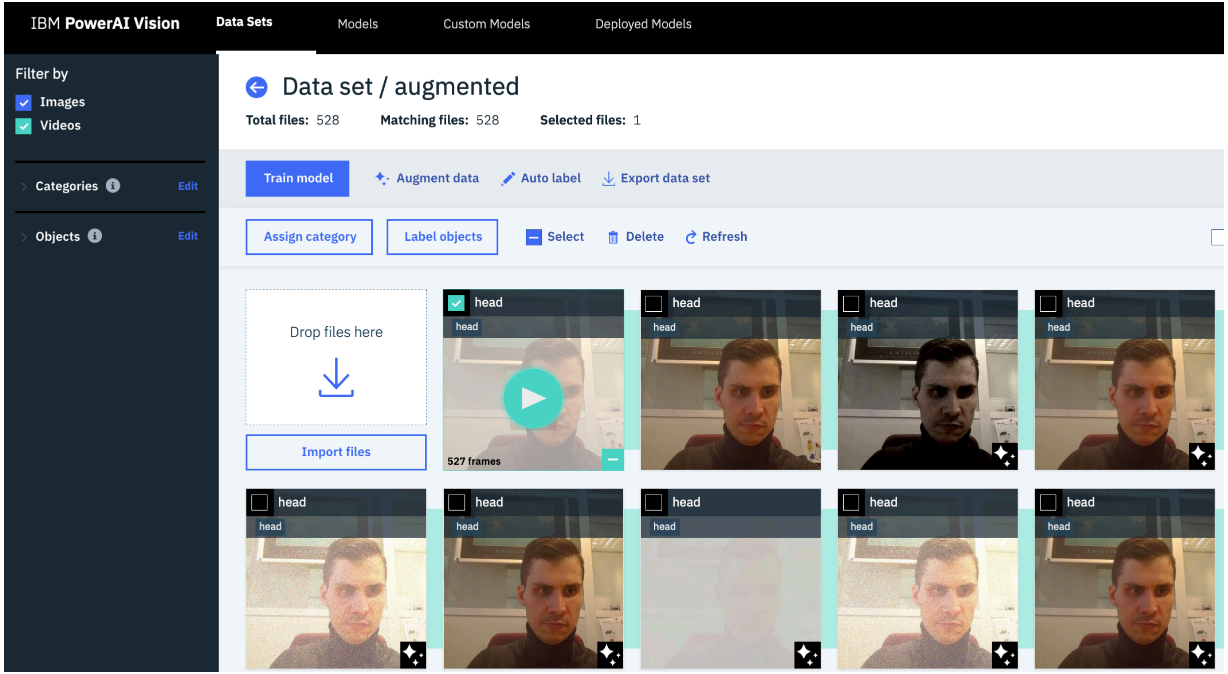
Model created with AutoAI on Studio. Can be deployed on WML (REST API…)

Computer Vision with PowerAI Vision & IBM i



ID	DETECTEDLABEL	CONFIDENCE	YMAX	XMAX	XMIN	YMIN	A
165	head	0.995372474193573	119.0	111.0	73.0	36.0	em
164	head	0.9906670451164246	119.0	122.0	84.0	62.0	em
163	head	0.9786785244941711	119.0	157.0	123.0	60.0	em
162	head	0.998145580291748	119.0	101.0	53.0	54.0	em
161	head	0.9998226761817932	119.0	95.0	52.0	53.0	em
160	head	0.9996845722198486	119.0	104.0	61.0	53.0	em
159	head	0.9455117583274841	119.0	124.0	83.0	57.0	em
158	head	0.735583484172821	119.0	126.0	87.0	74.0	em
157	head	0.9001550674438477	119.0	119.0	84.0	63.0	em
156	head	0.6558237075805664	119.0	37.0	0.0	52.0	em
155	head	0.9980860948562622	119.0	45.0	3.0	39.0	em
154	head	0.9998077750205994	119.0	103.0	60.0	50.0	em

Computer Vision with PowerAI Vision & IBM i



Computer Vision with PowerAI Vision & IBM i

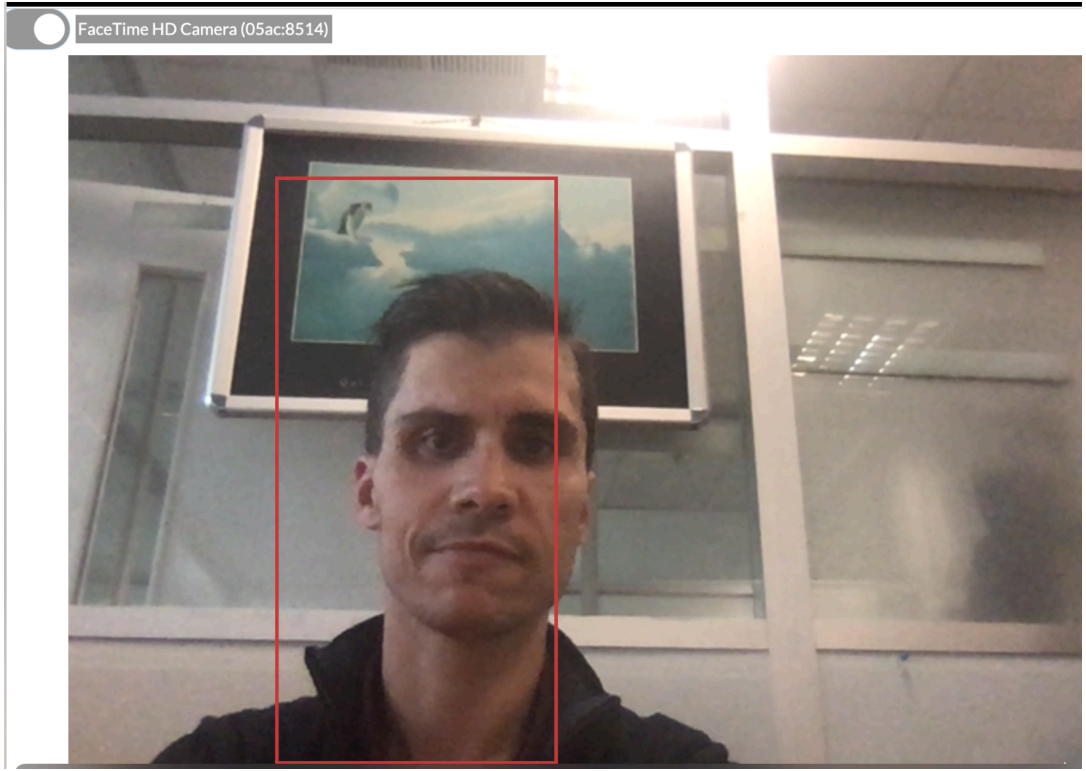
IBM i can now detection objects using an object detection API on premise powered by PowerAI Vision On ppc64le with Nvidia GPUs for inference.

```
[[10:32:25][BENOIT.ICC.LOCAL][~]# system "dsplib aivision"
 5770SS1 V7R3M0  160422                  Display Library                                         5/16/19 10:32:43
 Library . . . . . . . . . . . . . . . . :   AIVISION
 Type  . . . . . . . . . . . . . . . . . :   PROD
 Number of objects . . . . . . . . . . . :           25
 Library ASP number  . . . . . . . . . . :         1
 Library ASP device  . . . . . . . . . . :   *SYSBAS
 Library ASP group   . . . . . . . . . . :   *SYSBAS
 Create authority  . . . . . . . . . . . :   *EXCLUDE
 Text description  . . . . . . . . . . . :   COLLECTION - created by SQL
   Object      Type      Attribute            Size  Description
   QSQJRN0001  *JRNRCV                     1118208  COLLECTION - created by SQL
   QSQJRN0002  *JRNRCV                     1118208  COLLECTION - created by SQL
   QSQJRN0003  *JRNRCV                     1118208  COLLECTION - created by SQL
   QSQJRN0004  *JRNRCV                     1118208  COLLECTION - created by SQL
   QSQJRN      *JRN                          12288  COLLECTION - created by SQL
   DETECTIONS  *FILE     PF                 290816
   SYSCHKCST   *FILE     LF                  45056  SQL catalog view
   SYSCOLUMNS  *FILE     LF                 135168  SQL catalog view
   SYSCST      *FILE     LF                  86016  SQL catalog view
   SYSCSTCOL   *FILE     LF                  57344  SQL catalog view
   SYSCSTDEP   *FILE     LF                  57344  SQL catalog view
   SYSFIELDS   *FILE     LF                  86016  SQL catalog view
   SYSINDEXES  *FILE     LF                 126976  SQL catalog view
   SYSKEYCST   *FILE     LF                  69632  SQL catalog view
   SYSKEYS     *FILE     LF                  86016  SQL catalog view
   SYSPACKAGE  *FILE     LF                  98304  SQL catalog view
   SYSREFCST   *FILE     LF                  77824  SQL catalog view
   SYSTABDEP   *FILE     LF                  77824  SQL catalog view
   SYSTABLES   *FILE     LF                 114688  SQL catalog view
   SYSTRIGCOL  *FILE     LF                 110592  SQL catalog view
   SYSTRIGDEP  *FILE     LF                 114688  SQL catalog view
   SYSTRIGGER  *FILE     LF                 167936  SQL catalog view
   SYSTRIGUPD  *FILE     LF                  81920  SQL catalog view
   SYSVIEWDEP  *FILE     LF                  98304  SQL catalog view
   SYSVIEWS    *FILE     LF                  65536  SQL catalog view
                     Total size :          6631424
                      * * * * *   E N D   O F   L I S T I N G   * * * * *
```

```sql
select * from aivision.detections order by id desc
```

ID	DETECTEDLABEL	CONFIDENCE	YMAX	XMAX	XMIN	YMIN			
165	head	0.995372474193573	119.0	111.0	73.0	36.			
164	head	0.9906670451164246	119.0	122.0	84.0	62.			
163	head	0.9786785244941711	119.0	157.0	123.0	60.			
162	head	0.998145580291748	119.0	101.0	53.0	54.			
161	head	0.9998226761817932	119.0	95.0	52.0	53.			
160	head	0.9996845722198486	119.0	104.0	61.0	53.0	empty	c3a89e6c-77f0-4871-a1ee-6fc8b02a7b7b	http://powerai-vision-vision-portal:9080/pow
159	head	0.9455117583274841	119.0	124.0	83.0	57.0	empty	c3a89e6c-77f0-4871-a1ee-6fc8b02a7b7b	http://powerai-vision-vision-portal:9080/pow
158	head	0.735583484172821	119.0	126.0	87.0	74.0	empty	c3a89e6c-77f0-4871-a1ee-6fc8b02a7b7b	http://powerai-vision-vision-portal:9080/pow
157	head	0.9001550674438477	119.0	119.0	84.0	63.0	empty	c3a89e6c-77f0-4871-a1ee-6fc8b02a7b7b	http://powerai-vision-vision-portal:9080/pow
156	head	0.6558237075805664	119.0	37.0	0.0	52.0	empty	c3a89e6c-77f0-4871-a1ee-6fc8b02a7b7b	http://powerai-vision-vision-portal:9080/pow
155	head	0.9980860948562622	119.0	45.0	3.0	39.0	empty	c3a89e6c-77f0-4871-a1ee-6fc8b02a7b7b	http://powerai-vision-vision-portal:9080/pow
154	head	0.9998077750205994	119.0	103.0	60.0	50.0	empty	c3a89e6c-77f0-4871-a1ee-6fc8b02a7b7b	http://powerai-vision-vision-portal:9080/pow

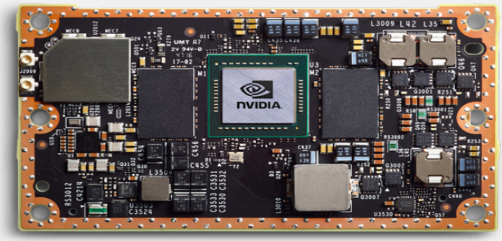
Computer Vision with PowerAI Vision & IBM i



Visual Recognition Demo on IBM i + PowerAI Vision

Accelerated embedded edge devices

NVIDIA Jetson TX2 Module



Jetson TX2 is the fastest, most power-efficient embedded AI computing device. This 7.5-watt supercomputer on a module brings true AI computing at the edge. It's built around an NVIDIA Pascal™-family GPU and loaded with 8GB of memory and 59.7GB/s of memory bandwidth. It features a variety of standard hardware interfaces that make it easy to integrate it into a wide range of products and form factors.

[Train on PowerAI Vision but infer on embedded devices]()

Made with PowerAI Vision – Drone Inspection

• IBM POWER SYSTEMS

AC922

An Acceleration Superhighway
Unleash state of the art IO and accelerated computing potential in the post “CPU-only” era

Designed for the AI Era
Architected for the modern analytics and AI workloads that fuel insights

Delivering Enterprise-Class AI
Flatten the time to AI value curve by accelerating the journey to build, train, and infer deep neural networks