Decisions algorithmiques

Des modèles prescriptifs pour encadrer l’apprentissage automatique

Forum Industriel d’Intelligence Artificiel
2019

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IBM France Lab

R&D Laboratory in France
600 members
Collaboration with ww Research labs

Sites
- Gentilly
- Sophia
- Pornichet
- Paris-Saclay campus

Main Activities
- Decision Optimization
- Automation Intelligence
- NLP
- DevOps
- Cloud

Hiring
https://careers.ibm.com/ShowJob/Id/472394/Ing%C3%A9nieur(e)s-de-d%C3%A9veloppement-de-logiciels-d'IA-au-France-Lab-d'IBM/?lang=fr

Examples of Operational Decisions infused with AI

Sales
Market basket analysis, next-best offer, customer churn, propensity to buy, and smart engagement.

Marketing
Discount targeting, email optimization, and lifetime client value, basket recommendation systems.

Human Resources
Medicare fraud detection, AI-assisted diagnosis, and drug demand forecasting.

Supply Chain
Predictive maintenance, process optimization, and demand forecasting.

Energy & Utilities
Power usage prediction, maintenance, and smart grid management.

Finance
Customer segmentation, credit risk, and credit card fraud detection.

Security
Activity monitoring, intrusion detection, and log analysis.

Data & Technology
Dynamic pricing, call center assistance, tourism forecasting, and self-driving cars.

Is Machine Learning enough to fulfill the AI promise for my business?

How should I operationalize AI in my organization?

How can I bridge my data science and operational decision teams together to improve my business automation?

94% of companies believe AI is key to competitive advantage

5% companies have extensively incorporated AI in their offerings or processes

What is Machine Learning?

Traditional Programming

Machine Learning

Machine Learning is…an approximation theorem

Computers that …
Learn without being explicitly programmed

CNN, RNN, …
Deep Learning
Supervised
Classification

K-Means, …
Clustering
Unsupervised
Regression

Why Machine Learning

- Good decision needs experts with knowledge and experience which have always been scarce resources
- Even experts need to spend lots of time on data analysis to create right rules which could be combination of hundreds of variables
- Rules need to be updated regularly to stay in sync with business requirement
- Increasing mass of data and lower compute & storage prices have significantly decreased prediction cost

Why ML alone is not enough?

- ✓ Machine Learning gives predictions

  but how does your organization choose to use them, with what risk level?

- ✓ Machine Learning is good at *reproducing the past*

  but business usually want to *influence the future*, need prescriptive logic to impose a business strategy

- ✓ Machine Learning needs good quality data and training

  but business usually needs agility to quickly change strategy and adapt to ever-changing regulations, for which no data exist yet.

- ✓ Machine Learning is a black box

  but business requires transparency and explainability

- ✓ Machine Learning requires deep skills

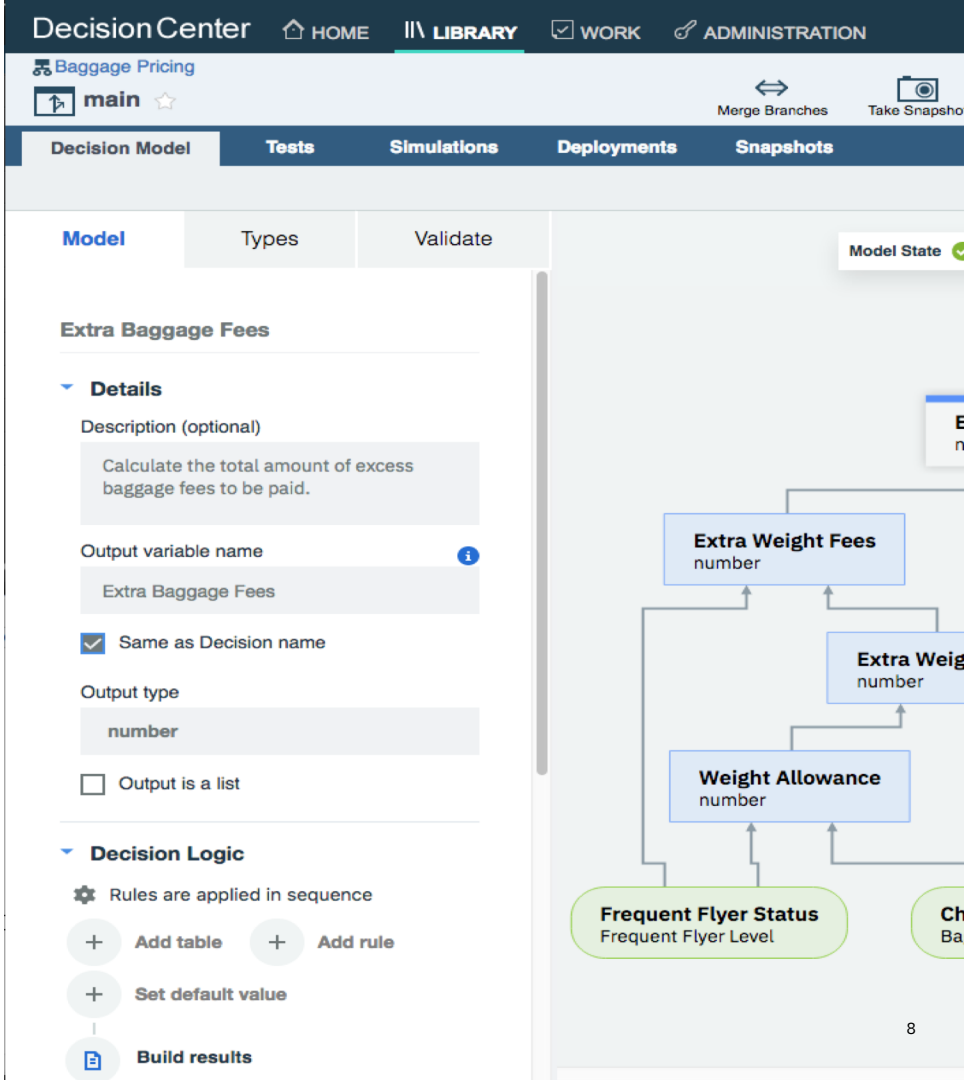
  to manage data quality, find the right predicting features and tune the models to deliver non-biased and good quality predictions.
  A lot of knowledge is already in your SME's heads.

Use ML to get insights from your historical data, but need to control how insights are turned into action or decision.

What are Business Rules

Business experts can

- Declare new decision services based on textual if then else rules and decision tables
- Model data, decision diagrams and logic iteratively
- Validate what's been authored, declared rules being evaluated by an inference engine
- Test, Simulate, Manage, & Govern
- Deploy!

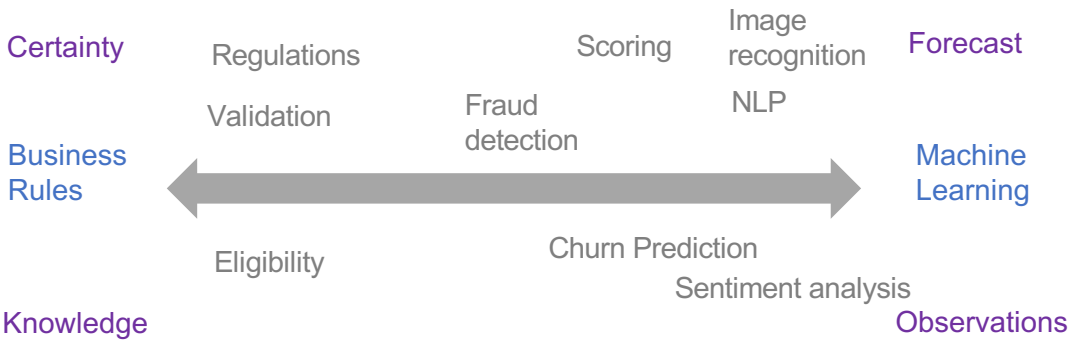


ML and Rules have sweet spots

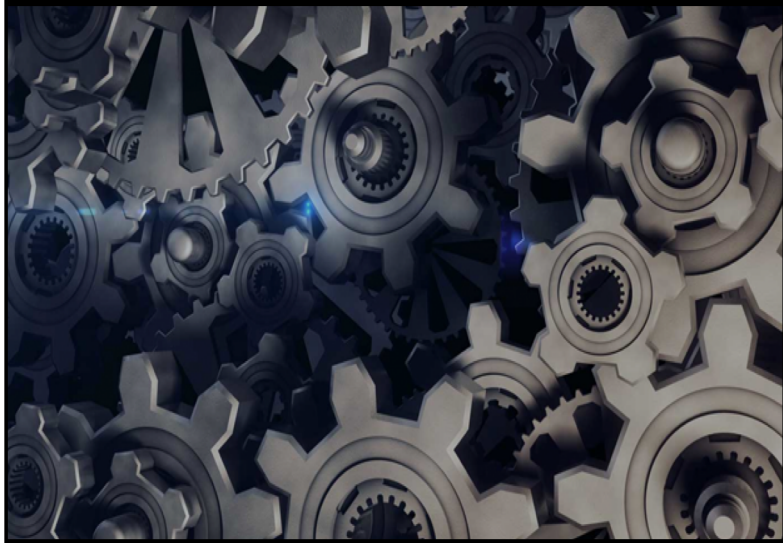
	Perceiving	Learning	Abstracting	Reasoning
Machine Learning				
Rules Systems				

Source: DARPA perspective on IA, John Launchbury

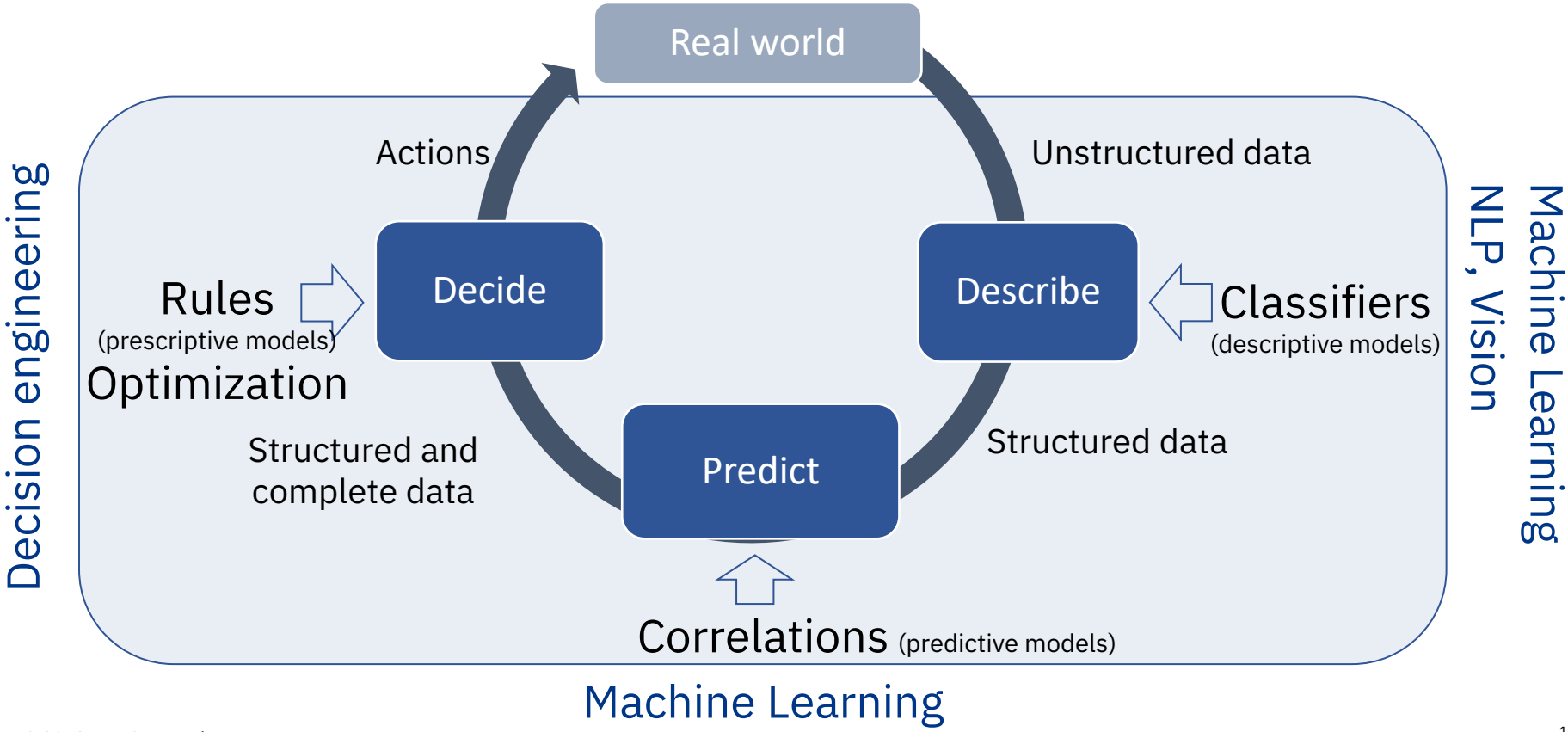
https://www.youtube.com/watch?v=-O01G3tSYpU



Wrapping predictive scores with rules is the way to fulfill the need of explainable AI (XAI) in business operations



Cognitive Computing and Decisions



Mixing Prescriptive and predictive models in Decisions

Prescript

If the client is at least 18 years old and his risk score is less than 20% then accept the application

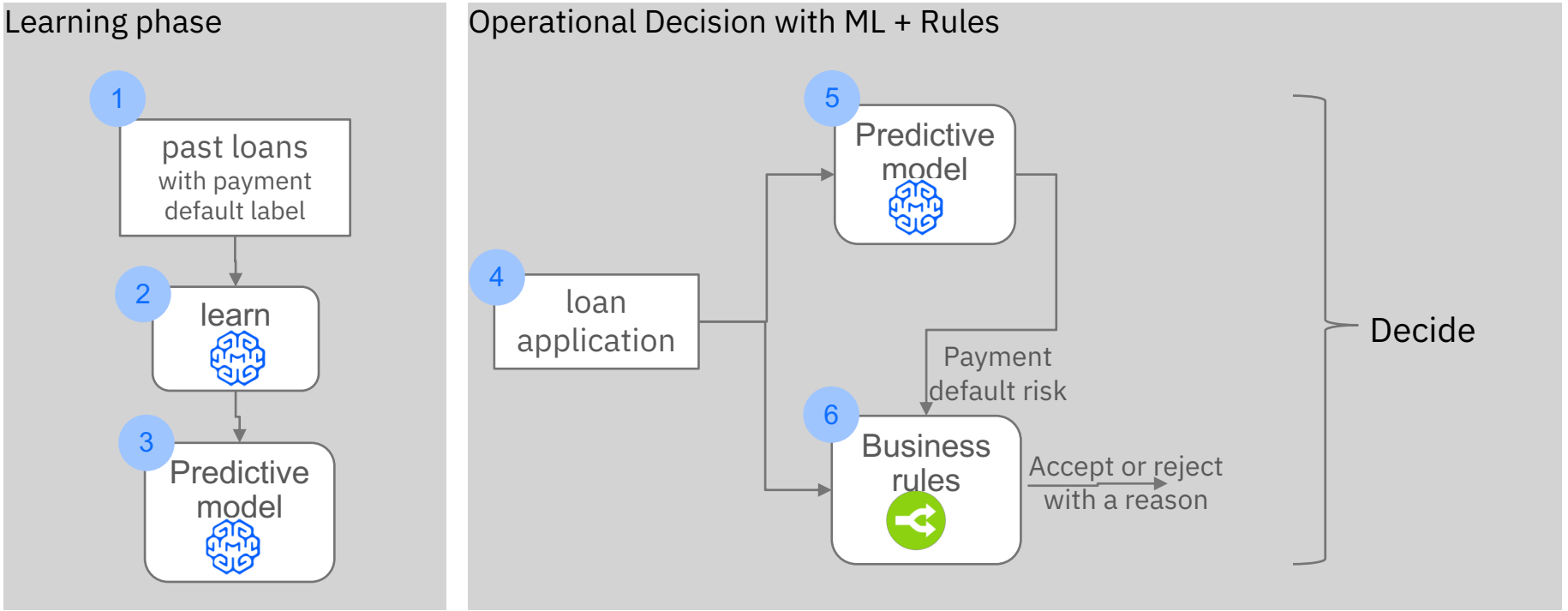
ML model

Predict

Loan validation by combining ML with Rules

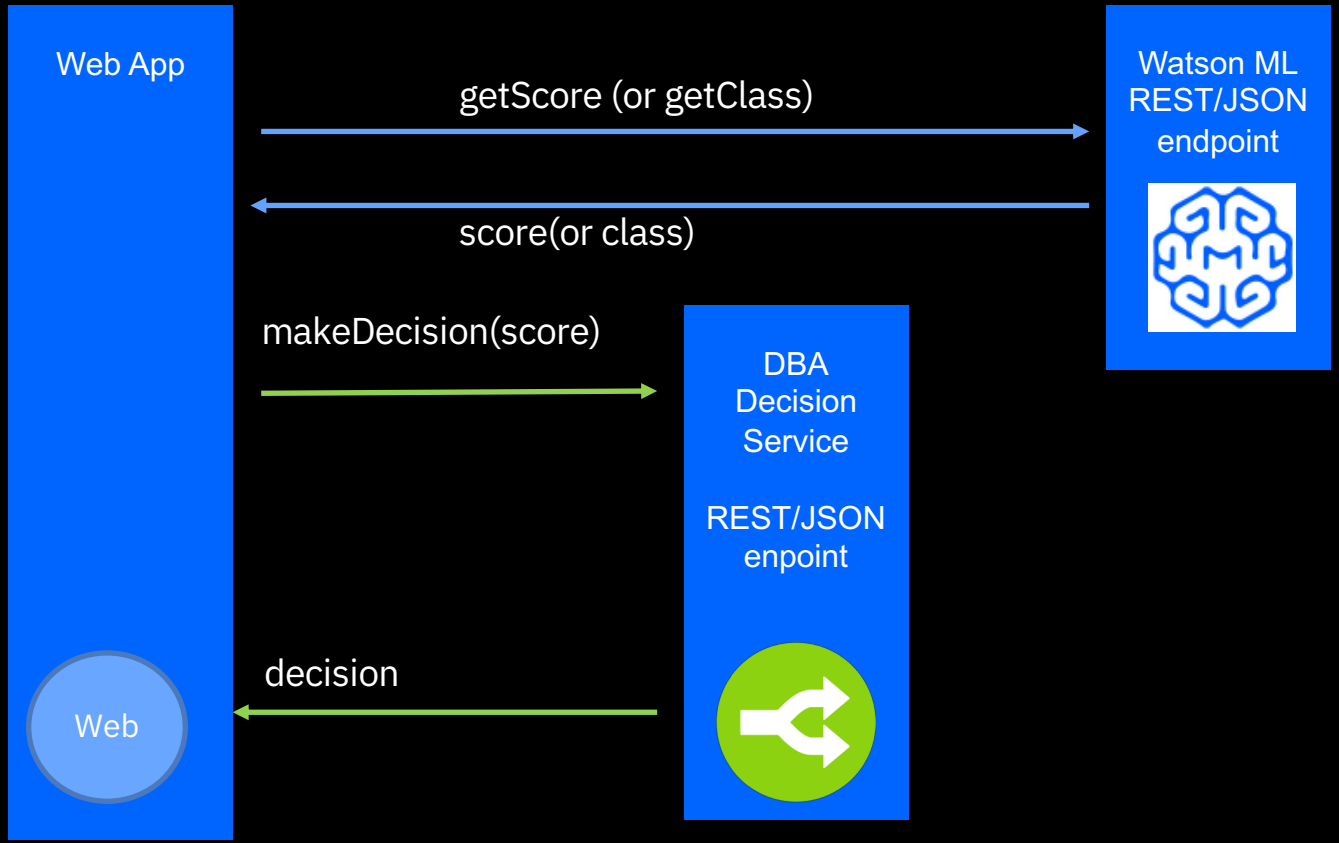
Watson ML + DBA Decision service

Notebook



An Online Web Architecture with Digital Business Automation

- REST/JSON syle integration
- Microservice friendly
- Load balanced for HA and scalability
- Supported in K8S/Docker, distribute and z/OS
- Rule execution in ms



AI in Decisions: IBM Vision

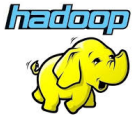
Infusing Intelligence into Automation

Directions

- Bridge ML and Operational Decision Management together
- Bring a business capsule on the top of ML models
  - Bias detection -> Watson OpenScale
  - Explanation -> Watson OpenScale
  - Business Data Model
  - Guiderails on KPIs
  - Assertions
- Simulation
- Hybrid causal & probabilistic models

Take Aways

- Inject today Machine Learning in Operational Decisioning
  - Online & Offline systems
  - Cloud, distributed & z
  - Hadoop



- Use ML to get insights from your historical data, use Business Rules to control how insights are turned into decision and action

"Insight-To-Action Cycles Crucial For Digital Business"

Forrester

- Use declarative logic like Business Rules to define AI guiderails

Links

Build Scala Apps that Combine IBM ODM Decisions, Big Data and Machine Learning

https://developer.ibm.com/odm/docs/solutions/odm-and-analytics/build-ibm-operational-decision-manager-apps-scala-combine-rule-based-decisions-big-data-machine-learning-analytics/

ODM Business Rules with Apache Spark Batch operations

https://developer.ibm.com/odm/docs/solutions/odm-and-analytics/odm-business-rules-with-apache-spark-batch-operations/

ODM public Github

https://github.com/ODMDev/decisions-on-spark

ODM Dev Docker image

https://hub.docker.com/r/ibmcom/odm/

Think Big with Decision Composer on IBM Cloud

https://github.com/ncrowther/DecisionComposerHadoopIntegration

ODM z/OS with MLz

http://www.redbooks.ibm.com/redpapers/pdfs/redp5502.pdf