TRAIL
TRUSTED AI LABS
BY DIGITALWALLONIA4.AI / SPW-RECHERCHE

HuMaLearn

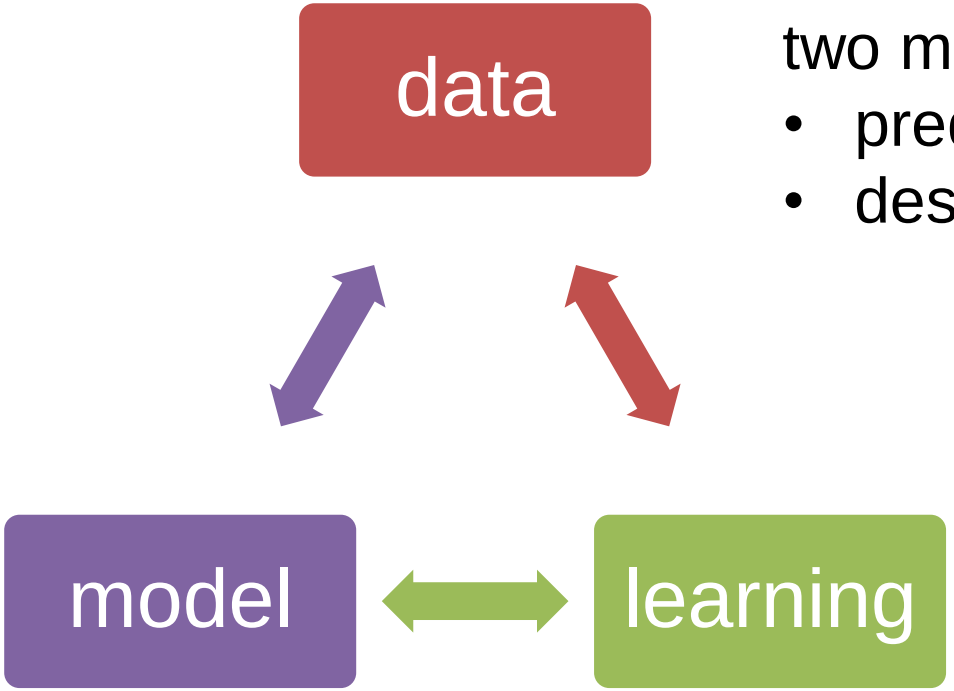
The Human-Centered Machine Learning (HuMaLearn) Team

Prof. Benoît Frénay

NADI / PReCISE / Faculté d'informatique

UNIVERSITÉ DE NAMUR
NADI Namur Digital Institute
precise
EOS THE EXCELLENCE OF SCIENCE
FRIA fnrs Fonds pour la formation à la recherche dans l'industrie et dans l'agriculture
Wallonie service public SPW

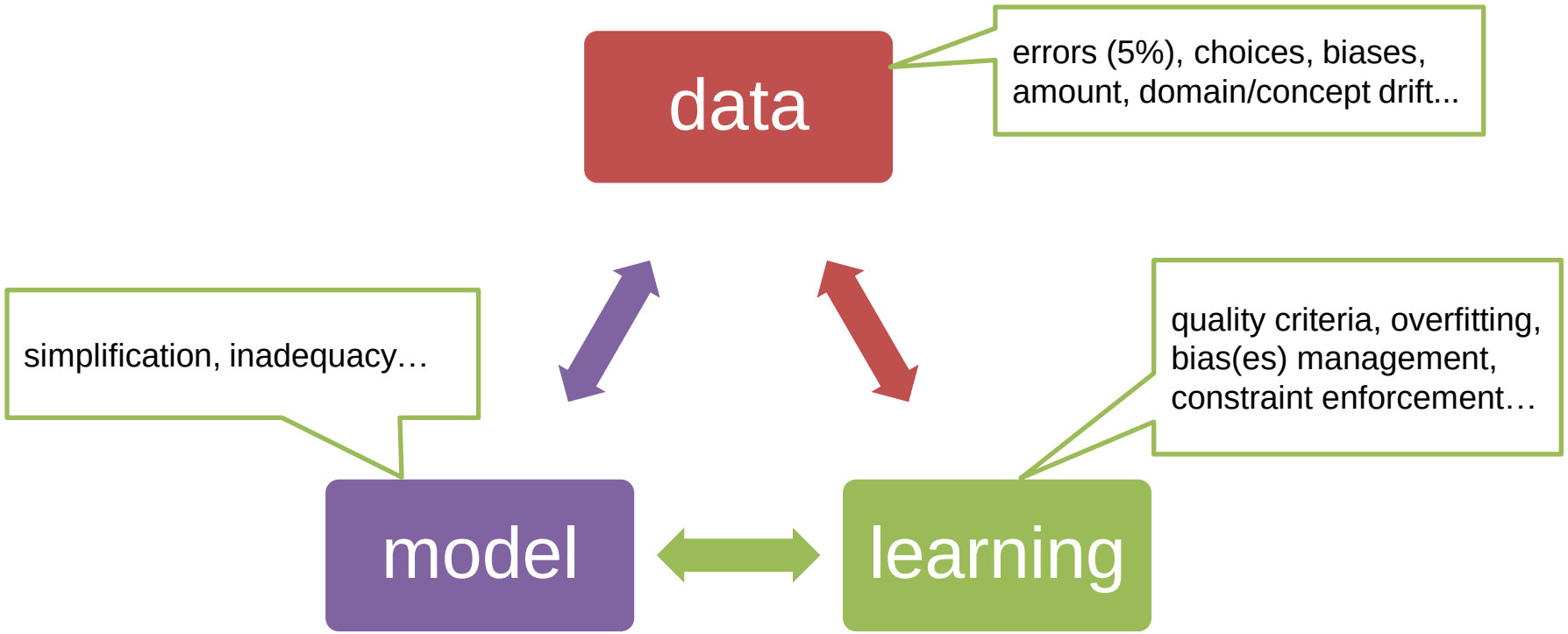
Machine Learning in a Nutshell

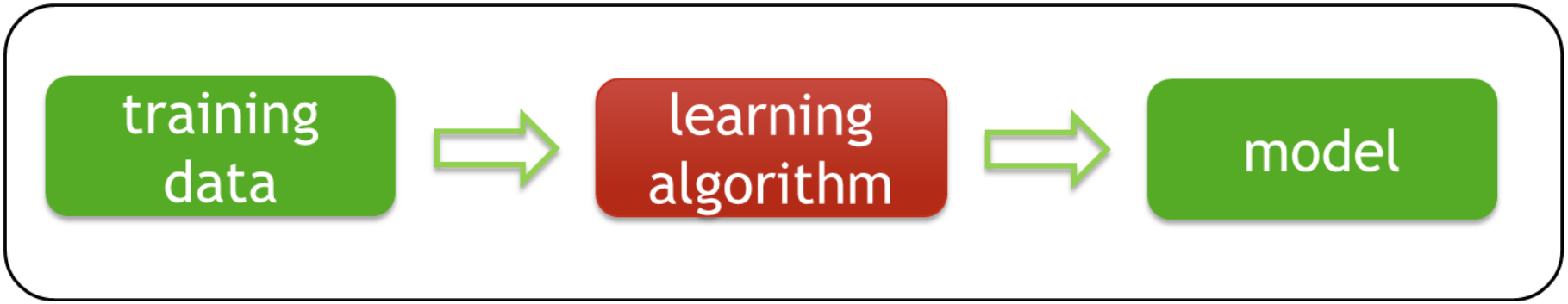


two main objectives

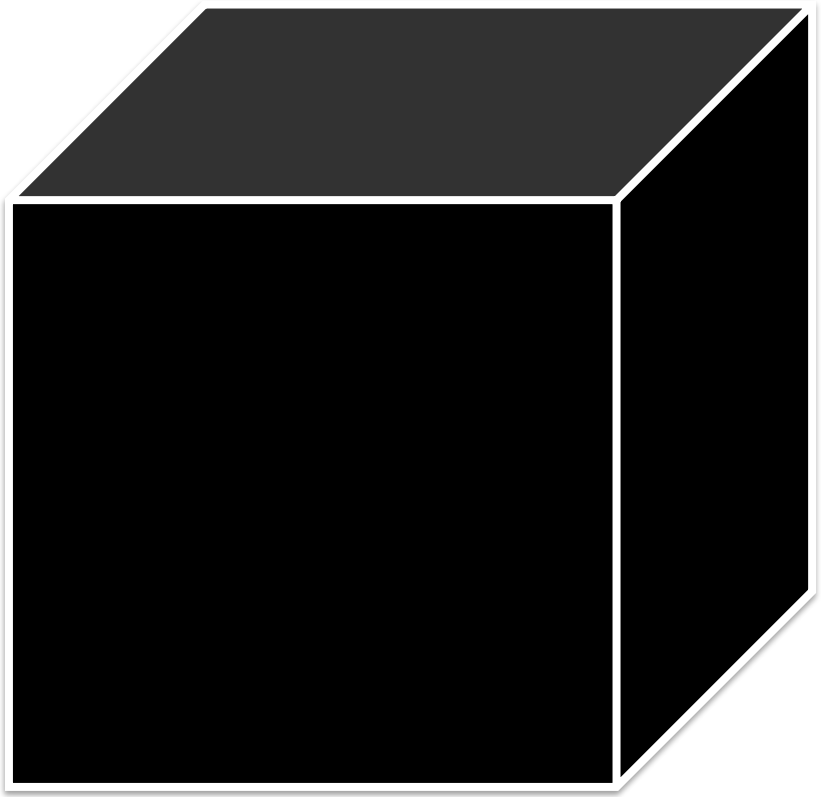
- prediction
- description

Data and Algorithms - What could Possibly Go Wrong?





Why it Matters to Get Users in the Loop



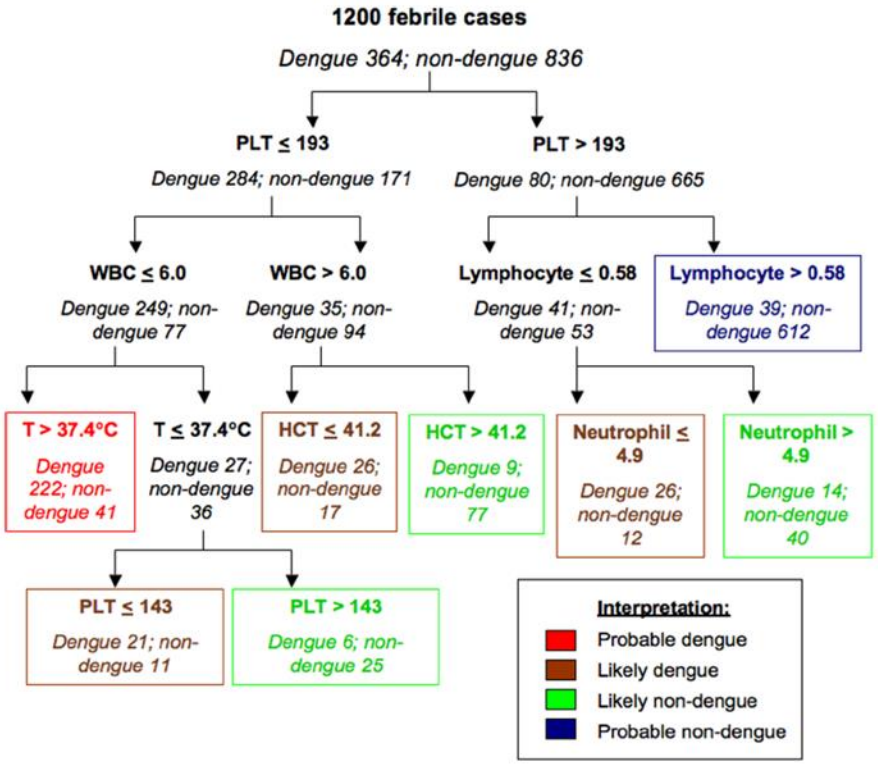
What do we need to trust models?

1. Understand how they work and how they make decisions.
2. Have some control on their internals and interact with them.
3. Set constraints and obtain guarantees on their behaviour.

In machine learning terms

1. Interpretability / explainability
2. Interactive machine learning
3. Constraint enforcement & model validation / checking / testing

Do Androids Dream of Interpretable Models?



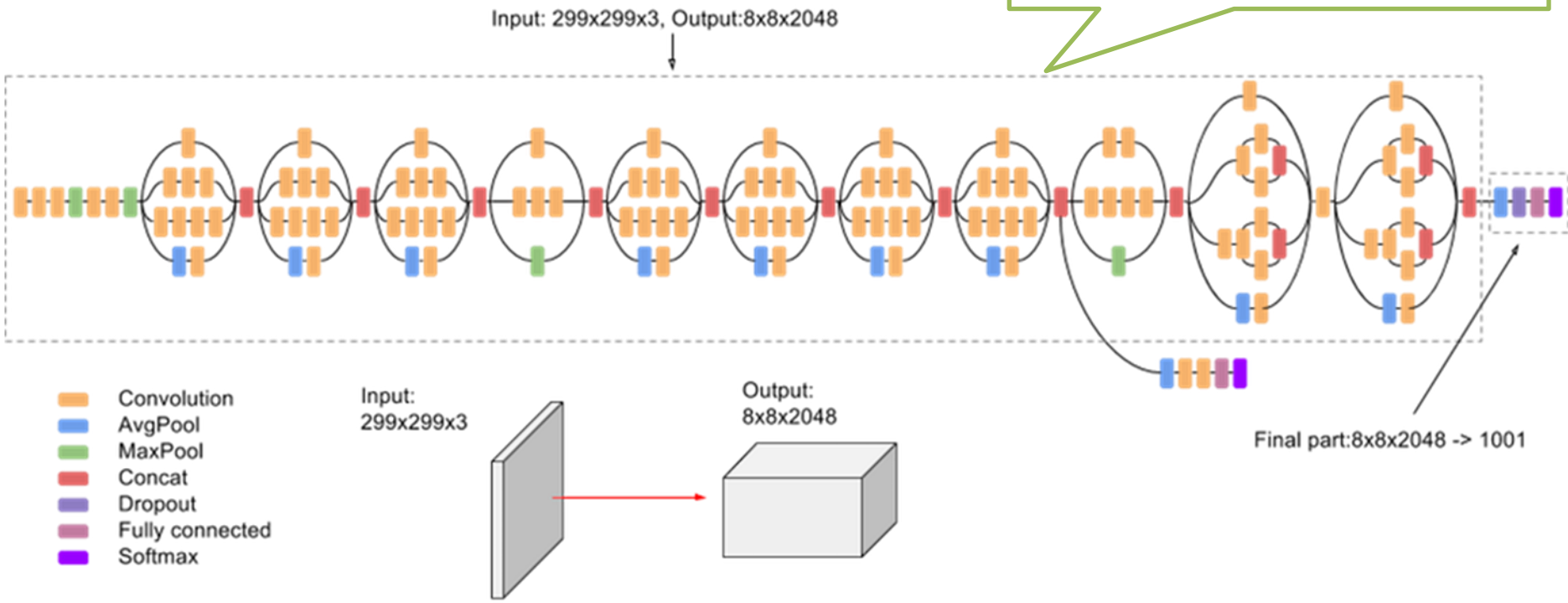
Decision Node Feature
Platelet count ≤ 193 X 1000/mm^3
White cell count ≤ 6.0 x 1000 cells/mm^3
Body temperature > 37.4°C
Platelet < 143 x 1000/mm^3
Hematocrit ≤ 41.2
Lymphocyte count ≤ 0.58 x 1000 cells/mm^3
Neutrophil count < 4.9 x 1000 cells/mm^3

Tanner L, Schreiber M, Low JGH, Ong A, Tolfvenstam T, et al. (2008) Decision Tree Algorithms Predict the Diagnosis and Outcome of Dengue Fever in the Early Phase of Illness. PLoS Negl Trop Dis 2(3): e196.

decision tree	linear model	SVM	deep learning
logical rules	feature coefficients	individual importance	millions of weights saliency maps

Do Androids Dream of Interpret

23 885 392 weights = 96 MB



https://cloud.google.com/tpu/docs/inception-v3-advanced

decision tree	linear model	SVM	deep learning
logical rules	feature coefficients	individual importance	millions of weights saliency maps

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Human-Centered Machine Learning (HuMaLearn) Team

Arnaud Bougaham

Industry 4.0 optimisation through ML & deep learning

Paterne Chokki

Open data for citizen participation

Valentin Delchevalerie

Constraints in deep learning

Julien Albert

Recommendation

Jérôme Fink

Deep learning for sign language recognition

Michael Lognoul

AI & Law

Sacha Corbugy

Post hoc explanations

Pierre Poitier

Recurrent neural networks with guarantees

Charline Dardenne

ML for astronomy

Mohammed El Adoui

Modelling of Sensors for I4.0

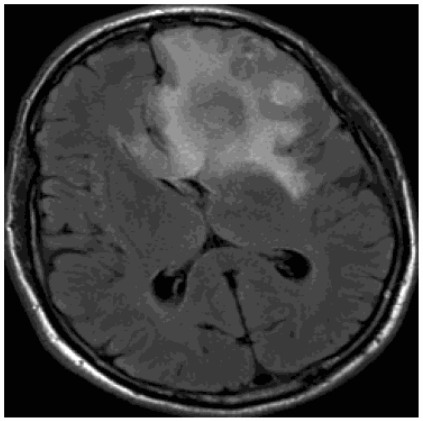
Armielle Ngaffo

Test of ML Systems

HuMaLearn: Towards Safe-to-use ML and DL

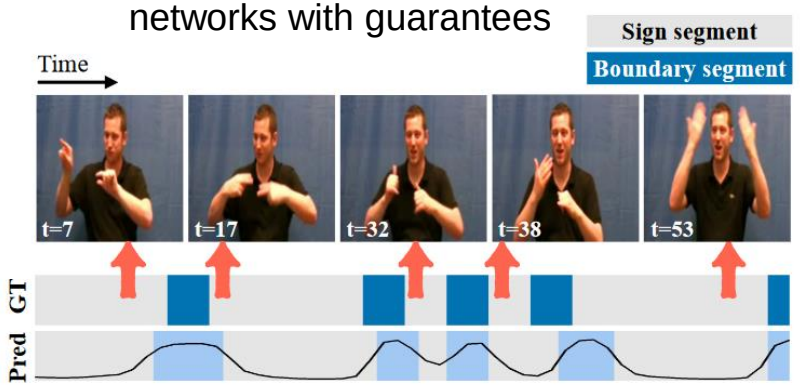
Valentin Delchevalerie

Constraints
in deep learning



Pierre Poitier

Recurrent neural
networks with guarantees



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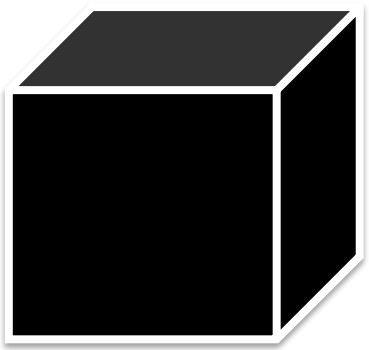
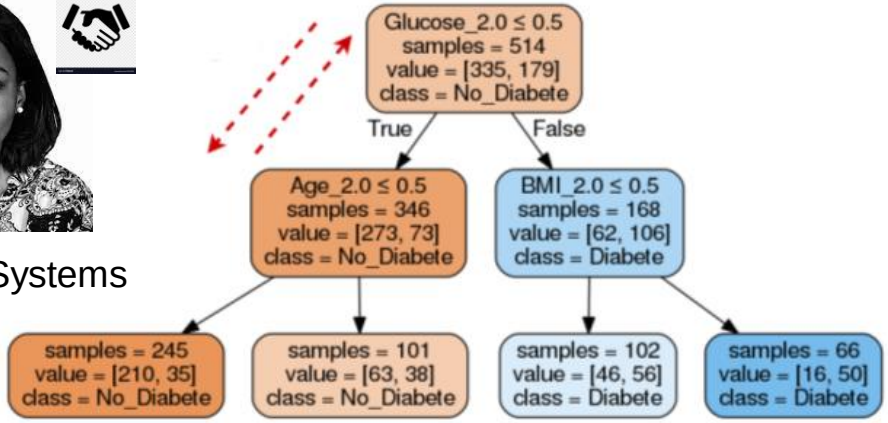
THE EXCELLENCE
OF SCIENCE

Armielle Ngaffo

Test of ML Systems





HuMaLearn: Putting Users at the Center of ML and DL

Julien Albert

Recommendation

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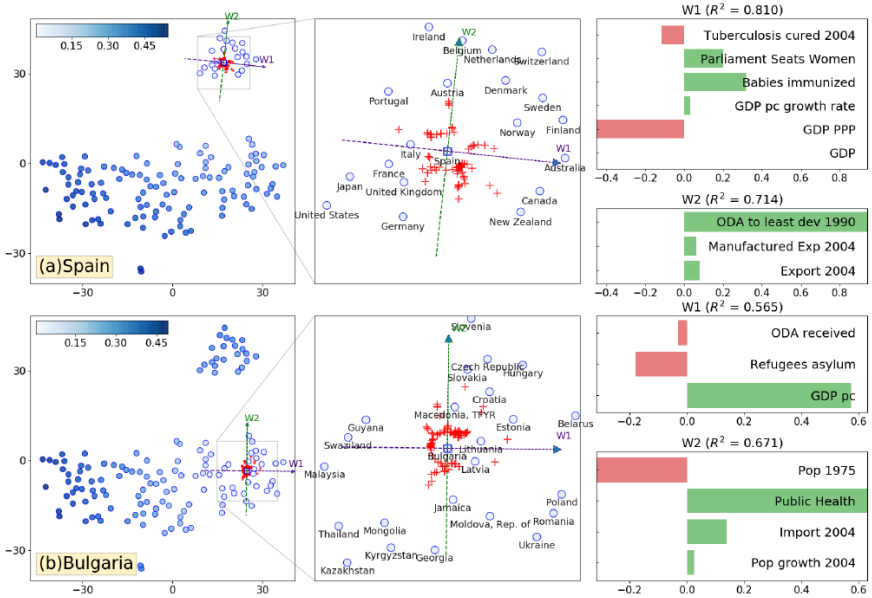
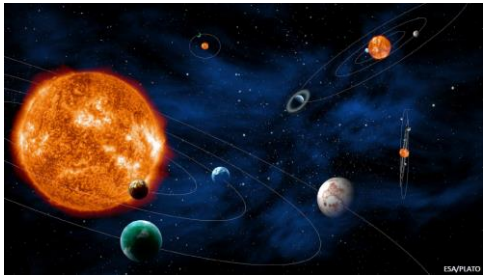


Sacha Corbugy

Post hoc explanations

HuMaLearn: Applying ML and DL in the Real World

Charline Dardenne



ML for astronomy

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Industry 4.0 optimisation
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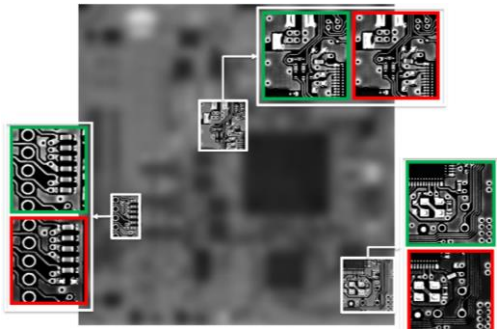

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VOCSens
Smart sensing solutions

Michael Lognoul

AI & Law

COUNCIL OF EUROPE
CONSEIL DE L'EUROPE

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In a few keywords:

1. machine leaning / deep learning / AI
2. interpretability / explainability
3. feedback / control / interactivity
4. constraints / guarantees / test
5. visualisation of complex data
6. inspiration from physics, math, etc.
7. applications in the real world

+ we care about the impact of AI

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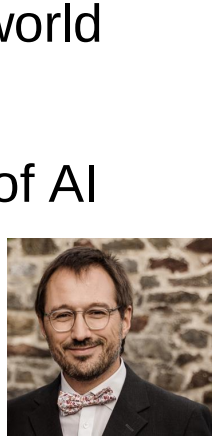

or visit our team (offices 405, 408 and 411)