



tellmeplus

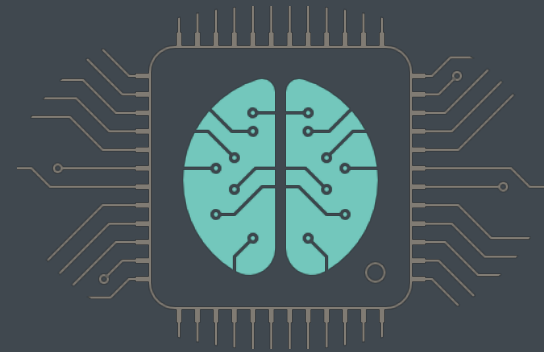
Predictive Objects



Automated PredictiveModels:
AI driving AI

Vision...

Artificial Intelligence
will drive
Artificial Intelligence



About...



Automated Embedded
Artificial Intelligence



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AI progress is not linear but **exponential**

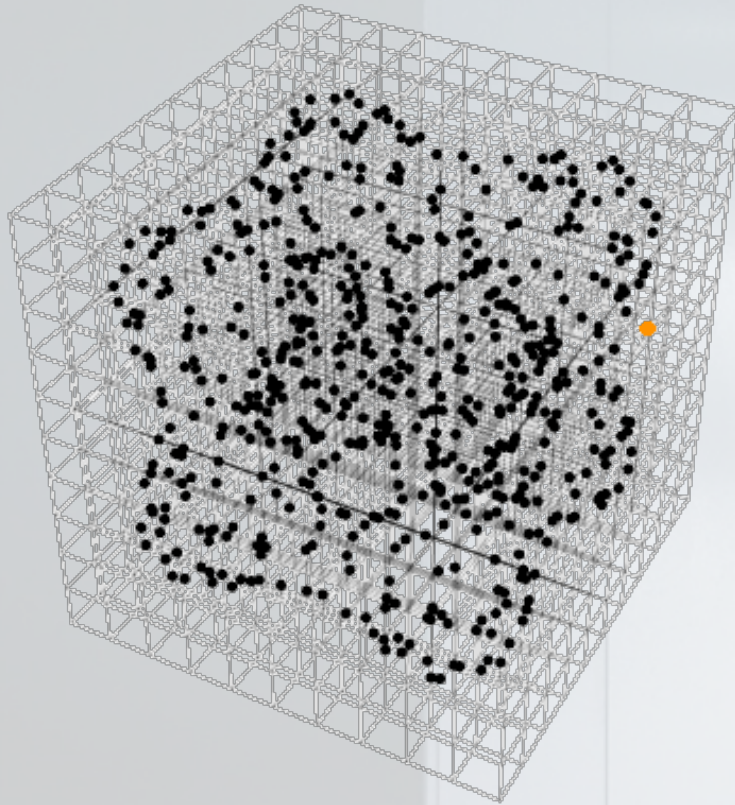
Deep learning – Neuronal network

VS

Symbolic Machine Learning



Analysis/Modeling Issues

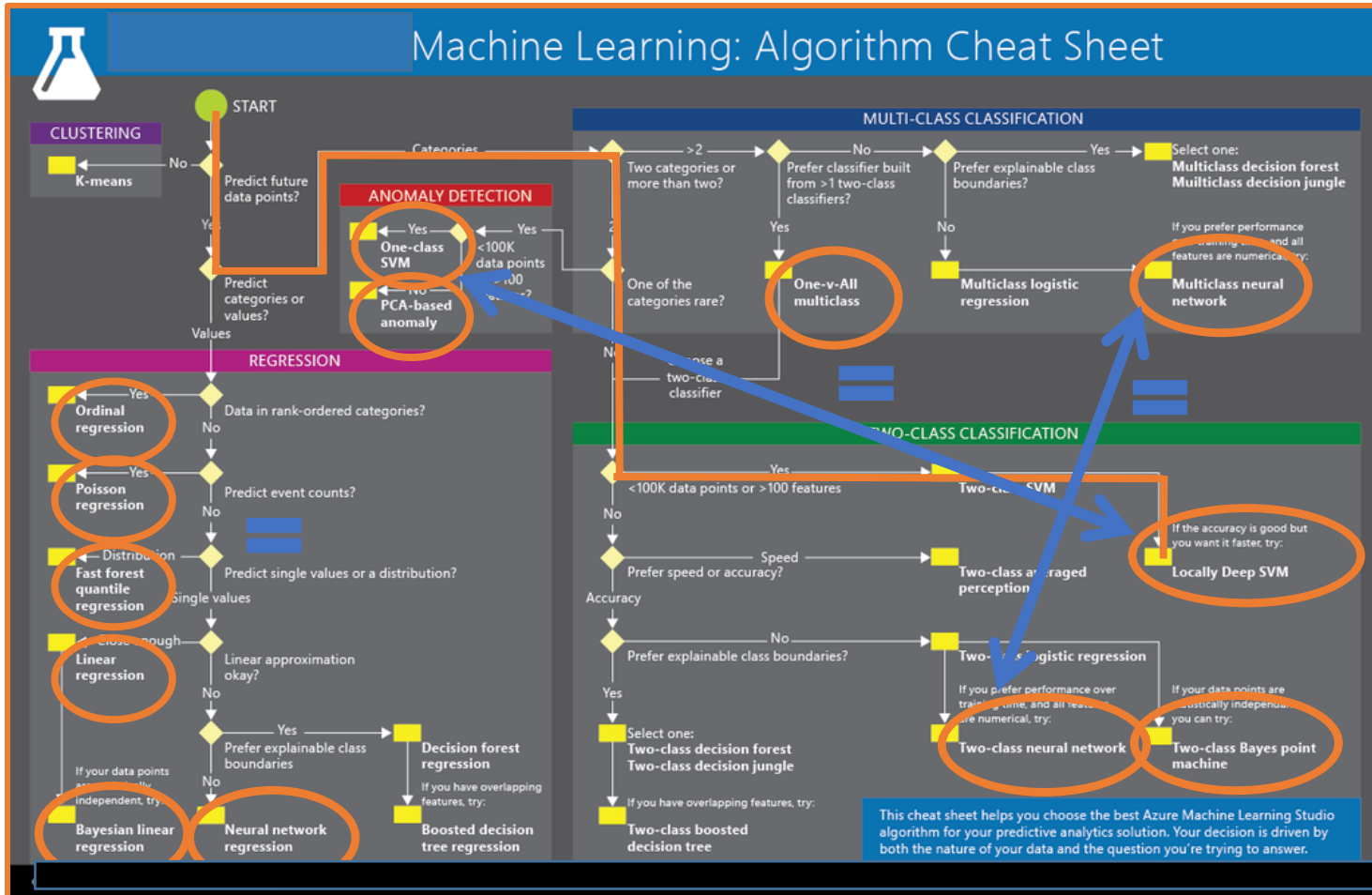


Modeling is a 3 dimensions exploration:

- Which parts of my dataset should I use?
- Which algorithm?
- What set of parameters should I use for the selected algorithm?

Walking through the cube is time consuming & you may never reach your goal...

What about Manual Tunning?



1 Question → 1 Algorithm

Ex : Customer Intelligence
Churn Usecase

- Predict future
- 2 classes
- More than 100 features

Mainly numerical techniques

Numerical Techniques

Advantages:

- + scales up
- + do not require tuning

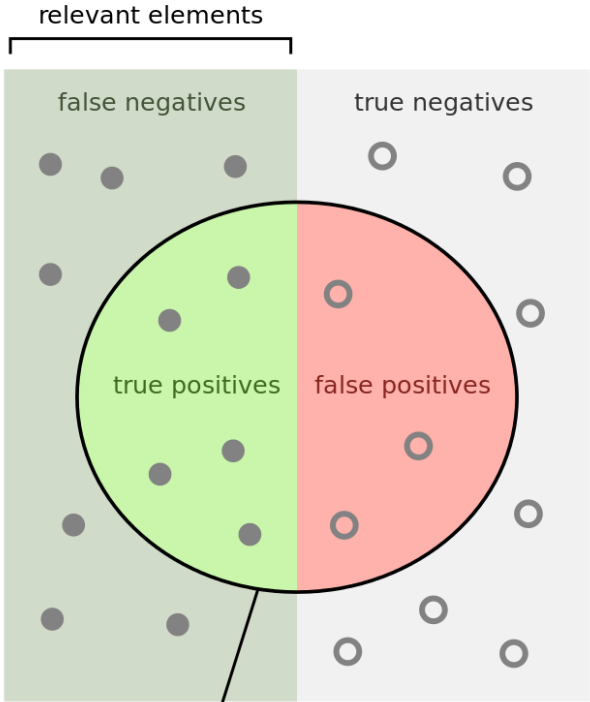
Drawbacks:

- outperformed by symbolic techniques on CI/M2M usecase
- meaningless predictions

How to explain a deep neural network?



Objective function

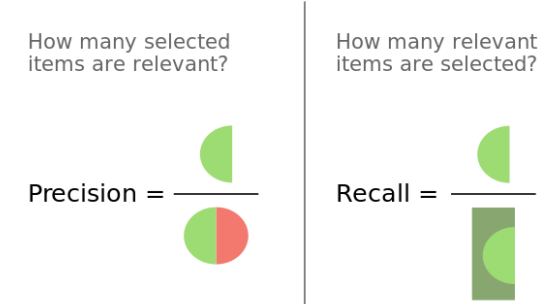


Ex1: Daily maintenance:
 « what are top priority list of machines my ingeneers have to visit today ? »

Ex2: Long term maintenance:
 « give me all the machines which may require change component XYZ (so that i order the right stock) »

Existing approaches:
 A posteriori threshold tuning

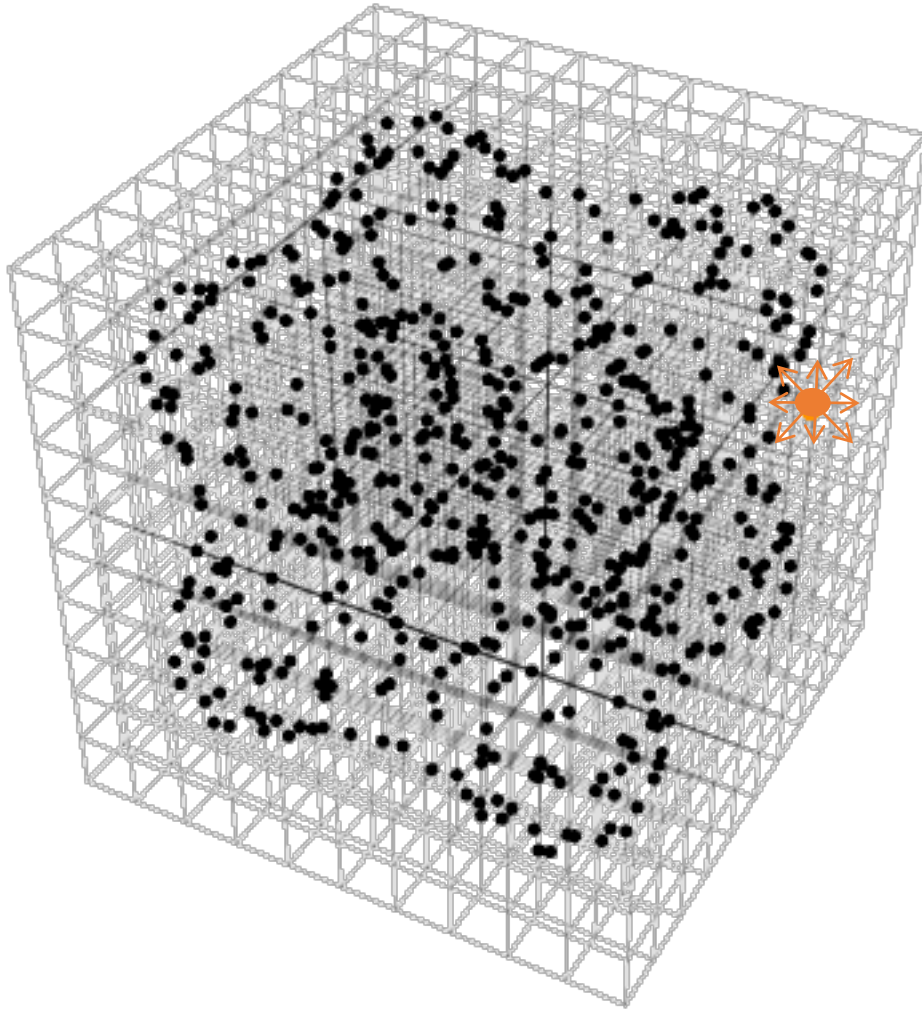
Our approach:
 Declarative objective function as an input



Cost matrix

If model predicts 1	and value is 1	the gain is	1	×	11	=	11.00
	but value is 0	the gain is	-0,3	×	29	=	-8.70
Model predicts 0	and value is 0	the gain is	0	×	19929	=	0.00
	but value is 1	the gain is	0	×	119	=	0.00
Average gain per record			0.00	×	20088	=	2.30

Meta Active Machine Learning



1 Question \longrightarrow n Algorithms
+ Obj function

1 Algorithm



+

A set of parameters



Exploitation

...



Exploration

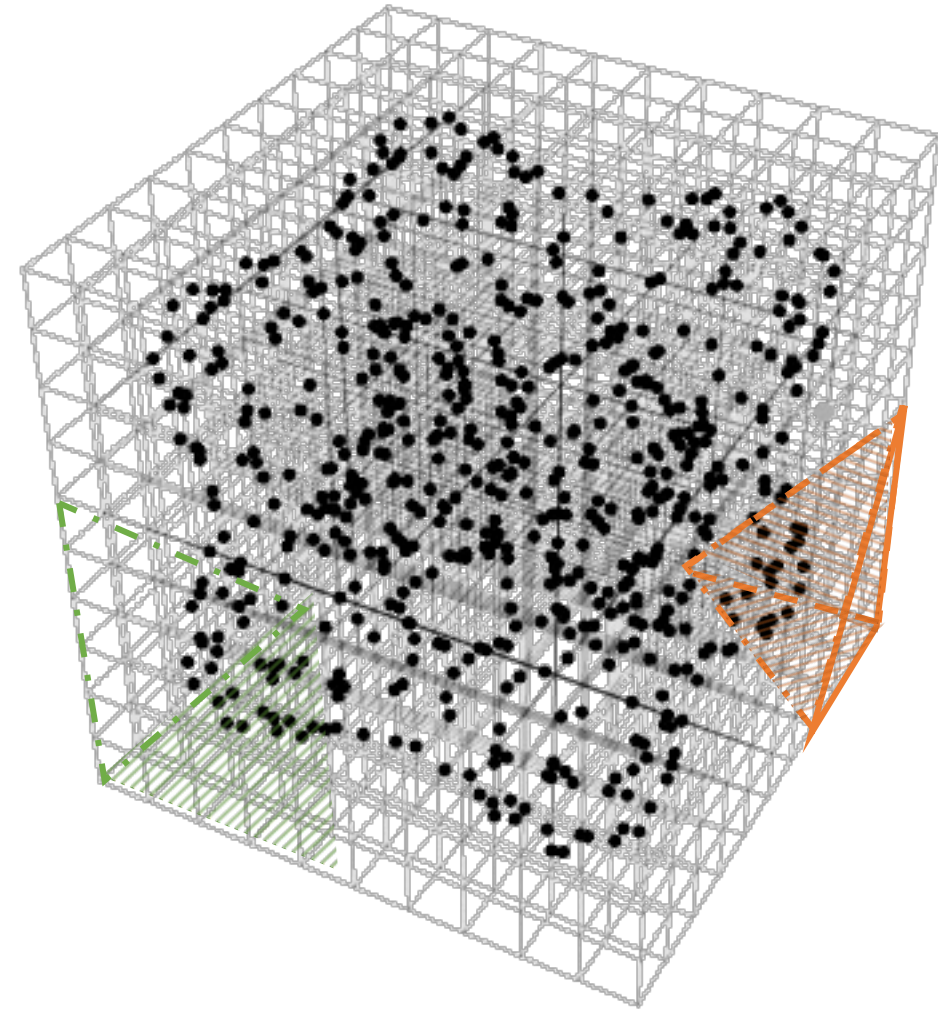
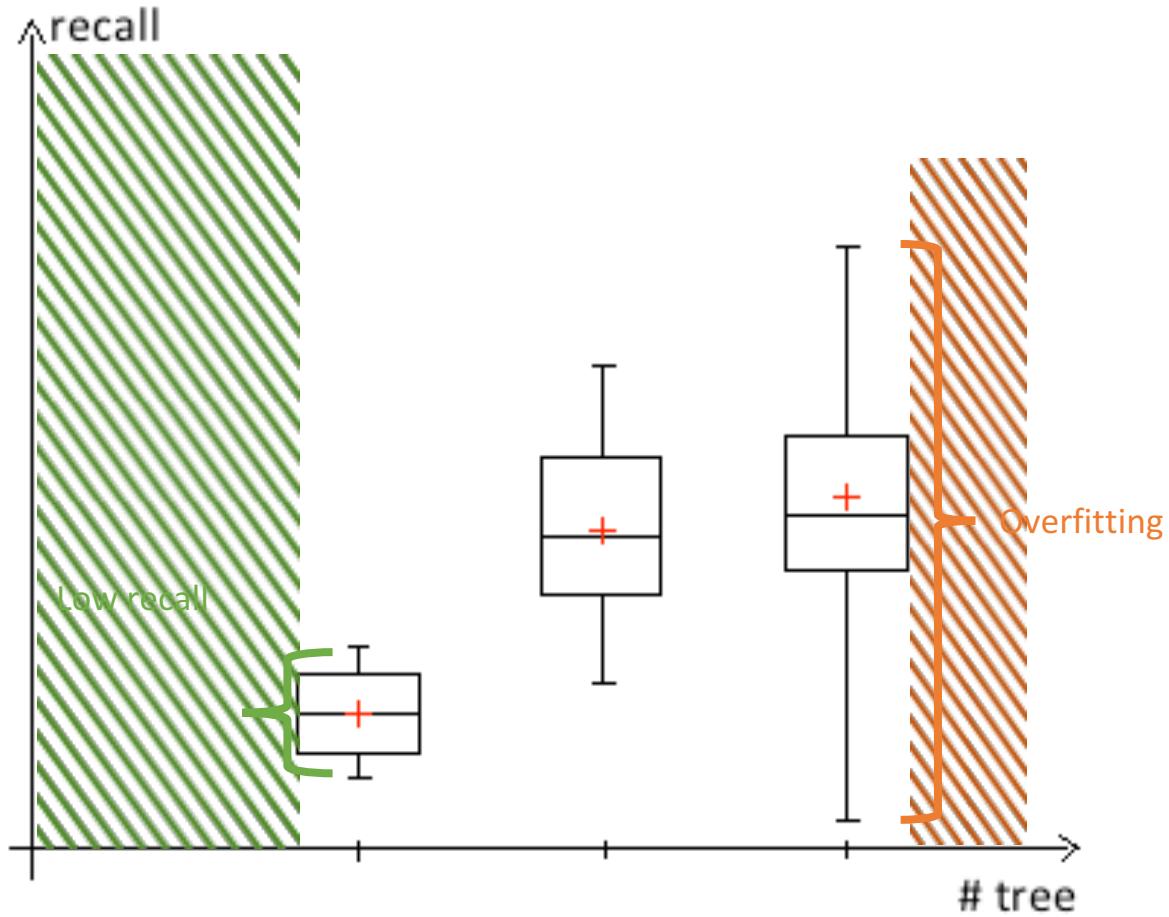
Automated choice of algorithm

Approach is now shared with others actors (Weka, DSS,)

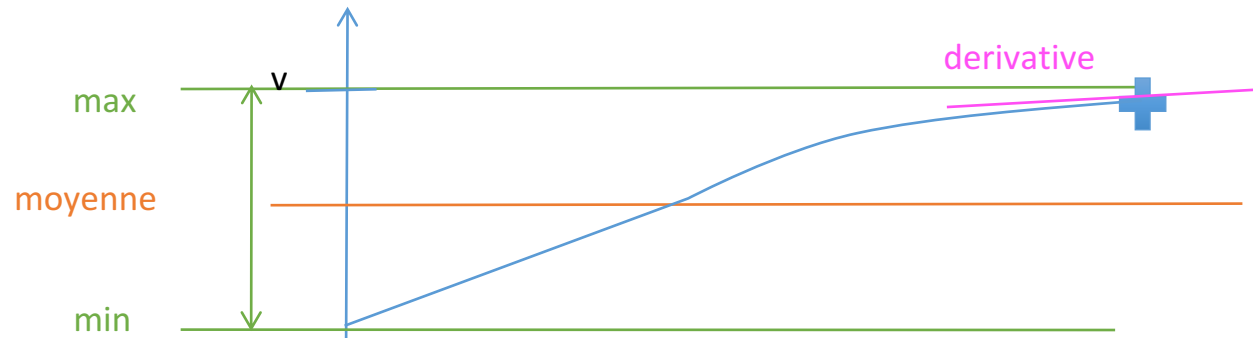
Too many configurations to be tested
(even in a HPC Environnement)

Mandatory to prune the search space (in a Constraint Programming Way)

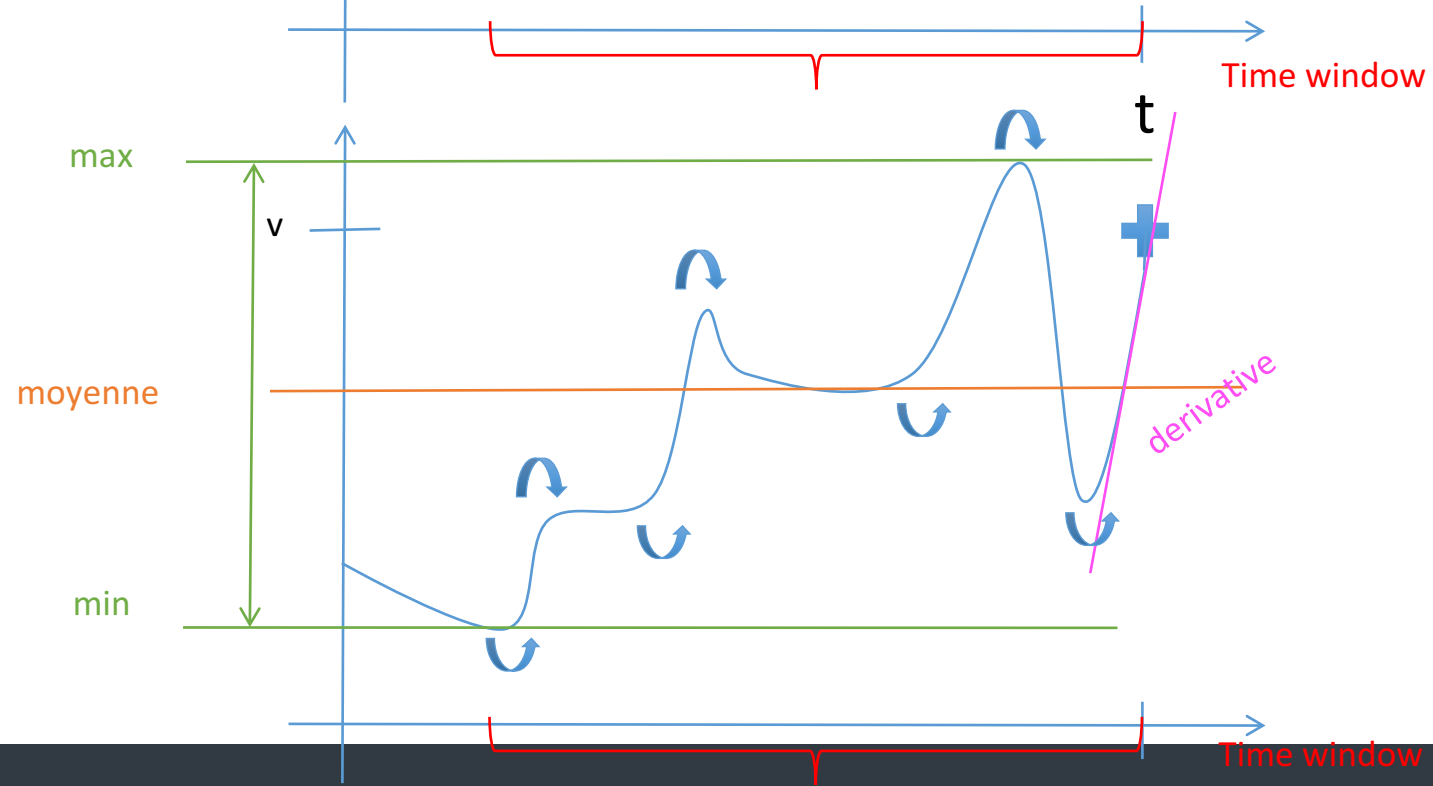
Pruning the Search Space



Sequence Learning

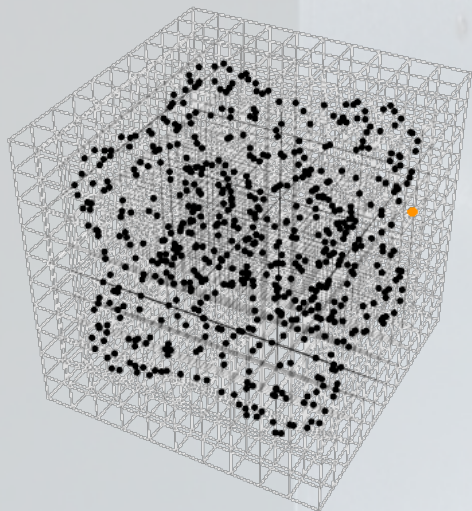


Sensor #1



Sensor #2

t



Analysis/Modeling Solution

Meta Active Machine Learning engine will

- drive you through the cube
- give you the optimal model for prediction accuracy



Why **embedded** is so critical?

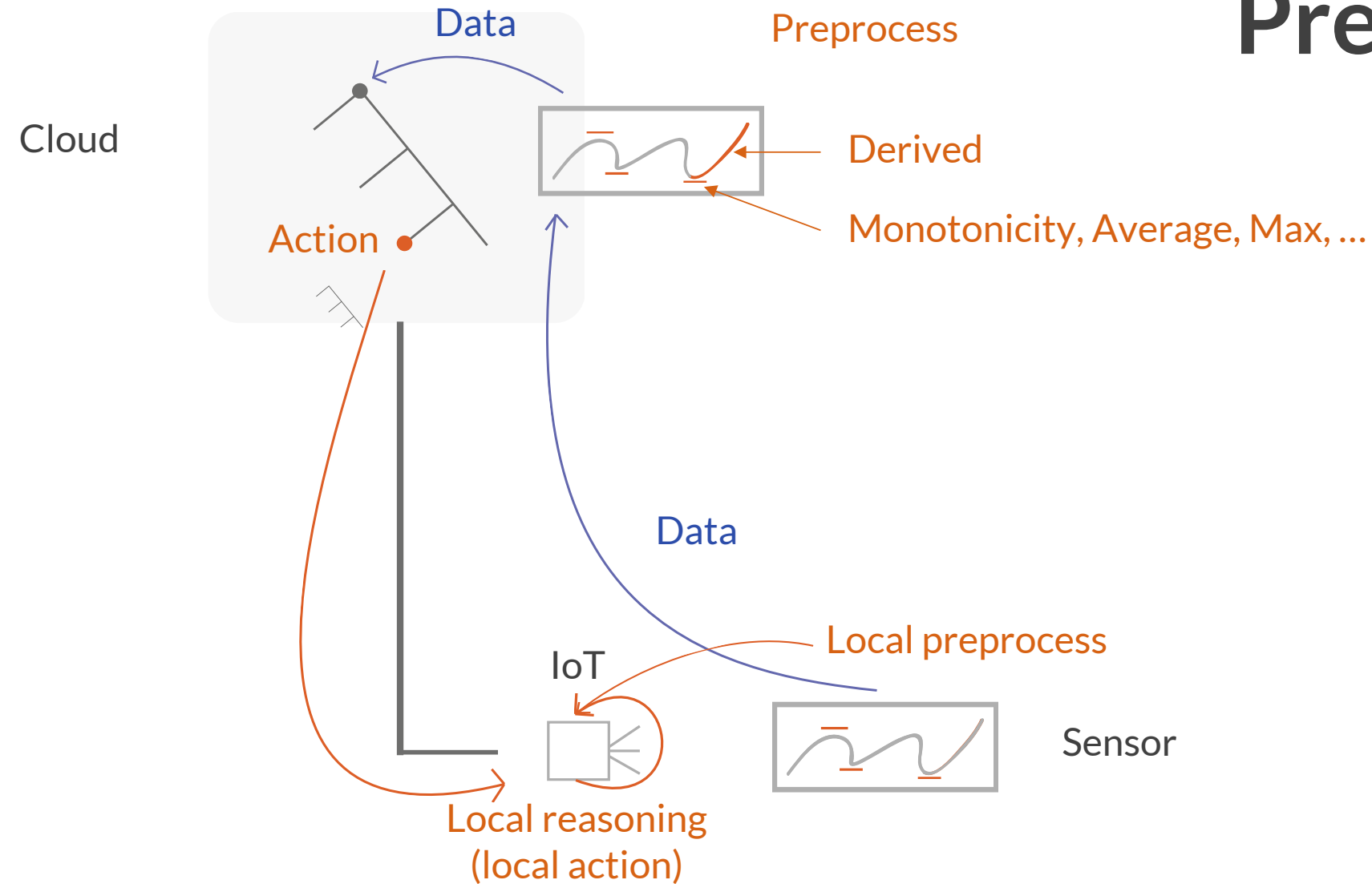
Fully Cloud ML

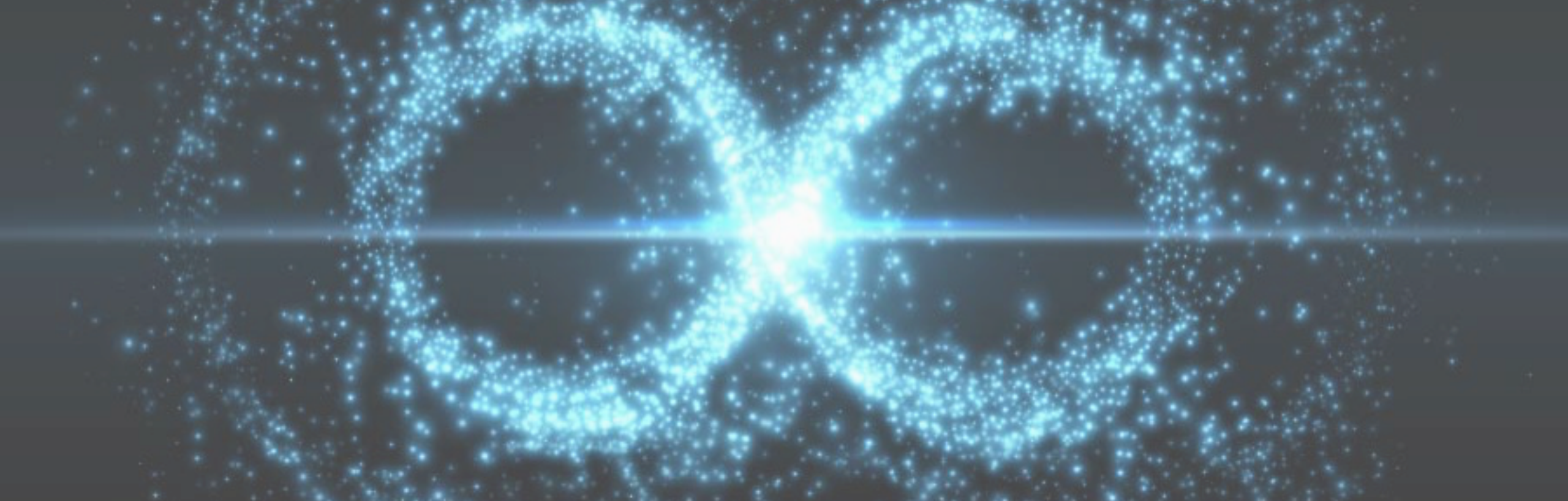
Fully decentralized ML

- Latency in decision making
- No decision when not connected
- Privacy issues
- Knowledge sharing
- HPC/ Cloud computing capacities



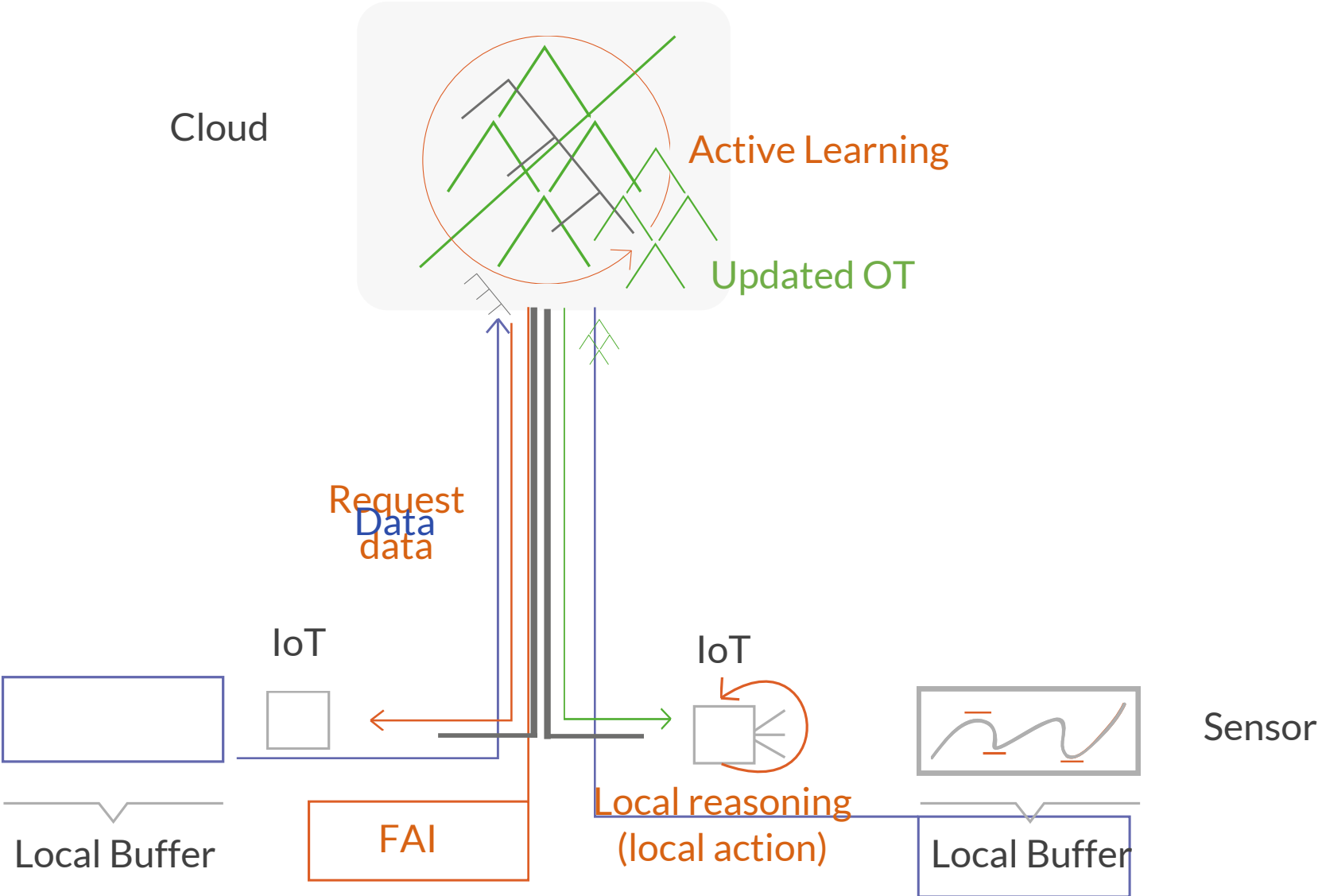
Embedded Predictive Objects





What about
continuous learning?

Continuous Learning



Fail 1 : No effect

Fail 2 : Poor confidence



Thank you !

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