Machine learning: basi e sue applicazioni

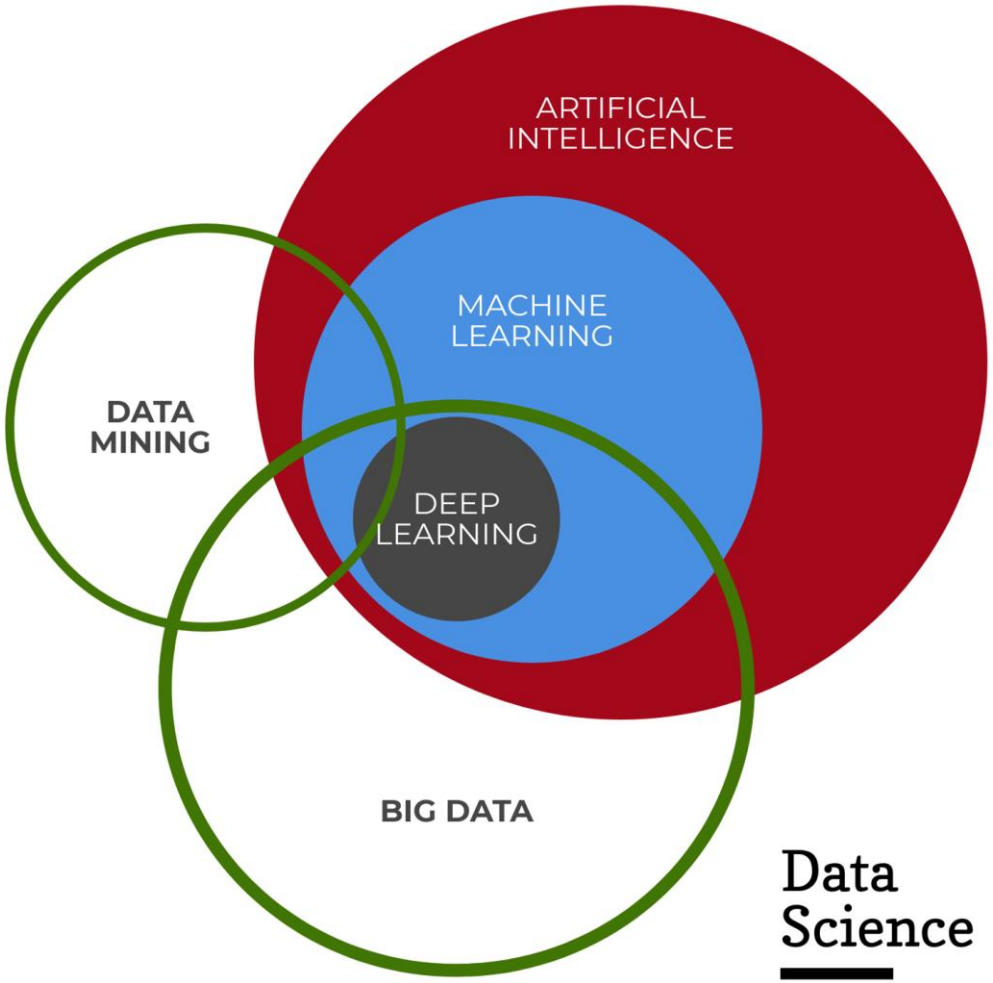
Christian Salvatore
Scuola Universitaria Superiore IUSS Pavia

christian.salvatore@iusspavia.it

Machine learning

Machine learning is the subfield of computer science that gives "**computers the ability to learn without being explicitly programmed**"

Arthur Samuel, 1959



Machine learning

How is ML different from classical statistics?

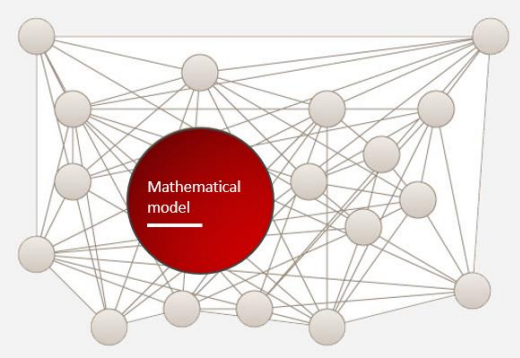
*It is focused on **classification** rather than inference*

Distribution-free approach

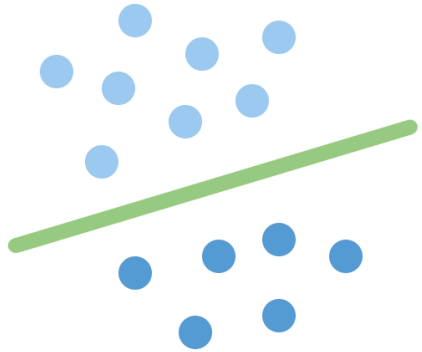
High-dimensional problems

Algorithmic and computational aspects play a central role

Machine learning



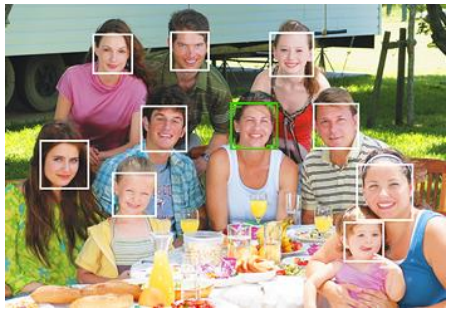
Designing mathematical models able to…



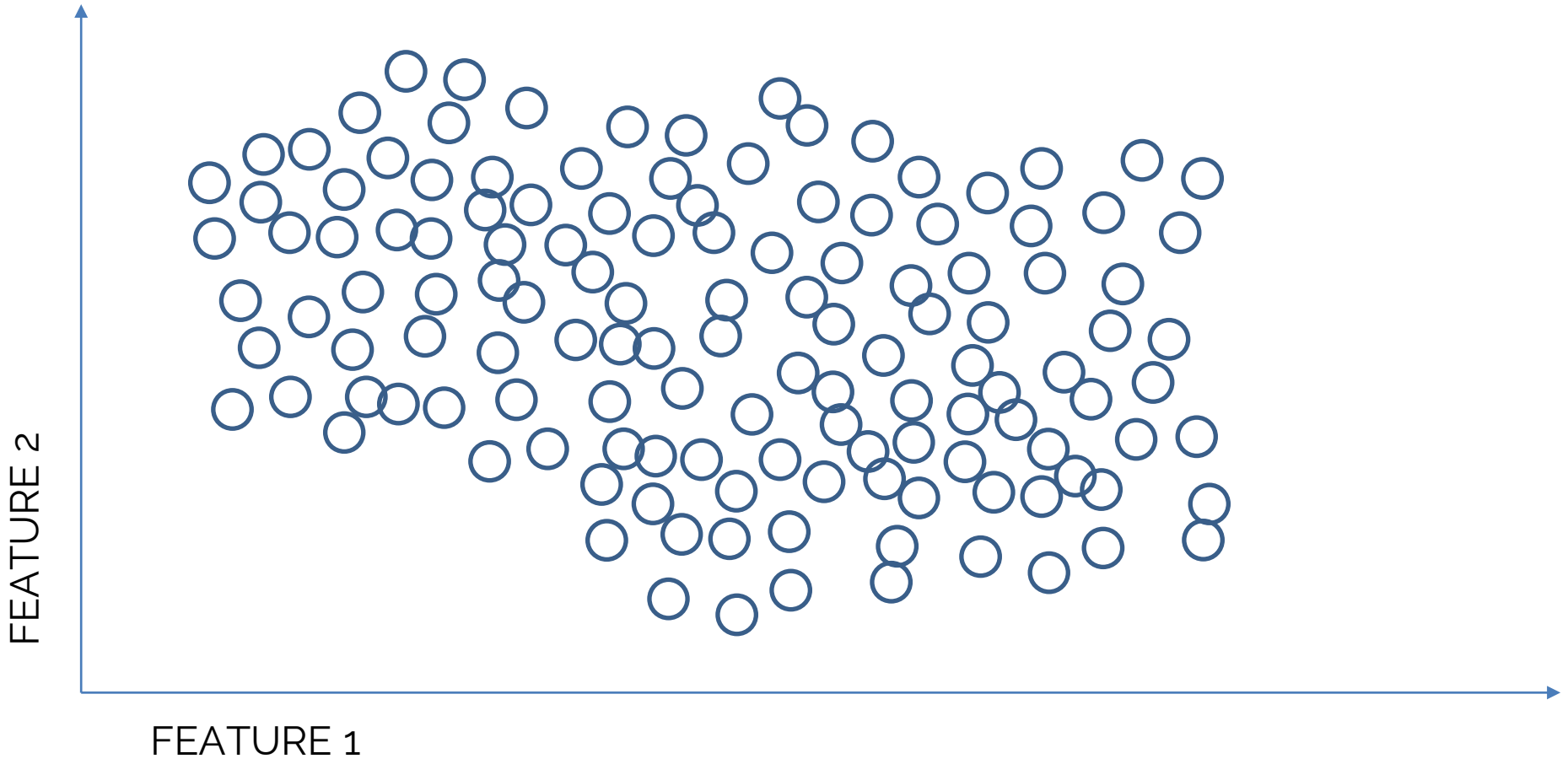
1. identify hidden patterns in data
2. handle and summarize a great quantity of data into a model
3. use that model to perform automatic classification

Machine learning

Training data		Target variable
From the trend registered during the last years	PREDICT	Future market performance
From a set of images	DETECT	Faces (in new images)



Classification



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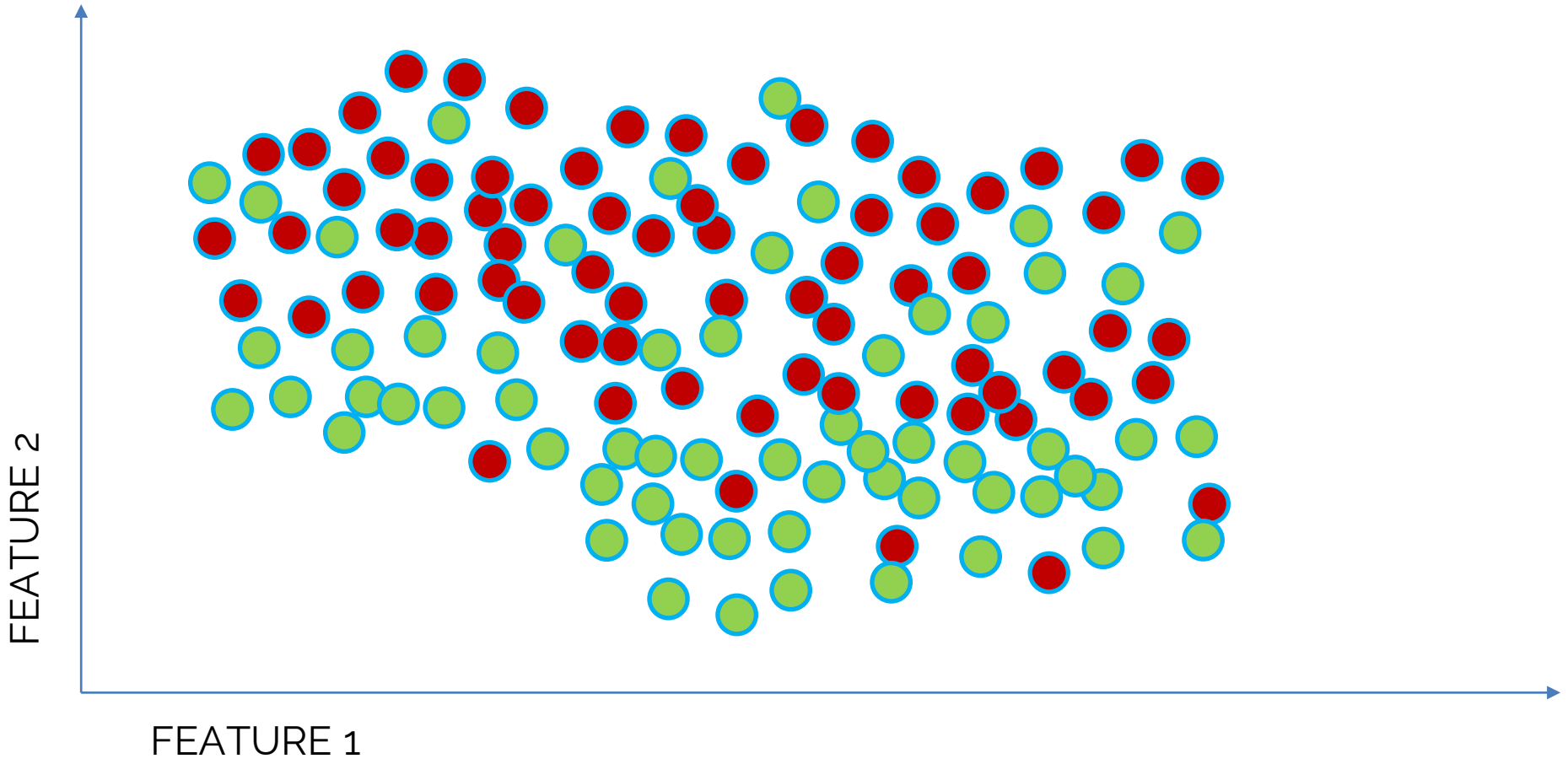

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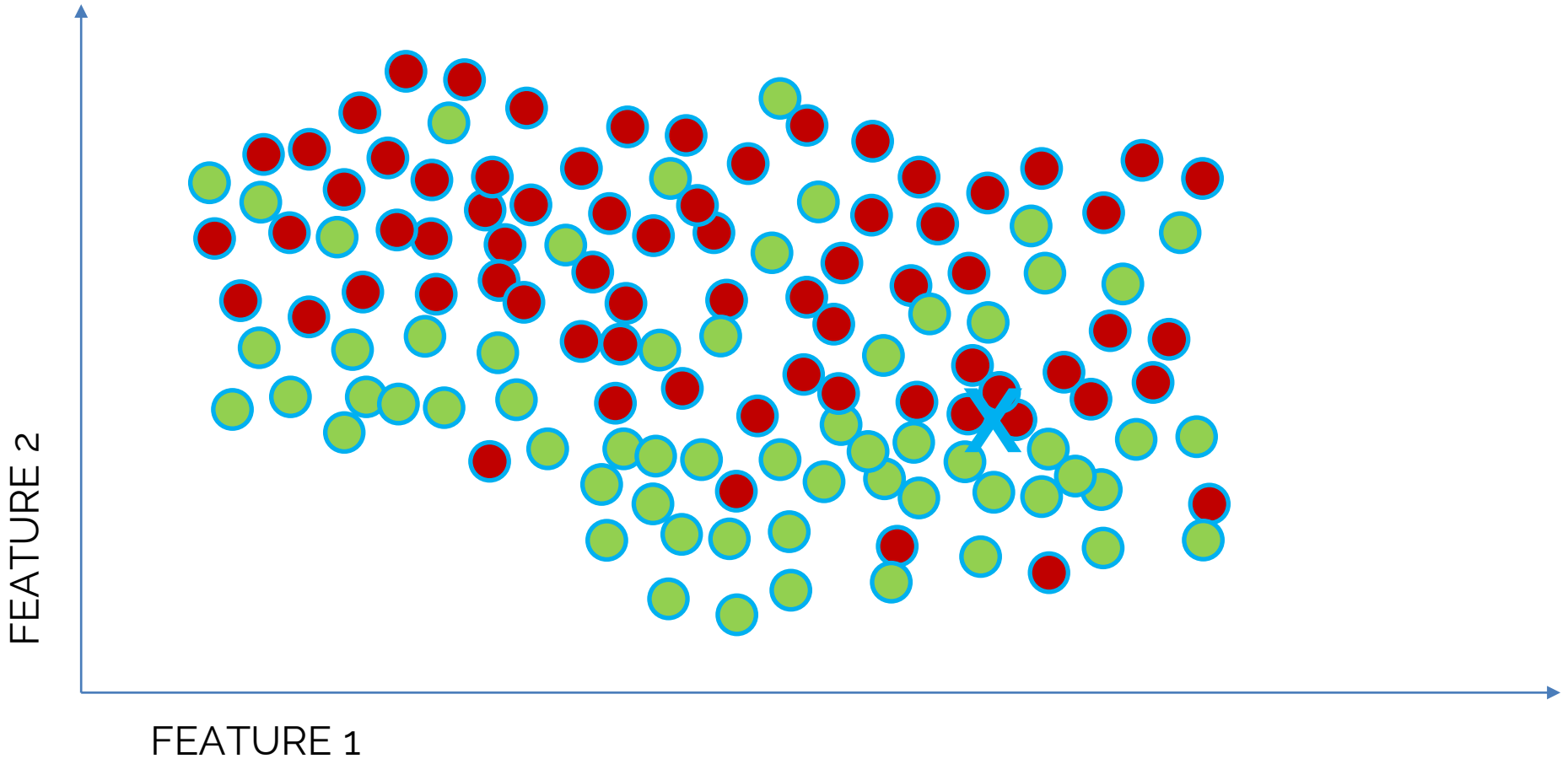

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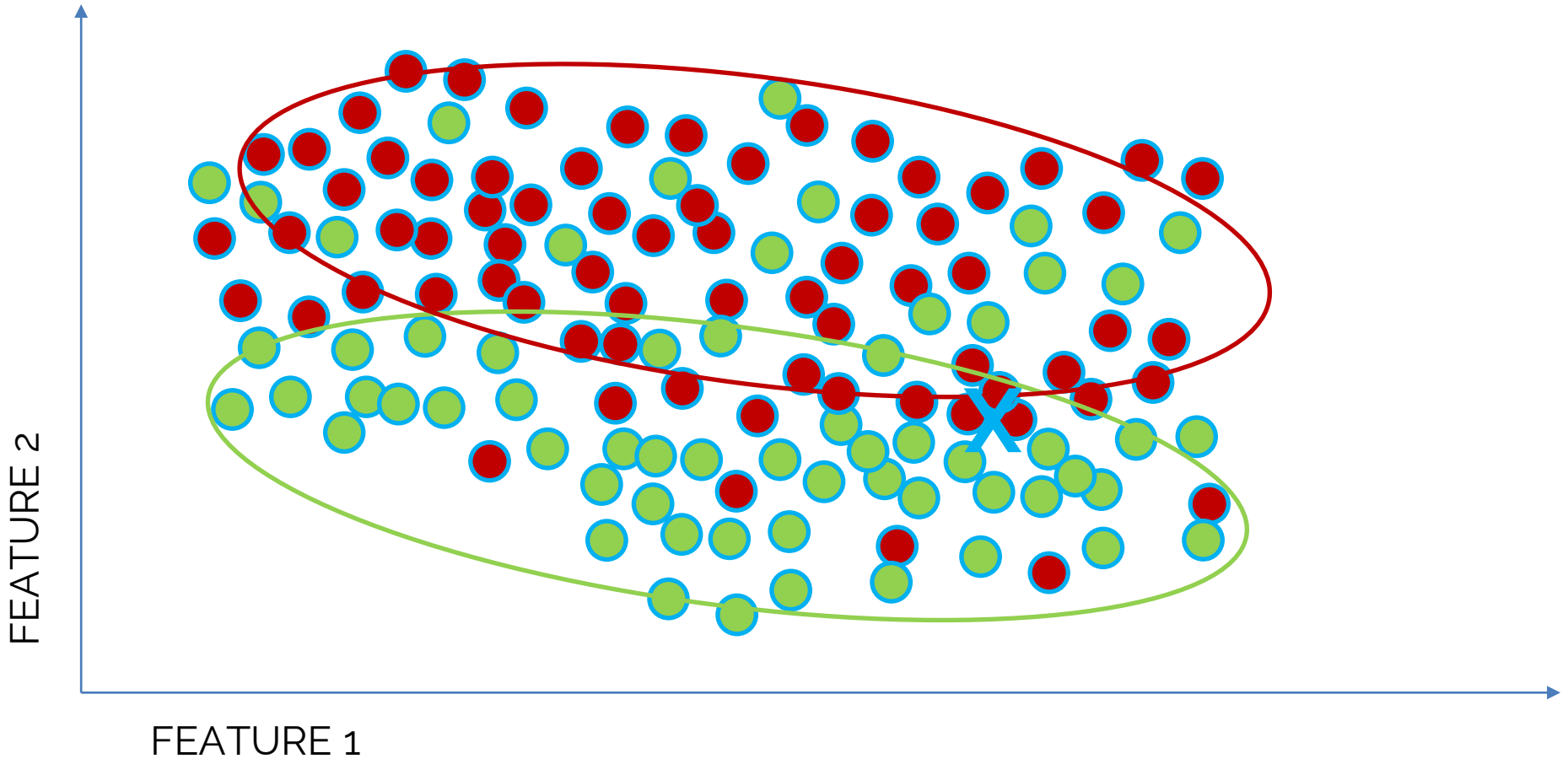

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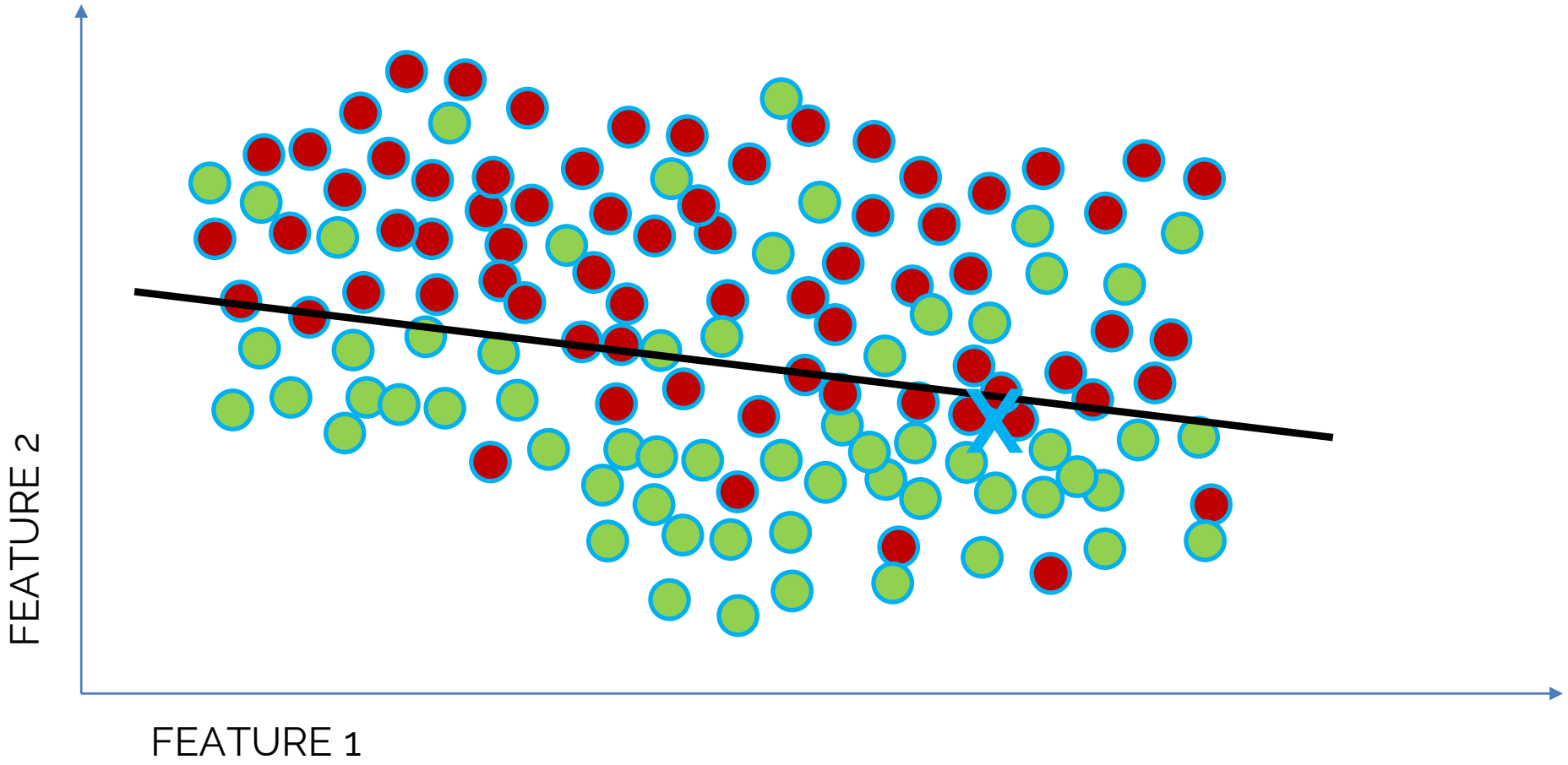

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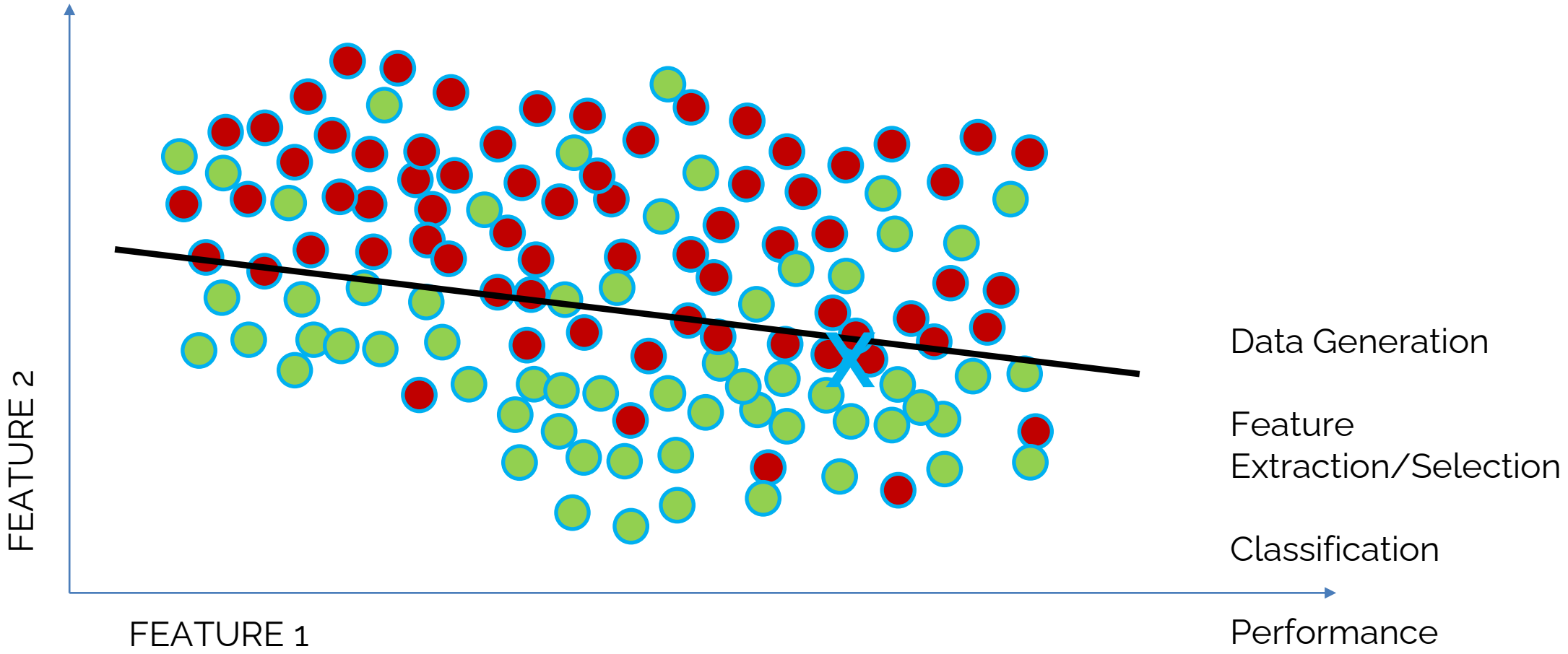


Vocabulary

DATASET

FEATURES
VARIABLES

TRAINING
VALIDATION
TESTING

CLASSIFICATION

TRAINING SET / DATA
VALIDATION SET / DATA
TESTING SET / DATA

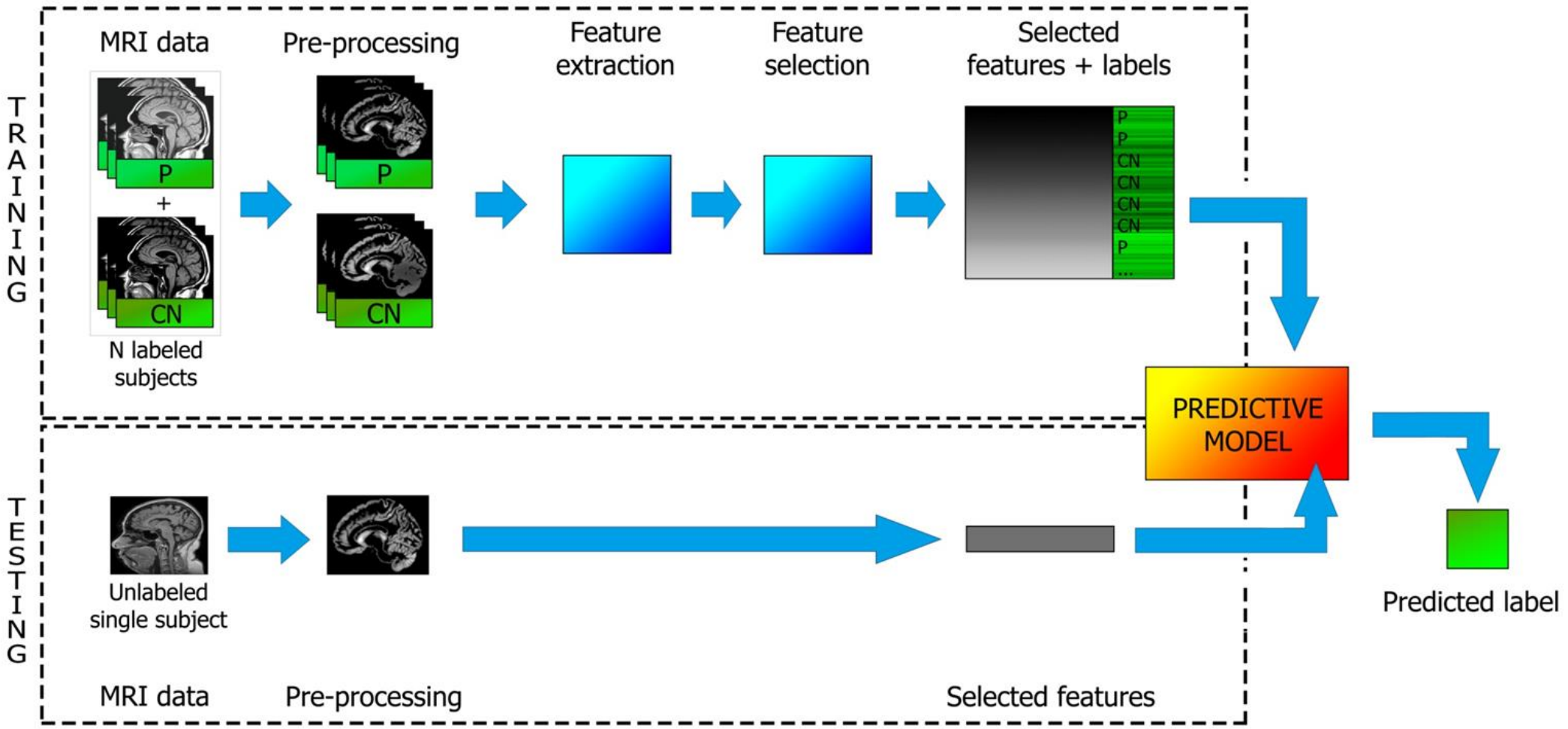
TRAINING PERFORMANCE
VALIDATION PERFORMANCE
TESTING PERFORMANCE

SAMPLES

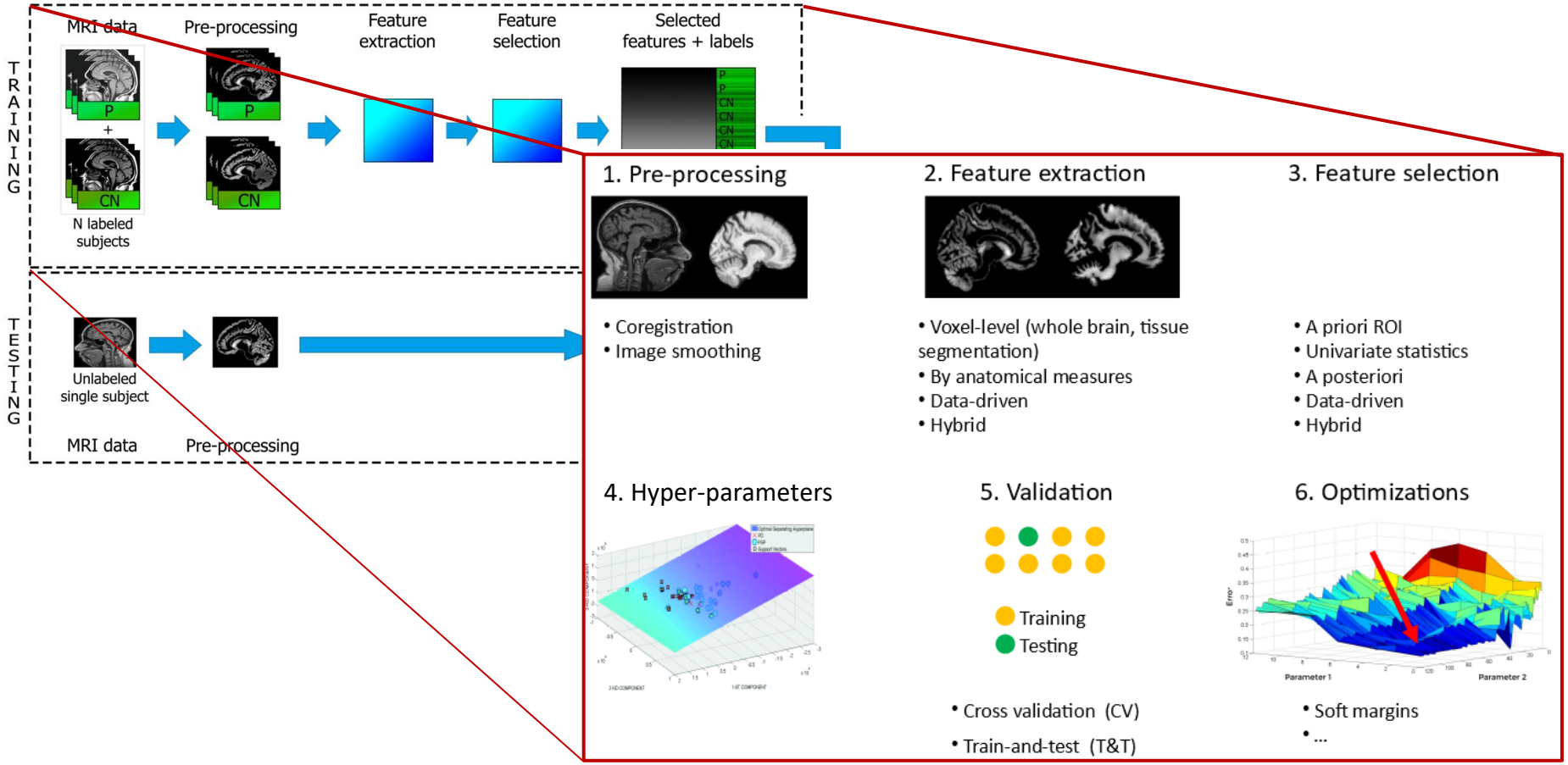
LABEL

TARGET

Machine Learning Applied to Medical Data

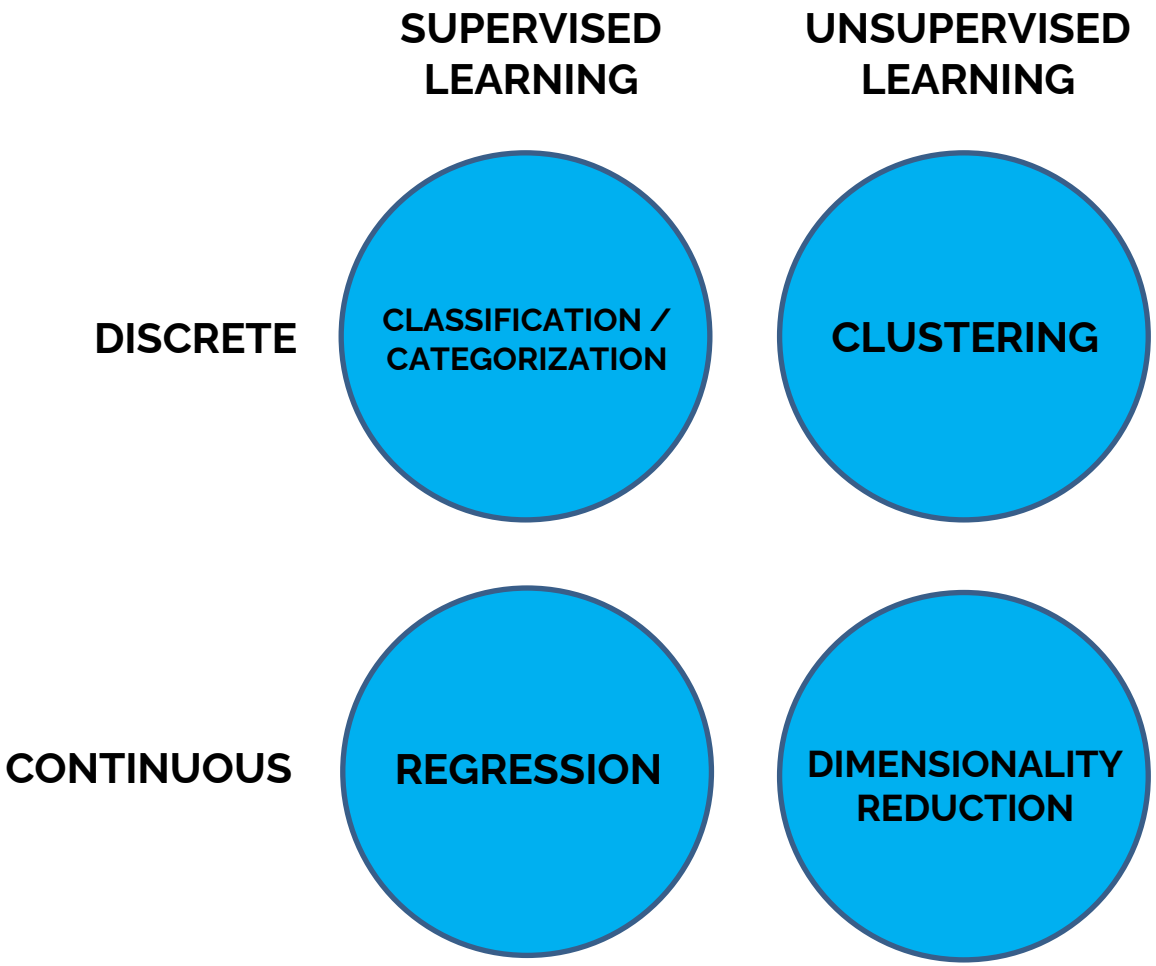


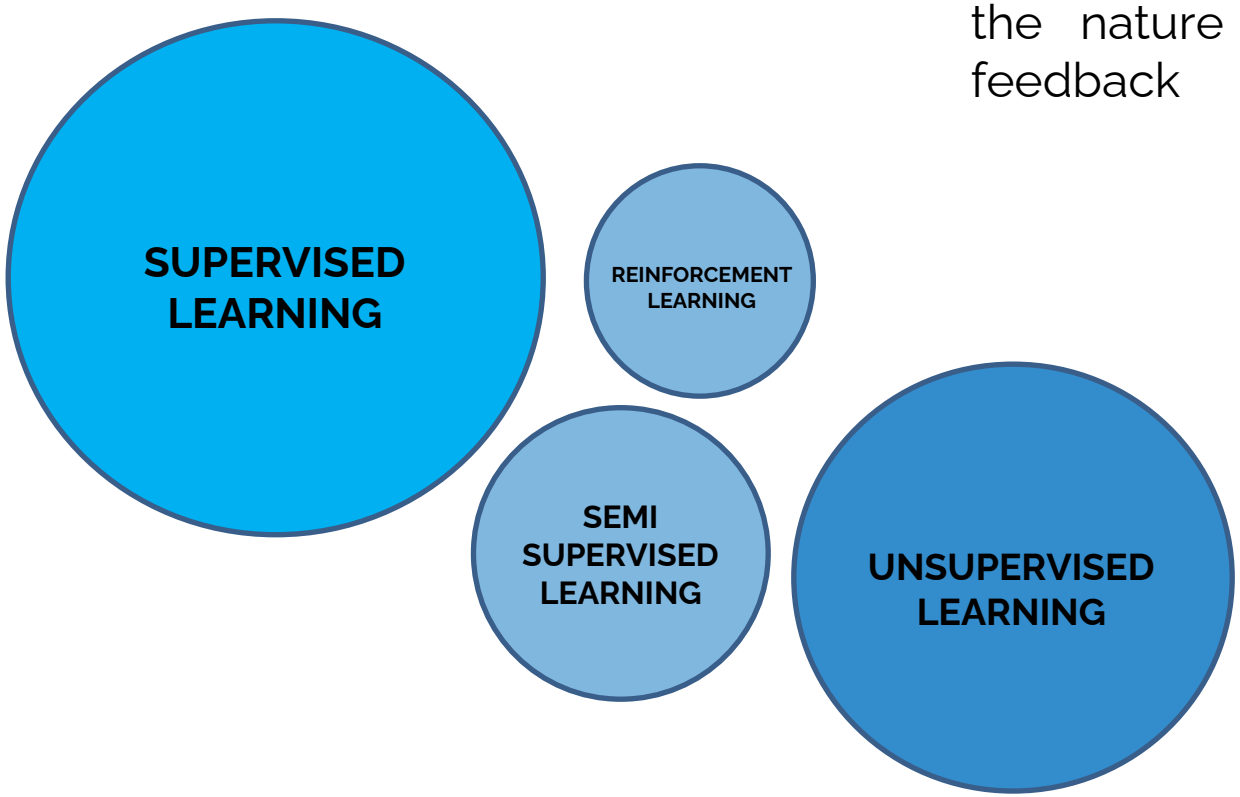
Machine Learning Applied to Medical Data



Machine learning

Categorization by the output of the algorithm



Machine learning

Categorization by the nature of the feedback