

Power Week

Université IBM i 2019



22 et 23 mai

IBM Client Center Paris

S12 - PowerAI, Watson et IBM i – Partie 2 Demonstrations

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@MarolleauBenoit



Online version – EN & FR
<https://ibm.biz/bma-wiki>

Agenda

■ PARTIE 1

- Presentation bientôt disponible sur <https://www.2019.universite-i.fr/> et ici <https://ibm.biz/bma-wiki>

■ PARTIE 2

Exemple et demonstration – Technologies en action sur IBM i

Machine Learning sur IBM i: Scikit-Learn

Machine Learning accéléré sur H2O.ai Driverless AI

Deep Learning (Visual Recognition) avec PowerAI Vision, IBM i et Node.js



IBM i, Machine Learning & Solutions IBM

Quelques questions à se poser

Machine Learning use cases & relevance for business ?

- Business Analyst & Data Expertise
- Model Precision / Accuracy
- Model evaluation, monitoring & re-training

Deployment Options ? (vs. regulation, cost, performance, skills, other technical aspects)

- AI in the Public Cloud
- AI in the Datacenter (on premise)
- AI on the edge

Data Science Phases ?

- Data Preparation & Model building (which data sources, language & EDI, framework, libraries, algorithm?)
- Model training & validation
- Model evaluation, deployment for Inference (REST API? Batch? Streaming?)

Performance / Cost / Time to market ?

- Accelerated ML (GPU, FPGA,...) or not for model training? Model Inference?

Regulation & Auditability vs. model understanding ?

- Model Fairness
- Model Interpretability

IBM i, Machine Learning & Solutions IBM

Solutions Cloud ou dans le datacenter

1

ML Capabilities on IBM i

Simple, Efficient

No GPU, runs on CPUs



Machine Learning Libraries

Accelerated ++

Divide Training time by x vs. x86

DL: Large Model Support & NVLink

ML: Accelerated ML with SnapML and Nvidia Rapids

Free PowerAI Supported & Optimized Frameworks –

Simple Docker based deployment. Optional K8s/ICP

2



Watson Studio + WML
+ Data Platform

IBM Cloud

PaaS/SaaS model, Pay per use

Great functionalities, quickly available, CPU and GPU

Advanced users (i.e. Cluster with 4+ PowerAI)

- WML-A for Hyperparameter optimization
- Unique Linear Scalability : Distributed DL (DDL)
- State of the art EGO job Scheduler from HPC

3



PowerAI Vision



Watson Studio +WML



Plugin – Training & Inference

WML-A



PowerAI Base (WML-CE) – optional ICP K8s Deployment



AC922

AC922



AC922

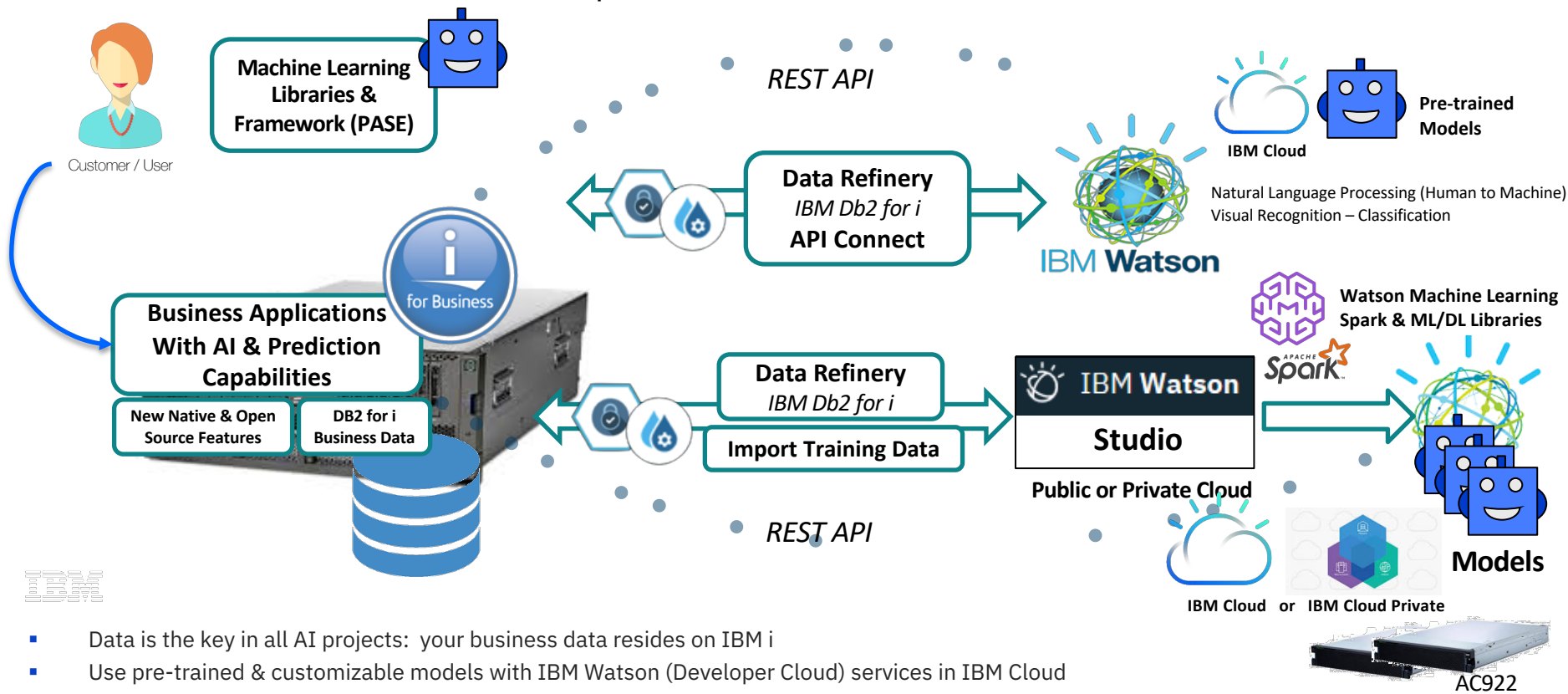
On top of PowerAI Base (WML-CE):

Watson Studio, H2O Driverless AI, PowerAI Vision...

Get Results in minutes

IBM i & Artificial Intelligence

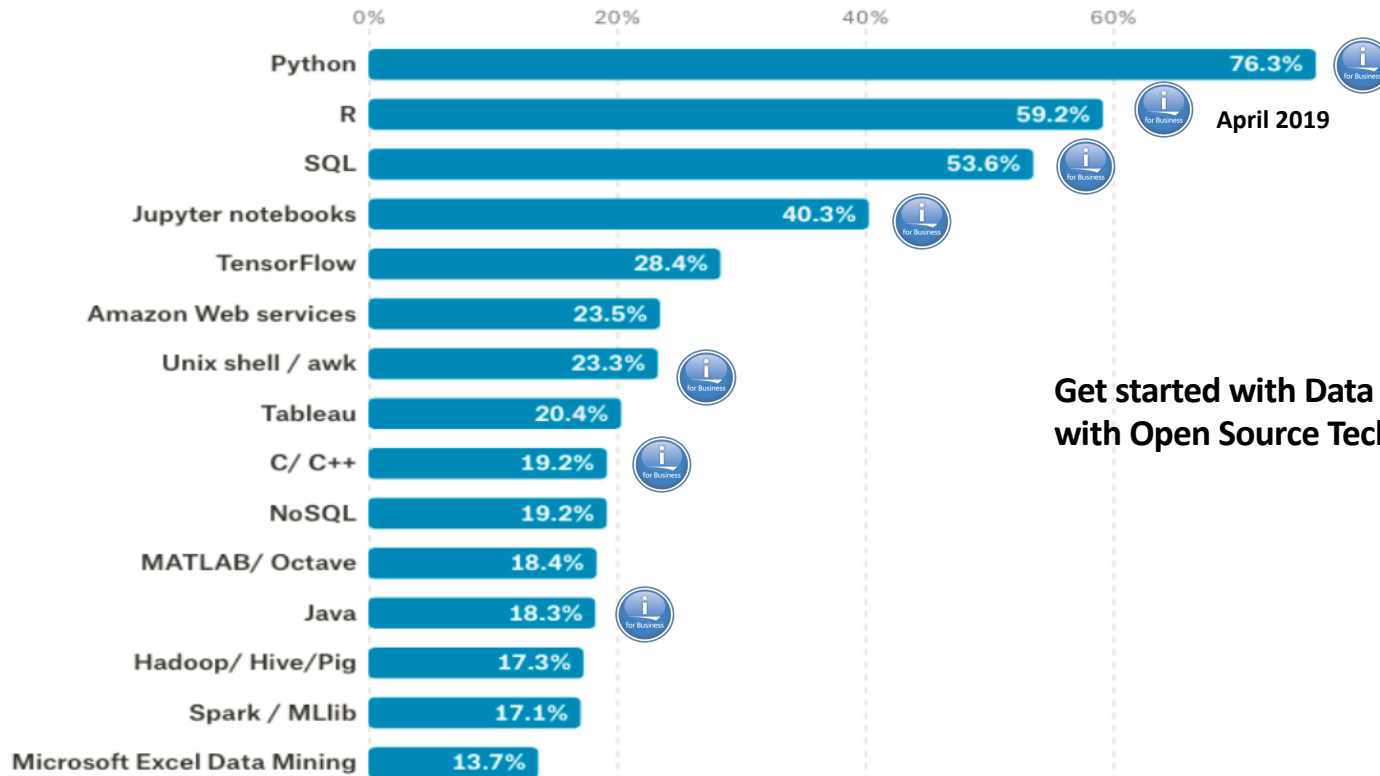
Scenario 2: Utiliser Watson Developer Cloud (API) , IBM Watson Studio (Cloud ou Local)



- Data is the key in all AI projects: your business data resides on IBM i
- Use pre-trained & customizable models with IBM Watson (Developer Cloud) services in IBM Cloud
- Build your own use case & business specific models with IBM Watson Studio - IBM Cloud / on premises (Studio Local w/ Cloud Private)

Data Science tools & technologies

Kaggle 2017 Data Science Tools Survey



April 2019

Get started with Data Science on IBM i
with Open Source Technologies

IBM Data Science Technologies & IBM i

Scenario 1: Utiliser les frameworks et langages disponible sur IBM i 7.2+

Data & Scientific Packages Available

Numpy, Pandas : Data Processing

Scipy, Scikit-Learn

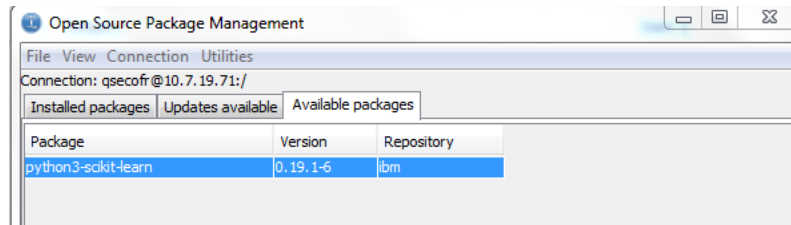
IPython : interactive Python

[NLTK](#) : Natural Language Processing

Matplotlib, jupyter : Data Visualization

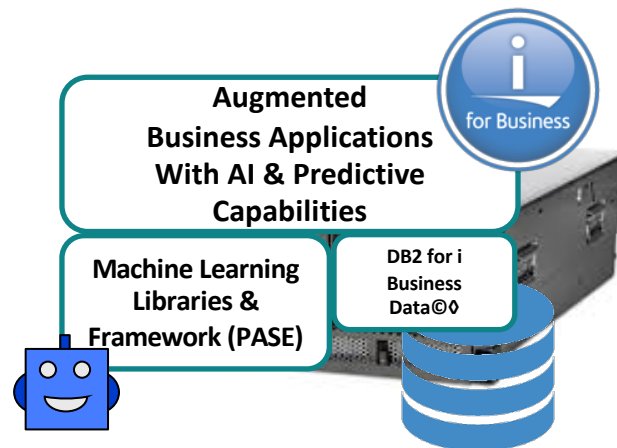
R Language (Interpreter, Runtime)

More to come? 😊



Alternative vs. dataset size, investment on ML etc.

- Training & Inference on IBM i
- Training on PowerAI / WML , Inference on IBM i (<->) (Public or Private Cloud)
- Data preparation on IBM i, Training & Inference on Accelerated Servers (PowerAI, WML-A)



IBM Data Science Technologies & IBM i

Demo1



- Customer Churn Demo
 - Supervised model – classification with Scikit-Learn
- Install yum packages and git clone
 - <https://github.com/bmarolleau/firstdemo-scikitlearn-ibmi/>



IBM Data Science Technologies & IBM i

Demo1



Classification

Identifying to which category an object belongs to.

Applications: Spam detection, Image recognition.

Algorithms: SVM, nearest neighbors, random forest, ... — Examples

Regression

Predicting a continuous-valued attribute associated with an object.

Applications: Drug response, Stock prices.

Algorithms: SVR, ridge regression, Lasso, ... — Examples

Clustering

Automatic grouping of similar objects into sets.

Applications: Customer segmentation, Grouping experiment outcomes

Algorithms: k-Means, spectral clustering, mean-shift, ... — Examples

Dimensionality reduction

Reducing the number of random variables to consider.

Applications: Visualization, Increased efficiency

Algorithms: PCA, feature selection, non-negative matrix factorization. — Examples

Model selection

Comparing, validating and choosing parameters and models.

Goal: Improved accuracy via parameter tuning

Modules: grid search, cross validation, metrics. — Examples

Preprocessing

Feature extraction and normalization.

Application: Transforming input data such as text for use with machine learning algorithms.

Modules: preprocessing, feature extraction. — Examples

IBM Data Science Technologies & IBM i

Demo1

- Customer Churn Demo
 - Customer segmentation :
is this customer going to leave now? soon? or not?
- Dataset from Db2 CHURN.CHURNCUST2
- Use ACS for data transfers (CSV <-> Db2)
- Ipython and/or Jupyter for coding
- From Data preparation to model inference on IBM i
- Final model can infer on IBM i or can be externalized on an accelerated node or Watson ML (On prems, Cloud)

```
Terminal Shell Edit View Window Help
Benoit2 — ssh beno

air-de-benoit:~ Benoit2$ ssh benoit@10.7.19.71
benoit@10.7.19.71's password:

***** IBM i 7.3 Montpellier Client Center *****

### ##### # # ##### #####
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# # # # # # # # # #
### ##### # # # # # #####

***** Contact: benoit.marolleau@fr.ibm.com *****

[[13:06:15][BENOIT.ICC.LOCAL][~]# cd SKLEARN/
[[13:06:18][BENOIT.ICC.LOCAL][~/SKLEARN]# ls -ltr
total 1736
-rw-r--r-- 1 benoit 0 977501 Mar 31 2015 WA_Fn-UseC_-Telco-Customer-Churn.csv
drwxr-sr-x 3 benoit 0 8192 May 13 17:57 jupyter
-rw-r--r-- 1 benoit 0 484078 May 14 10:29 SVC_Model_CHURN_IBMi_V1.joblib
-rw-r--r-- 1 benoit 0 132 May 14 10:51 0_download_Dataset_CSV.sh
-rw-r--r-- 1 benoit 0 393 May 14 11:33 0_load_Dataset_Db2.py
-rw-r--r-- 1 benoit 0 69673 May 14 11:36 customer-churn-prediction.ipynb
drwxr-sr-x 3 benoit 0 8192 May 14 12:28 firstdemo-scikitlearn-ibmi
-rw-r--r-- 1 benoit 0 234 May 14 12:37 README.md
-rw-r--r-- 1 benoit 0 2927 May 14 13:00 1-7_prepare_data_create_train_set.py
-rw-r--r-- 1 benoit 0 1040 May 14 13:03 8-9_feature_engineering.py
-rw-r--r-- 1 benoit 0 457 May 14 13:03 10-11_split_scale.py
-rw-r--r-- 1 benoit 0 164 May 14 13:03 12_build_SVC_ClassifierModel.py
-rw-r--r-- 1 benoit 0 739 May 14 13:04 13_evaluate_SVC_ClassifierModel.py
-rw-r--r-- 1 benoit 0 390 May 14 13:04 14_inference_SVC_ClassifierModel.py
-rw-r--r-- 1 benoit 0 83 May 14 13:04 15_persist_SVC_ClassifierModel.py
-rw-r--r-- 1 benoit 0 78 May 14 13:04 16_load_SVC_ClassifierModel.py
[[13:06:20][BENOIT.ICC.LOCAL][~/SKLEARN]#
```



IBM Data Science Technologies & IBM i

Untitled* - Run SQL Scripts - 10.7.19.71(O01dd6f4)

File Edit View Run VisualExplain Monitor Options Connection Tools Help

```
1 select * from CHURN.CUSTCHURN2
```

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
customerID	gender	SeniorCitizen	Partner	Dependents	tenure	PhoneService	MultipleLines	InternetService	OnlineSecurity
7590-VHVEG	Female	0	Yes	No	1	No	No phone service	DSL	No
5575-GNVDE	Male	0	No	No	34	Yes	No	DSL	Yes
3668-QPYBK	Male	0	No	No	2	Yes	No	DSL	Yes
7795-CFOCW	Male	0	No	No	45	No	No phone service	DSL	Yes
9237-HQITU	Female	0	No	No	2	Yes	No	Fiber optic	No
9305-CDSKC	Female	0	No	No	8	Yes	Yes	Fiber optic	No
1452-KIOVK	Male	0	No	Yes	22	Yes	Yes	Fiber optic	No
6713-OKOMC	Female	0	No	No	10	No	No phone service	DSL	Yes
7892-POOKP	Female	0	Yes	No	28	Yes	Yes	Fiber optic	No
6388-TABGU	Male	0	No	Yes	62	Yes	No	DSL	Yes
9763-GRSKD	Male	0	Yes	Yes	13	Yes	No	DSL	Yes
7469-LKBCI	Male	0	No	No	16	Yes	No	No	No internet service
8091-TTVAX	Male	0	Yes	No	58	Yes	Yes	Fiber optic	No
0280-XJGEX	Male	0	No	No	49	Yes	Yes	Fiber optic	No
5129-JLPIS	Male	0	No	No	25	Yes	No	Fiber optic	Yes
3655-SNOYZ	Female	0	Yes	Yes	69	Yes	Yes	Fiber optic	Yes

100 rows displayed (more data available).

Messages | Global Variables and Special Registers | **select * from CHURN.CUSTCHURN2**

Connected to relational database O01dd6f4 on 10.7.19.71 as QSECOFR - 136910/QUSER/QZDASOINIT using JDBC configuration 'Default'.

- System Configurations
- 5250 Session Manager
- HMC Probe Utility

F3=Exit F12=Cancel

Start Transfer Stop Transfer Properties

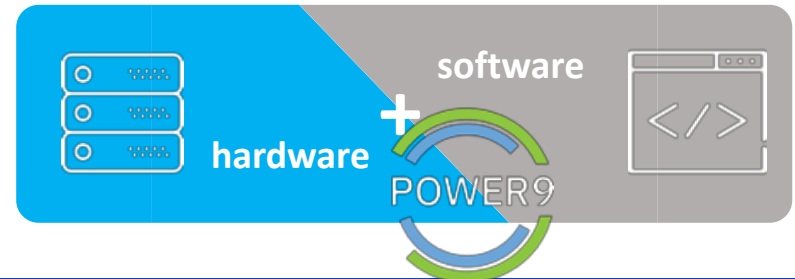
Rows transferred: 7,044



Demo 2 & 3 : PowerAI Vision / Accelerated AutoML avec Driverless AI

Scenario 3: Utiliser l'état de l'art du Private Accelerated ML/DL avec PowerAI / WML-A, s'intégrant automatiquement avec des solutions comme Watson Studio Local, PowerAI Vision, Driverless AI.

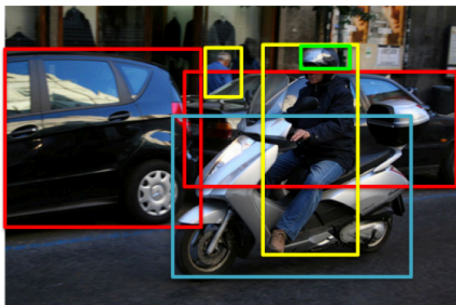
- L'objectif est de ne plus payer à l'usage, d'être autonome, et d'avoir une techno pérenne et performante
 - Prix compétitifs (vs. TCA/TCO, vs. offres Cloud ou « on premise » concurrentes)
- Solution Matérielle et logicielle Open source, supportée par IBM.
 - Solution designée pour le Machine Learning et Deep Learning accéléré. Base du supercalculateur CORAL Summit
 - Disponible « on premise », dans le Cloud public.
- Facilement Cloudifiable en Cloud Privé via Kubernetes / IBM Cloud Private (Hébergeurs, Consolidation des environnements AI)



Demo 2 & 3 : PowerAI Vision / Accelerated AutoML w/ Driverless AI



IBM Power AI delivers
Deep Learning for Images



Person
Car
Motorcycle
Helmet



H2O Driverless AI is an
Automatic Machine Learning

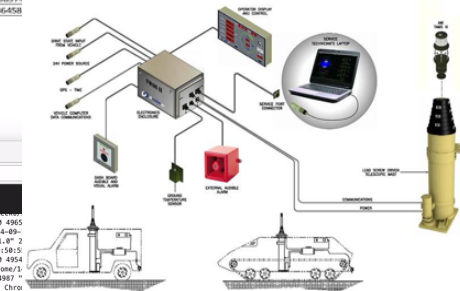
Transactional Data: Store Level

Transactional

Transaction ID	Date	Time	AMOUNT	Card_number
p3913045367	11/24/2010	3:20:32 AM	14.47521	*****2323
06789199170	12/4/2010	10:30:10 AM	39.46618	*****6251
0319278292	11/2/2010	1:23:23 AM	24.99964	*****2179
73292082178	10/8/2010	12:29:40 AM	19.21324	*****5826
t6835491952	10/17/2010	10:36:12 PM	30.56008	*****9408
08333871154	12/5/2010	5:22:59 PM	33.35401	*****9379
v1240343519	10/27/2010	4:12:38 AM	49.64481	*****5466
w5440123613	11/26/2010	10:36:36 PM	24.23247	*****1816
80906115216	11/3/2010	1:57:33 PM	32.45101	*****2602
v1400944560	11/25/2010	7:26:49 PM	23.12291	*****4393
z3665080889	10/9/2010	11:09:58 AM	21.93351	*****6533
pe738256686	11/23/2010	10:14:36 AM	21.71996	*****4615
08996299643	11/24/2010	1:19:24 AM	15.46741	*****7604
99012945206	11/22/2010	2:00:15 PM	31.14201	*****7140
z2116305133	11/23/2010	7:15:13 PM	43.16047	*****9208
174782724264	12/2/2010	12:08:46 PM	40.14018	*****2695
u0864100319	10/11/2010	3:10:19 AM	23.79607	*****2980
v2388298974				
w567236458				
TOTAL			18.47	

Example: Flat File

Sensors



Log

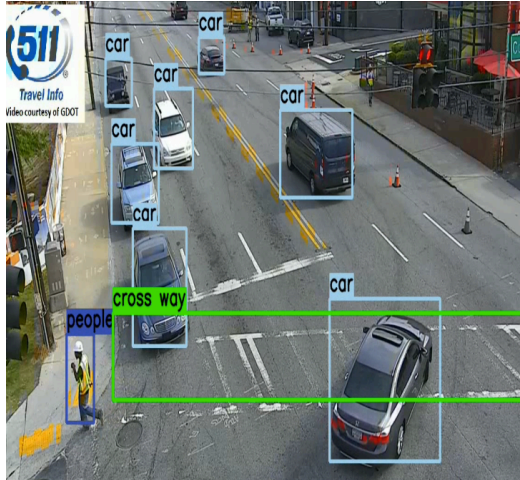
```
tail -F -
localhost:9001
tail -F -
220.134.169.96 -- [16/Sep/2017:09:54:03 +0200] "GET /explore HTTP/1.0" 200 4905
sp "Mozilla/5.0 (Windows 98; sl-si; rv:1.9.1.20) Gecko/2014-09-
113.130.63.126 -- [16/Sep/2017:09:55:00 +0200] "GET /app/main/posts HTTP/1.0" 2
lay/8 (X11; Linux x86_64; rv:1.9.6.20) Gecko/2012-10-06 20:58:5
171.32.25.164 -- [16/Sep/2017:09:57:15 +0200] "GET /app-main HTTP/1.0" 200 4954
a/5.0 (Windows CE; AppleWebKit/5322 (KHTML, Like Gecko) Chrome/
142.221.145.208 -- [16/Sep/2017:10:01:23 +0200] "GET /list HTTP/1.0" 200 4987
a/5.0 (Windows NT 5.1; AppleWebKit/5322 (KHTML, Like Gecko) Chrome
100.241.58.10 -- [16/Sep/2017:10:06:23 +0200] "DELETE /app-content HTTP/1.0" 404
"Mozilla/5.0 (Windows NT 5.1; AppleWebKit/5322 (KHTML, Like Gecko) Chrome/29.0.154.58; rv:1.9.2.20) Gecko/2010-10-29 Firefox/7.0"
235.99.289.148 -- [16/Sep/2017:10:09:11 +0200] "POST /app-content HTTP/1.0" 200 5829 "http://www.elliott-foster.org/" Mozilla
a/5.0 (Macintosh; U; PPC Mac OS X 10_5_7; rv:1.0; it-IT) AppleWebKit/531.9.6 (KHTML, Like Gecko) Version/5.1 Sa
fari/31.0-6"
231.252.210.232 -- [16/Sep/2017:10:12:24 +0200] "PUT /app/main/posts HTTP/1.0" 200 5832 "http://www.cineros.biz/" Mozilla/
5.0 (Windows NT 5.2; AppleWebKit/5342 (KHTML, Like Gecko) Chrome/15.0.85.0 Safari/5342)
134.55.85.239 -- [16/Sep/2017:10:15:50 +0200] "GET /app/main/posts HTTP/1.0" 200 4945 "http://elliott.com/faq/" Mozilla/5.0
(X11; Linux x86_64; rv:1.9.5.20) Gecko/2011-12-18 15:51:32 Firefox/4.0"
38.226.28.255 -- [16/Sep/2017:10:19:53 +0200] "DELETE /app/cart.jsppAppID=494 HTTP/1.0" 301 5058 "http://www.perkins-mendo
za.org/category/explore/index.html" Opera/8.27 (Windows NT 6.0; it-IT) Presto/2.9.171 Version/12.00"
4.169.212.86 -- [16/Sep/2017:10:21:40 +0200] "GET /app-main HTTP/1.0" 200 4969 "http://www.primoan.org/faq/" Mozilla/5.0 (Mac
intosh; Intel Mac OS X 10_8_7; rv:1.9.5.20) Gecko/2011-06-03 22:09:59 Firefox/4.0"
128.242.65.27 -- [16/Sep/2017:10:21:40 +0200] "GET /app-content HTTP/1.0" 200 5098 "http://www.burgess.com/explore/explore/
plure/register.html" Mozilla/5.0 (Macintosh; U; Intel Mac OS X 10_8_0; AppleWebKit/5311 (KHTML, Like Gecko) C
hrome/15.0.884.0 Safari/5311"
168.203.133.24 -- [16/Sep/2017:10:26:18 +0200] "GET /app/cart.jsppAppID=368 HTTP/1.0" 200 4972 "http://www.terry.org/" Mo
zilla/5.0 (Macintosh; PPC Mac OS X 10_7_9; rv:6.0; it-IT) AppleWebKit/534.26.3 (KHTML, Like Gecko) Version/5.0
Safari/534.26.3"
```

	Power AI Base (WML-CE)	Deep Learning Power AI Enterprise (WML-A)	AI Vision	ML and DL Watson Studio Local	Machine Learning H2O Driverless AI	
Offering	Description	Deep Learning	Deep Learning for the Enterprise	Deep Learning with Video tools	Notebook oriented development environment for ML and DL	Automated Machine learning
	Pricing Model	Free download	Commercial	Commercial	Commercial	Commercial
	Support	Available from IBM	IBM L 1-3 Included	IBM L1-3 Included	Available from IBM	H2O L 1-3
Applications	Text & Numeric	Yes	Yes	No	Yes	Yes
	Images	Yes	Yes	Yes	Yes	No
	Video	-	Optional add-on	Yes		No
	Primary Persona	Data Scientist	Data Scientist	Line of Business	Data Scientist	Data Scientist
	Second persona	IT	IT	IT	IT	Line of Business
	User Skill Level	High	Medium to high	Low	Medium to high	Low to Medium
	Strengths	Rapid deployment, high performance, scale	enterprise grade, High performance, rapid Deployment	Rapid deployment, simple GUI high performance	Notebook based development environment, strong collaboration, model management	Simplified deployment, intuitive user interface, automatic pipelines, "explainability" for models, end to end automation
Platform	Distributed DL (DDL)	1-4 nodes	1-thousands of nodes	Coming	Coming	-
	Large Model Support	Yes	Yes	Coming	Coming	-
	Server(s)	S822LC or AC922	S822LC or AC922	S822LC or AC922	S822LC or AC922, LC922	S822LC, AC922, LC921/922
IBM Products	Spectrum MPI (DDL)	Limited to 4 nodes	Included			Optional add-on
	Spectrum Conductor DLI	Optional add-on	Included	Coming	Optional Add On	Optional add-on
	IBM Watson Studio Local	Optional add-on	Optional add-on	No		Optional add-on
Cloud	IBM Cloud Public	Yes	No	Trial only	Watson Studio	?
	IBM Cloud Private	Yes	Yes	Yes	Yes	Yes

Comparing AI Offerings on Power

PowerAI Vision: "Point-and-Click" AI for Images & Video

Label Image or Video Data



Auto-Train AI Model

My DL Tasks / Create Task

New DL Task - Build Image Classifier

1 Choose Dataset
Select or create dataset

2 Build Model
Build model based on selected dataset

3 Deploy And Test
Deploy trained model and run test

Name of Image Classifier:

Select dataset: or

Latest Status: training 🔄

Train Iteration: 101
Train Loss: 0.62105

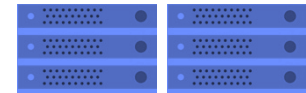
Test Iteration: 100
Test Loss: 0.47246
Accuracy: 0.81771

Estimated left time: 0 seconds

○ Train Loss

○ Test Loss ○ Accuracy

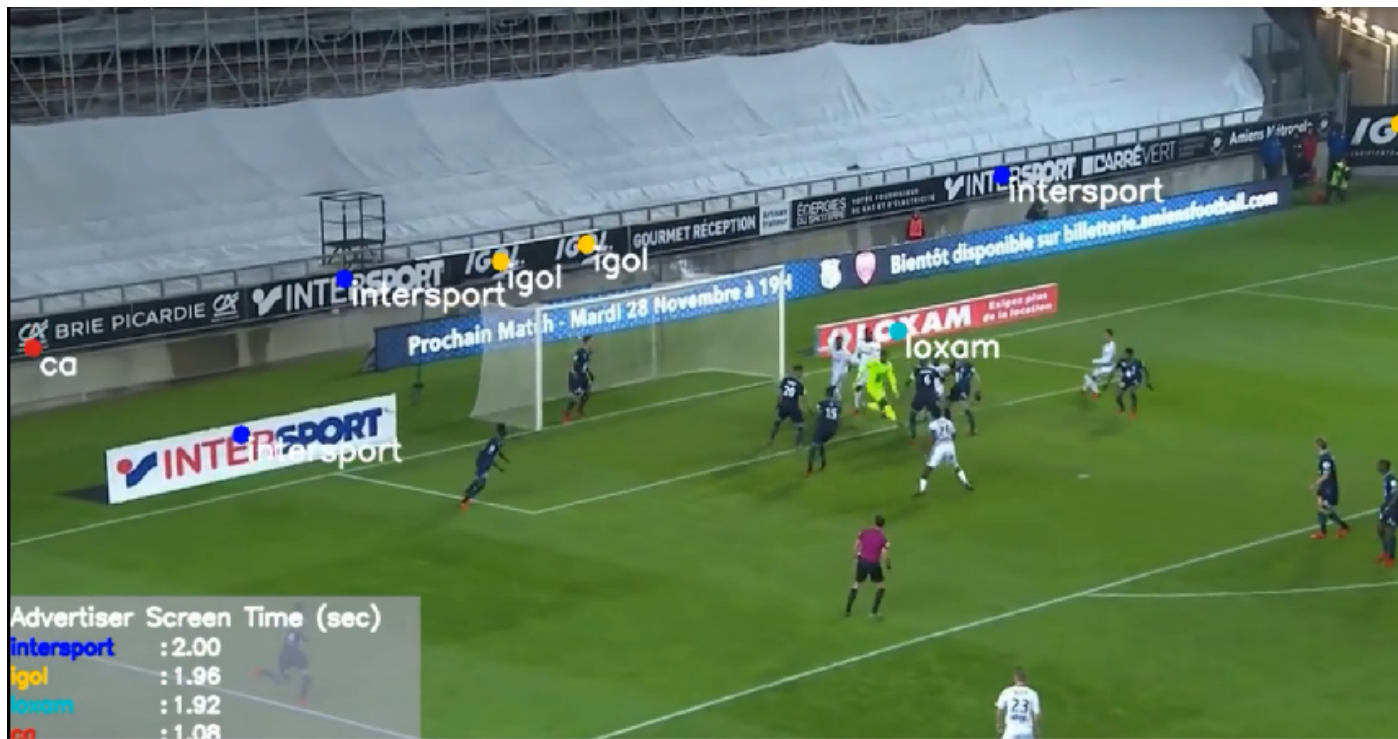
Package & Deploy AI Model



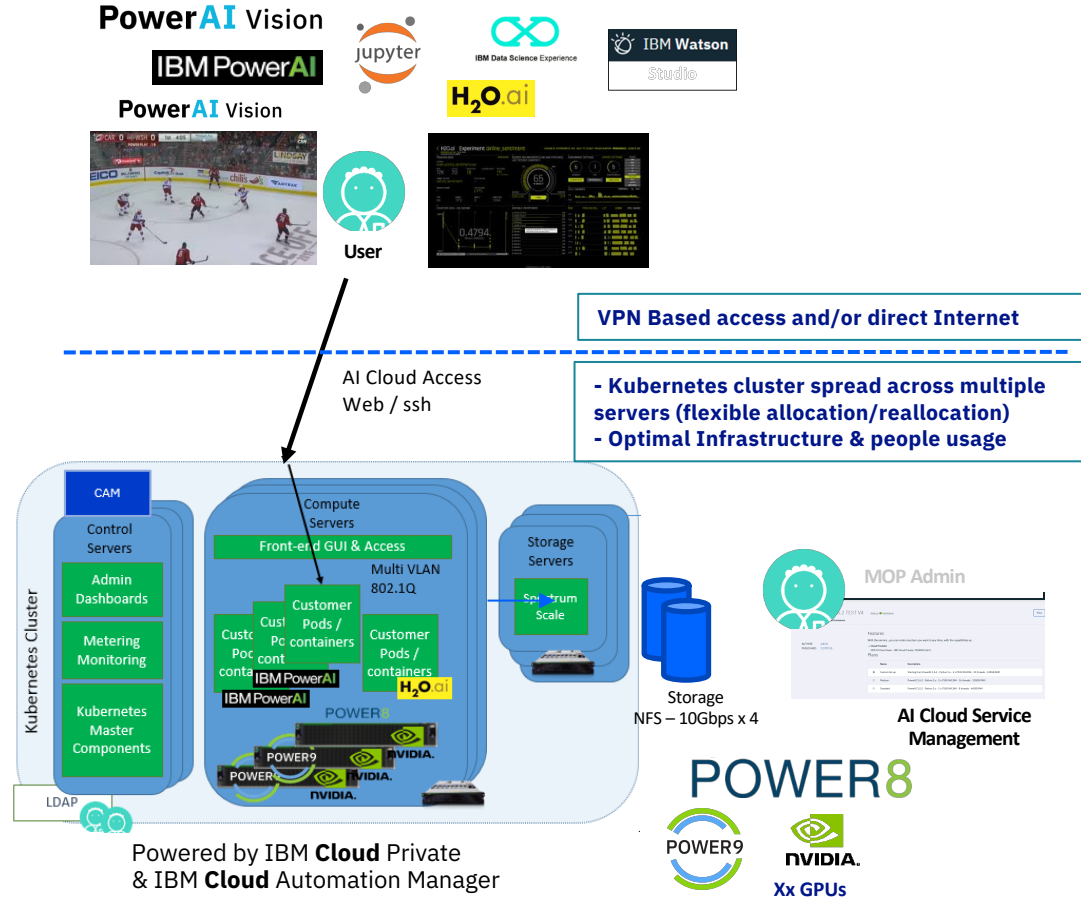
Made with PowerAI Vision – Drone Inspection



Made with PowerAI Vision – Sport / Advertising

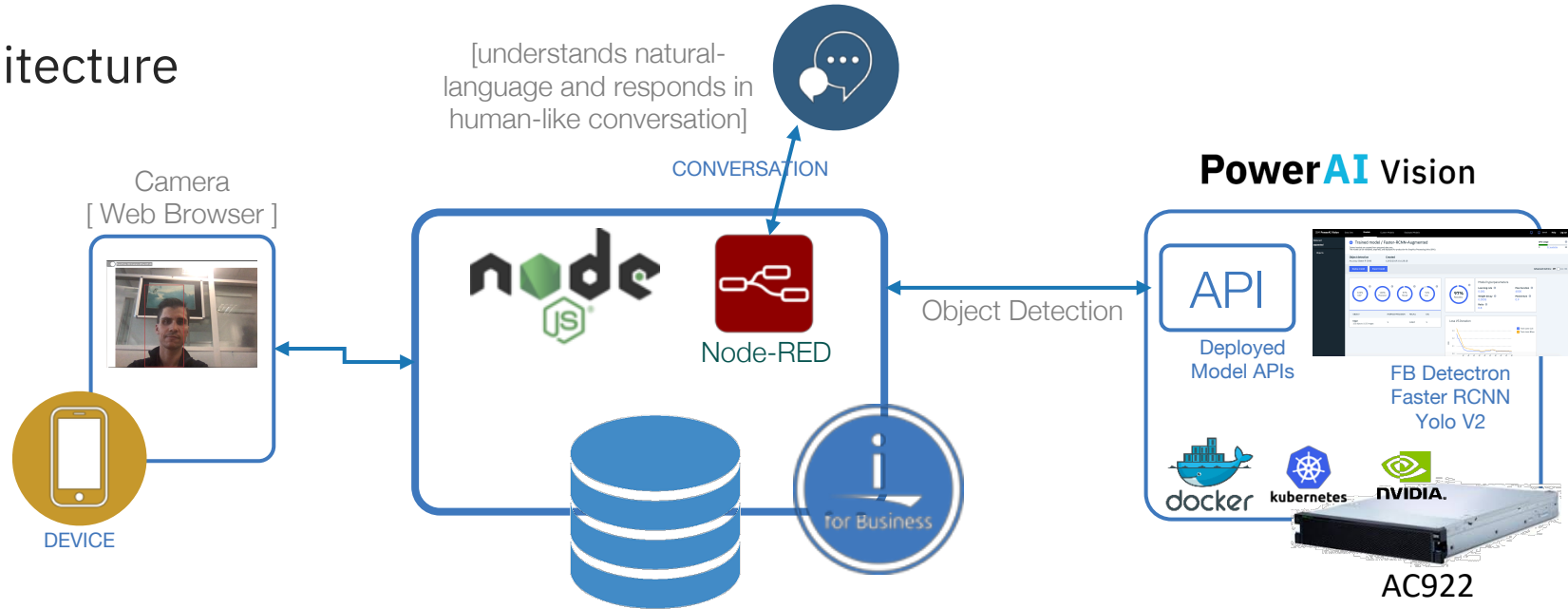


Demo Environment – Private AI Cluster



Computer Vision with PowerAI Vision & IBM i

Architecture



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

IBM
POWER
AI
VISION

Computer Vision with PowerAI Vision & IBM i

Welcome to IBM PowerAI Vision



Create Dataset

Start by adding images and video files to a data set.



Prepare Data

Label objects or assign categories to images or videos, then use auto labeling to complete the entire data set.



Train Model

Select a few custom options to create your model.



Deploy Model

Deploy the trained model and receive an API link for an inference device.

IBM
POWERAI
VISION

Computer Vision with PowerAI Vision & IBM i

The screenshot displays the IBM PowerAI Vision interface. At the top, there are navigation tabs: "Data Sets", "Models", "Custom Models", and "Deployed Models". The main header reads "Data set / augmented". Below this, statistics show "Total files: 528", "Matching files: 528", and "Selected files: 1". A toolbar contains buttons for "Train model", "Augment data", "Auto label", and "Export data set". Below the toolbar, there are buttons for "Assign category", "Label objects", "Select", "Delete", and "Refresh". On the left side, a sidebar shows "Filter by" with checkboxes for "Images" and "Videos", and sections for "Categories" and "Objects". The main area features a "Drop files here" section with an "Import files" button. Below this is a grid of image thumbnails. The first thumbnail in the top row has a play button and is labeled "527 frames". Each thumbnail shows a person's face with a bounding box and the label "head".



Computer Vision with PowerAI Vision & IBM i

The screenshot displays the IBM PowerAI Vision web interface. The top navigation bar includes 'Data Sets', 'Models', 'Custom Models', and 'Deployed Models'. The main content area is titled 'Trained model / Faster-RCNN-Augmented'. It provides details about the model's creation and offers options to 'Deploy model' or 'Export model'. Performance metrics are shown in four circular gauges: 100% mAP, 100% Precision, 97% Recall, and 91% IoU. A larger gauge shows 97% Accuracy. A table lists the model's performance on a 'head' with 155 objects across 155 images, showing an Average Precision of 1, Recall of 0.967, and IoU of 1. The 'Model hyperparameters' section lists: Learning rate (0.001), Max iteration (4000), Weight decay (0.0005), Momentum (0.9), and Ratio (0.8). A 'Loss VS Iteration' graph shows the training loss for CLS and Bbox, both decreasing over time.

IBM PowerAI Vision Data Sets Models Custom Models Deployed Models

Data set augmented

Trained model / Faster-RCNN-Augmented

Trained models are created from prepared data sets. The model can be validated, exported, and deployed for production for Graphics Processing Units (GPU).

GPU usage 0 22 available 32

Object detection Created
Accuracy (faster R-CNN) 13/03/2019 à 16:28:18

Deploy model Export model Advanced metrics: Off On

100% mAP 100% Precision 97% Recall 91% IoU

97% Accuracy

Model hyperparameters

- Learning rate: 0.001
- Max iteration: 4000
- Weight decay: 0.0005
- Momentum: 0.9
- Ratio: 0.8

OBJECT	AVERAGE PRECISION	RECALL	IOU
head 155 objects / 155 images	1	0.967	1

Loss VS Iteration

- Train Loss CLS
- Train Loss Bbox




IBM
PowerAI
Vision

Computer Vision with PowerAI Vision & IBM i

IBM PowerAI Vision Data Sets Models Custom Models **Deployed Models**

Deployed models

Selected: 0/1

Select  Rename  Delete  Refresh

NAME	TYPE	ACCURACY	STATUS	DATA SET
<input type="checkbox"/> Faster-RCNN-Augmented	Object detection	97%	<input type="radio"/> Starting	augmented



Computer Vision with PowerAI Vision & IBM i

The screenshot displays the IBM PowerAI Vision interface. At the top, there is a navigation bar with tabs for 'Data Sets', 'Models', 'Custom Models', and 'Deployed Models'. The 'Deployed Models' tab is active. On the left, a sidebar shows 'Data set augmented' and 'Objects'. The main content area is titled 'Deployed model / Faster-RCNN-Augmented'. Below the title, there is a brief description: 'You can call the generated application programming interface (API) to run your deployed model. The API is unique to this model, and you cannot edit the API.' The model details are presented in two columns: 'Object detection' (Accuracy: faster R-CNN, Model: [Faster-RCNN-Augmented](#)) and 'Created' (16/05/2019 à 15:12:58, By: benoit). An 'API Reference' section contains a 'GET' button and a 'POST' button. Below this, the 'API endpoint' is shown as 'api/dlapis/c3a89e6c-77f0-4871-a1ee-6fc8b02a7b7b' with a 'Copy' button. The 'Test Model' section includes a file upload area with a 'Drop files here' box, a download icon, and an 'Import files' button. To the right of the upload area, there is an 'Open' button and an 'External URL' input field with an 'Upload' button. On the far right, a circular gauge displays '97% Accuracy'.



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.

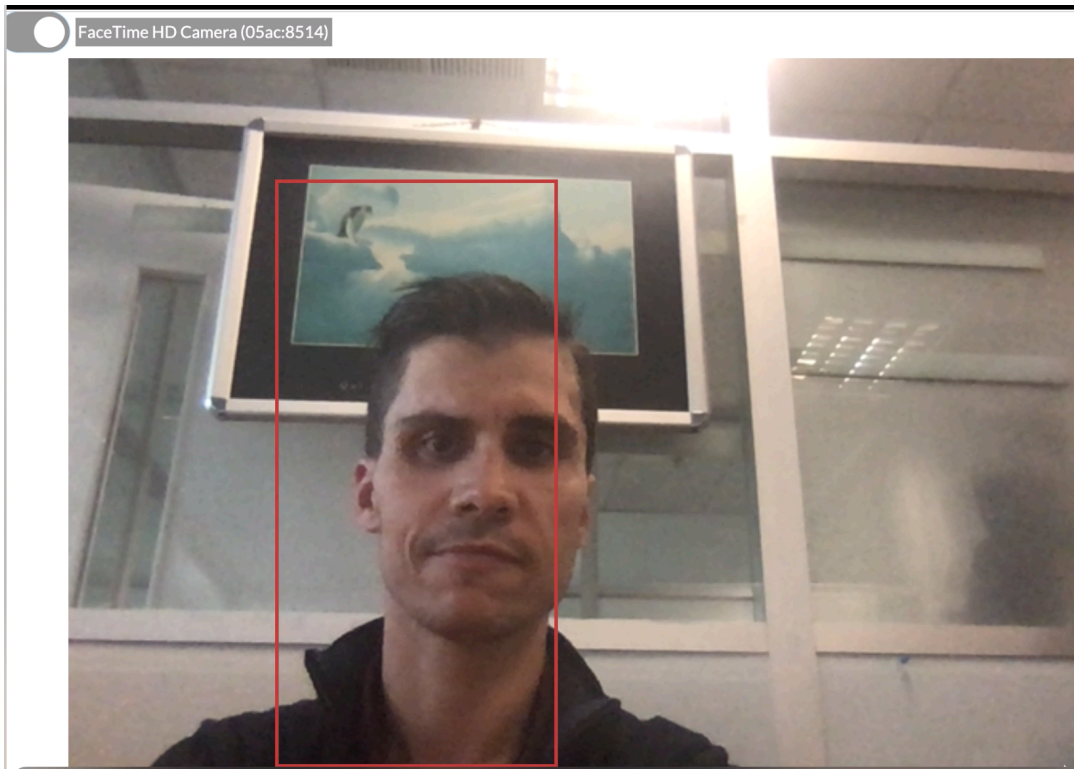
```
1 select * from aivision.detections order by id desc
```

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

```
[[10:32:25][BENOIT.ICC.LOCAL][~]# system "dsplib aivision"
5770SS1 V7R3M0 160422 Display Library
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
QSQRN0001 *JRNRCV 1118208 COLLECTION - created by SQL
QSQRN0002 *JRNRCV 1118208 COLLECTION - created by SQL
QSQRN0003 *JRNRCV 1118208 COLLECTION - created by SQL
QSQRN0004 *JRNRCV 1118208 COLLECTION - created by SQL
QSQRN *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
*****END OF LISTING*****
```

5/16/19 10:32:43

Made with PowerAI Vision – Real time detection on IBM i

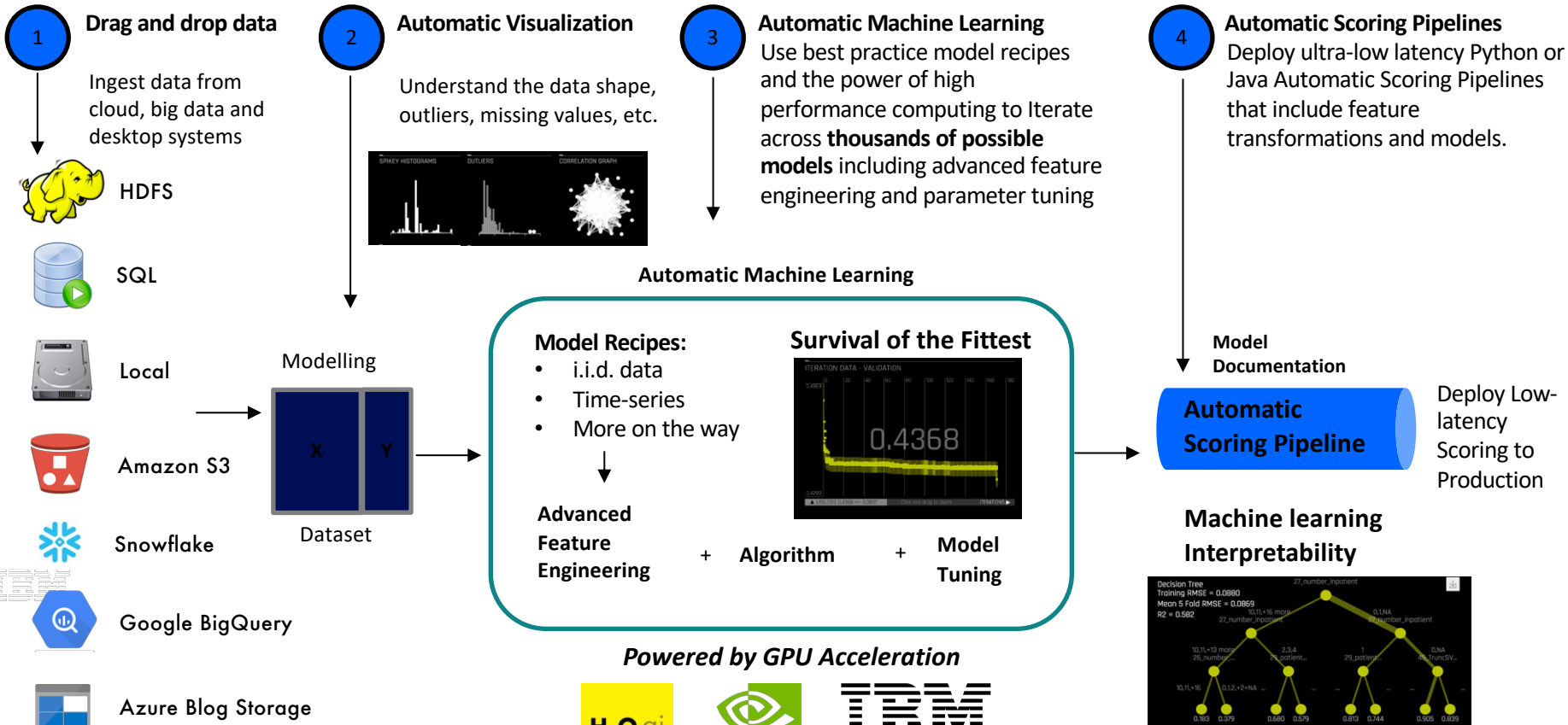


Visual Recognition Demo on IBM i + PowerAI Vision



PowerAI Vision

H2O Driverless AI: How it Works



Powered by GPU Acceleration



Financial Fraud Detection



- Driverless AI matched **10 years** of expert feature engineering
- Increased accuracy from **0.89 to 0.947 (6%)** in detecting fraudulent activity
- **6X** speed up when using H2O4GPU with Driverless AI

Experiment

- Training time (subset of data) – Driverless AI on GPU 6x faster
 - laptop (accuracy 1) - ~ 2 hours
 - GPU (accuracy 1) – 21 minutes; (accuracy 5) – 58 minutes

ID	TARGET	TRAIN SCORE	TEST SCORE	SCORER	ACCURACY	TIME	INTERPRETABILITY	STATUS	TIME
13c6ca	is_cc_bad	0.94703	NA	AUC	1	1	1	Done	01:53:29
067d32	is_cc_bad	0.94773	NA	AUC	5	5	5	Done	00:58:39
e55d93	is_cc_bad	0.94658	NA	AUC	1	1	1	Done	00:21:59

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“Driverless AI is giving amazing results in terms of feature and model performance “

Venkatesh Ramanathan
Senior Data Scientist, PayPal

Leader in Gartner’s 2018 Data
Science Quadrant

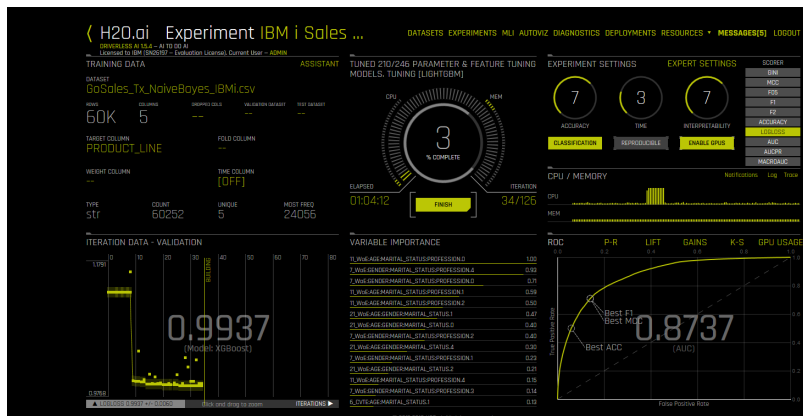
H2O Driverless AI and IBM POWER9 GPU Systems are bringing together the best of breed AI innovation. To handle the increasingly complex workloads of AI you need an integrated system of software and hardware:

- IBM POWER9 supports nearly 2.6x more RAM, 9.5x more I/O bandwidth than comparable systems.
- Nearly 2X the data ingest speed and over 50% faster feature engineering.
- With GPU accelerated machine learning delivering nearly 30X speedup on model building.
- Support for up to 6 V100 GPUs on a single system.

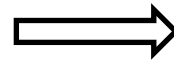
H₂O.ai

Made with Driverless AI : smarter IBM i apps

Sales + CRM data



Optimized for GPU-Accelerated Power9 Servers



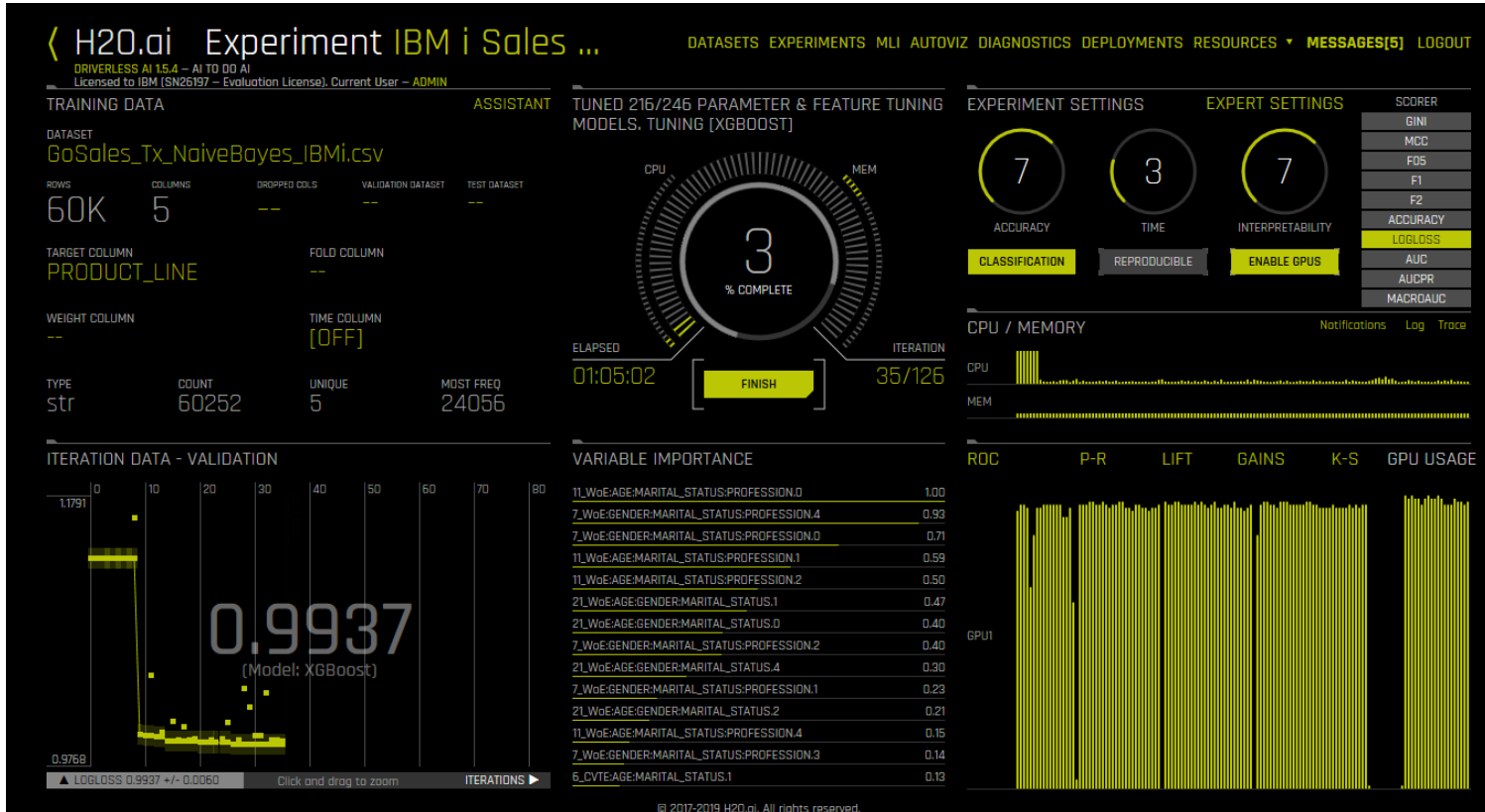
Recommendation Engine
Scoring Pipeline - REST API



```
[14:57:33] [sp4i-appserver.power.com] [/home/BENOIT/DAI]# uname -a
OS400 sp4i-appserver 2 7 00100006C37T
[14:57:37] [sp4i-appserver.power.com] [/home/BENOIT/DAI]# ./run_h2o_prediction_from_ibmi.sh M 21.0 Married Retail
This example script demonstrates how to communicate with the Driverless AI Scoring Service via HTTP from IBM i - PASE / Open Source / Any REST Client
The protocol used is JSON-RPC 2.0.
-----
Name Type Range Value
-----
GENDER object - M
AGE float32 [17.0, 69.0] 21.0
MARITAL_STATUS object - Married
PROFESSION object - Retail

Scoring individual rows from IBM i App...
{"jsonrpc": "2.0", "id": 1, "result": [0.7058841586112976, 0.03077976033091545, 0.04269004985690117, 0.022570349276065826, 0.19807571172714233]}
Get the target labels
{"jsonrpc": "2.0", "id": 1, "result": ["Camping Equipment", "Golf Equipment", "Mountaineering Equipment", "Outdoor Protection", "Personal Accessories"]}
```

Made with Driverless AI: smarter IBM i apps



Model Inference from IBM i (Python client)

```
[14:57:33][sp4i-appserver.power.com][~/home/BENOIT/DAI]# uname -a
OS400 sp4i-appserver 2 7 00100006C37T
[14:57:37][sp4i-appserver.power.com][~/home/BENOIT/DAI]# ./run_h2o_prediction_from_ibmi.sh M 21.0 Married Retail
This example script demonstrates how to communicate with the Driverless AI Scoring Service via HTTP from IBM i - PASE / Open Source / Any REST Client
The protocol used is JSON-RPC 2.0.
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Name Type Range Value
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GENDER object - M
AGE float32 [17.0, 69.0] 21.0
MARITAL_STATUS object - Married
PROFESSION object - Retail
-----
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{"jsonrpc": "2.0", "id": 1, "result": [0.7058841586112976, 0.03077976033091545, 0.04269004985690117, 0.022570349276065826, 0.19807571172714233]}
Get the target labels
{"jsonrpc": "2.0", "id": 1, "result": ["Camping Equipment", "Golf Equipment", "Mountaineering Equipment", "Outdoor Protection", "Personal Accessories"]}
```

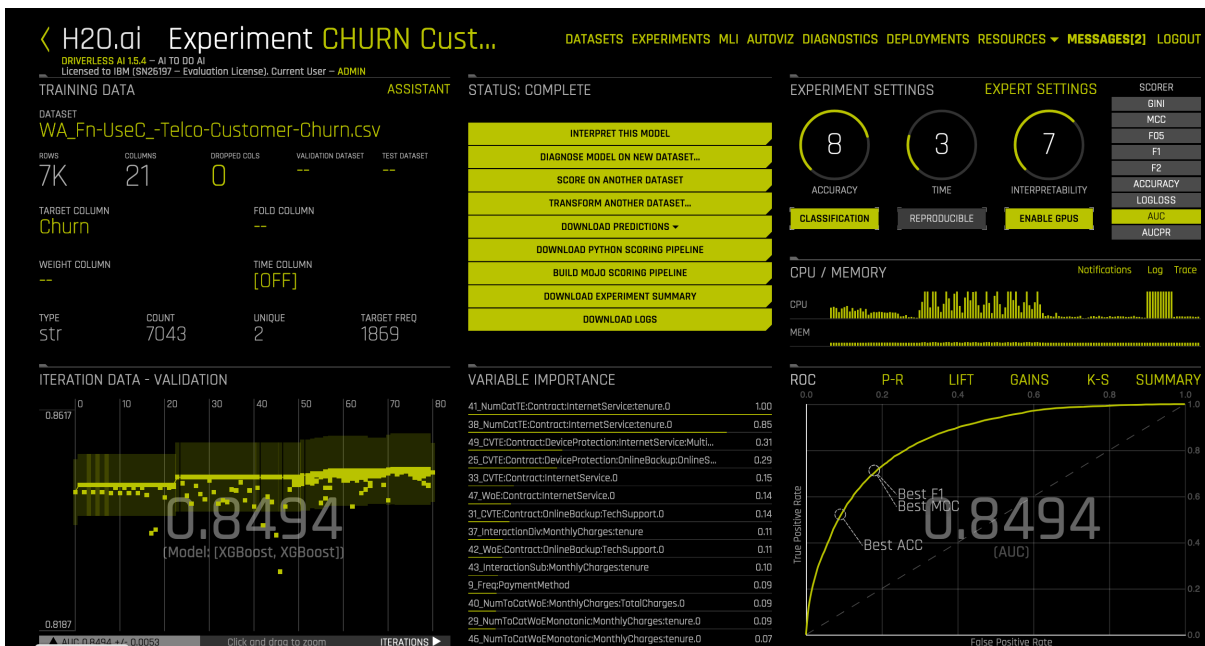


Basic Scikit Learn Modeling vs. Driverless AI demo 1 vs. demo 3

- Same dataset [WA_Fn-UseC_-Telco-Customer-Churn.csv](#)

- Accuracy:
0.79 vs. 0.84

- It is just a quick comparison:
Both modeling can be fine-tuned 😊
- Accelerated ML will be able to play with larger datasets
- AutoML (Driverless AI, Watson Studio) will create high quality models, that only experienced data scientists can do



W E R C

The image features the letters 'W', 'E', 'R', and 'C' in a large, white, sans-serif font. Each letter is filled with a different photograph of a diverse group of business professionals. The 'W' shows a woman with dark hair in a green top. The 'E' shows a man with a mustache in a patterned shirt. The 'R' shows a woman with her hands clasped in a light blue top. The 'C' shows a man in a blue suit and yellow tie. To the right of the 'C' is a vertical strip showing a man with glasses in a blue suit. The letters have a slight drop shadow.

Get Started Today

PowerAI Developer Portal

<https://developer.ibm.com/linuxonpower/deep-learning-powerai/technology-previews/powerai-vision/>

AI Vision Object Detection **Demo**

<https://www.youtube.com/watch?v=19vaot75JCY> & [Jupyter notebook](#)

AI Vision / Public Cloud – Get Started **demo**

<https://github.com/IBM/powerai-vision-object-detection>

PowerAI **FAQ**

<https://developer.ibm.com/linuxonpower/deep-learning-powerai/faq/>

PowerAI Vision 1.1.1 **Free trial**

[Register for a free 3-day trial of PowerAI Vision](#)

H2o.ai **Driverless AI** (Trial 21 days)

<https://www.h2o.ai/products/h2o-driverless-ai/>

Presentations, Demo Replays : <https://ibm.biz/bma-wiki>

Want to know more? Need support ?

Montpellier team & AI Environment for your PoC / Tests: Driverless/PowerAI/AI Vision Remote Access

Contact us : a2roy@fr.ibm.com / benoit.marolleau@fr.ibm.com

Deep Learning and PowerAI Development

Develop the next generation of applications

Get started

Others Using Deep Learning on Power

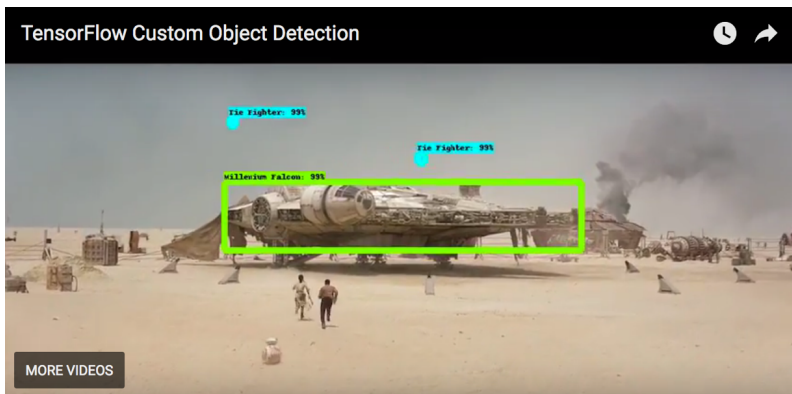
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PowerAI for Developers

PowerAI Releases

Technology Previews

Try PowerAI



Welcome to IBM PowerAI Trial

Get started or get scaling, faster, with a software distribution for machine learning running on the Enterprise Platform for AI: IBM Power Systems.

To access your IBM PowerAI Trial

1. Please issue the following command: `ssh -L 8888:localhost:8888 nimbix@[IP Address]`
2. Enter your password when prompted
3. On your local browser, visit the following URL to get started: <http://localhost:8888/tree/>

IBM PowerAI Trial Summary

User Id	IP Address	Password	Subscription Id	Start date	Expiration date
nimbix	[REDACTED]	[REDACTED]	502385381	Tuesday, October 17, 2017	Wednesday, October 18, 2017