Introduction to AI

Lecture 8: Introduction to ML

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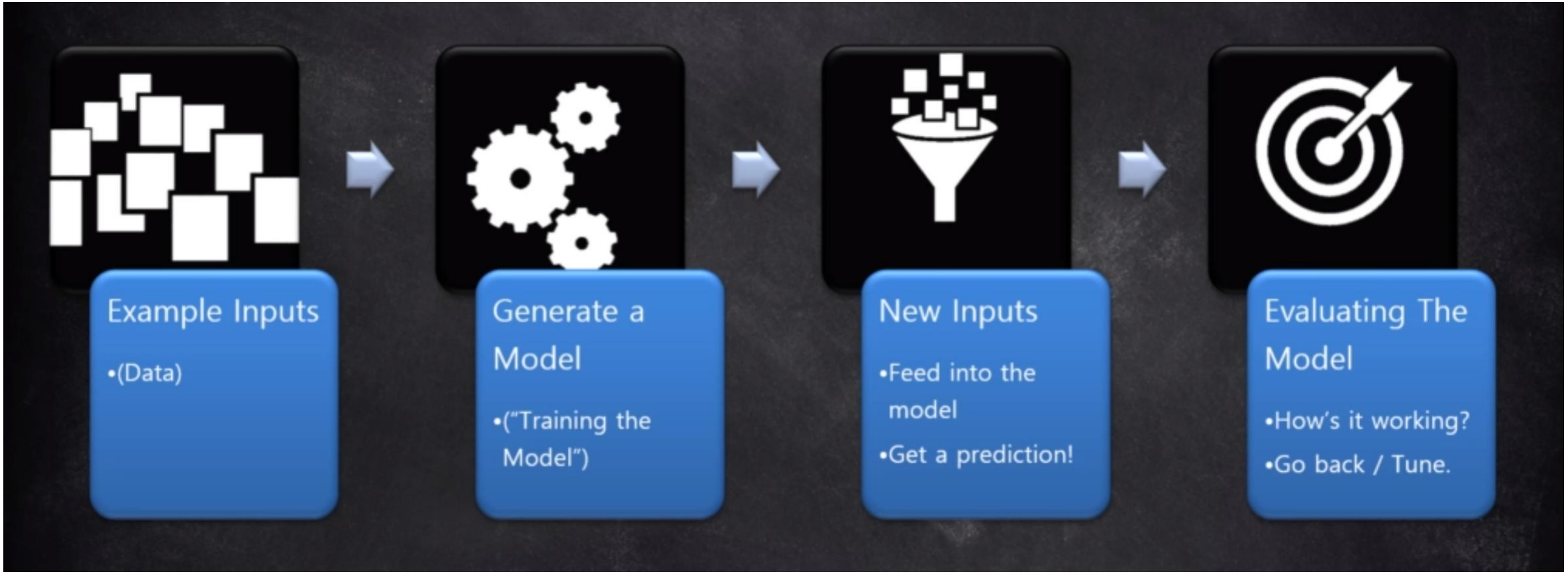
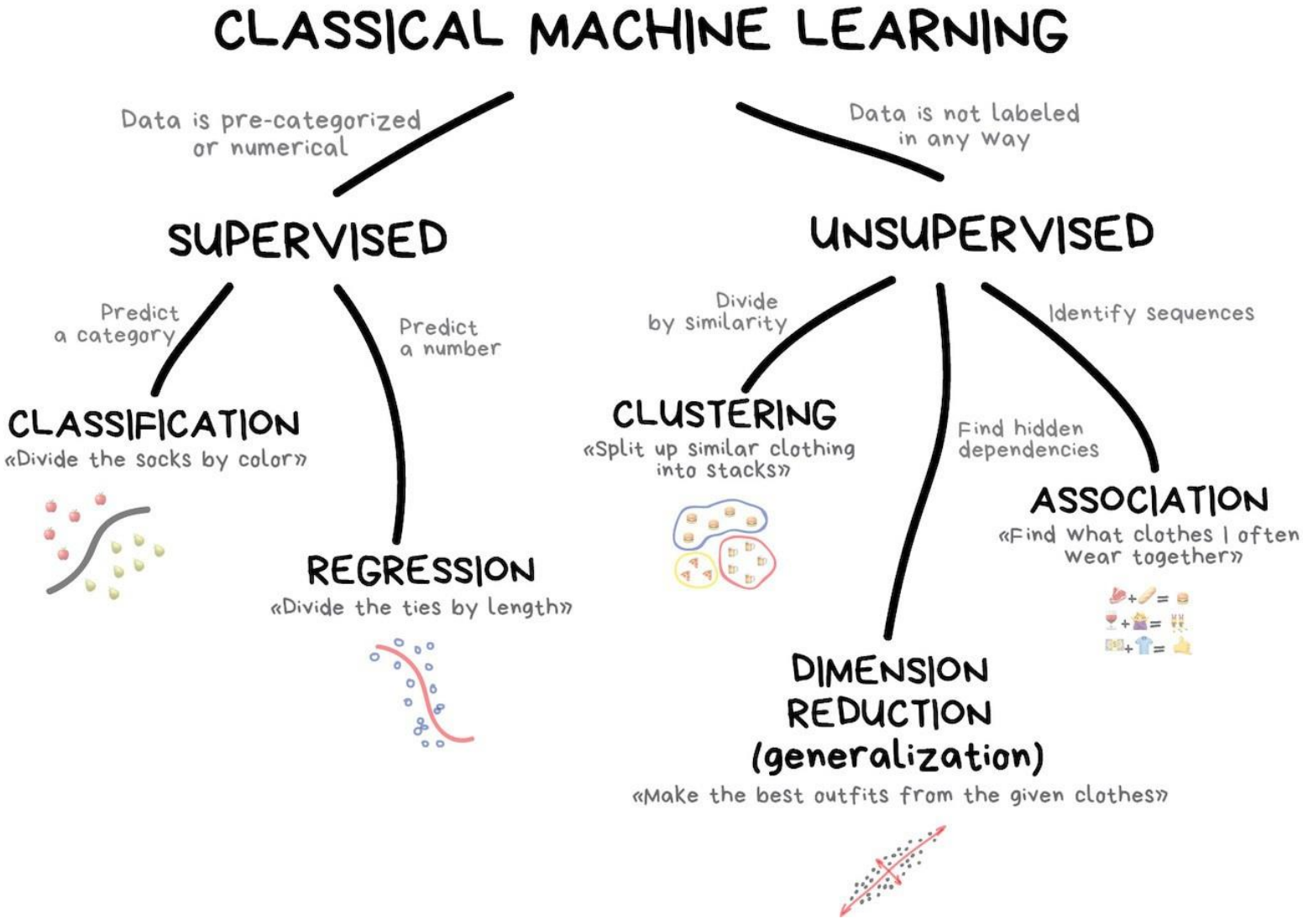
What is ML?


Example Inputs
•(Data)
Generate a Model
•("Training the Model")
New Inputs
•Feed into the model
•Get a prediction!
Evaluating The Model
•How's it working?
•Go back / Tune.

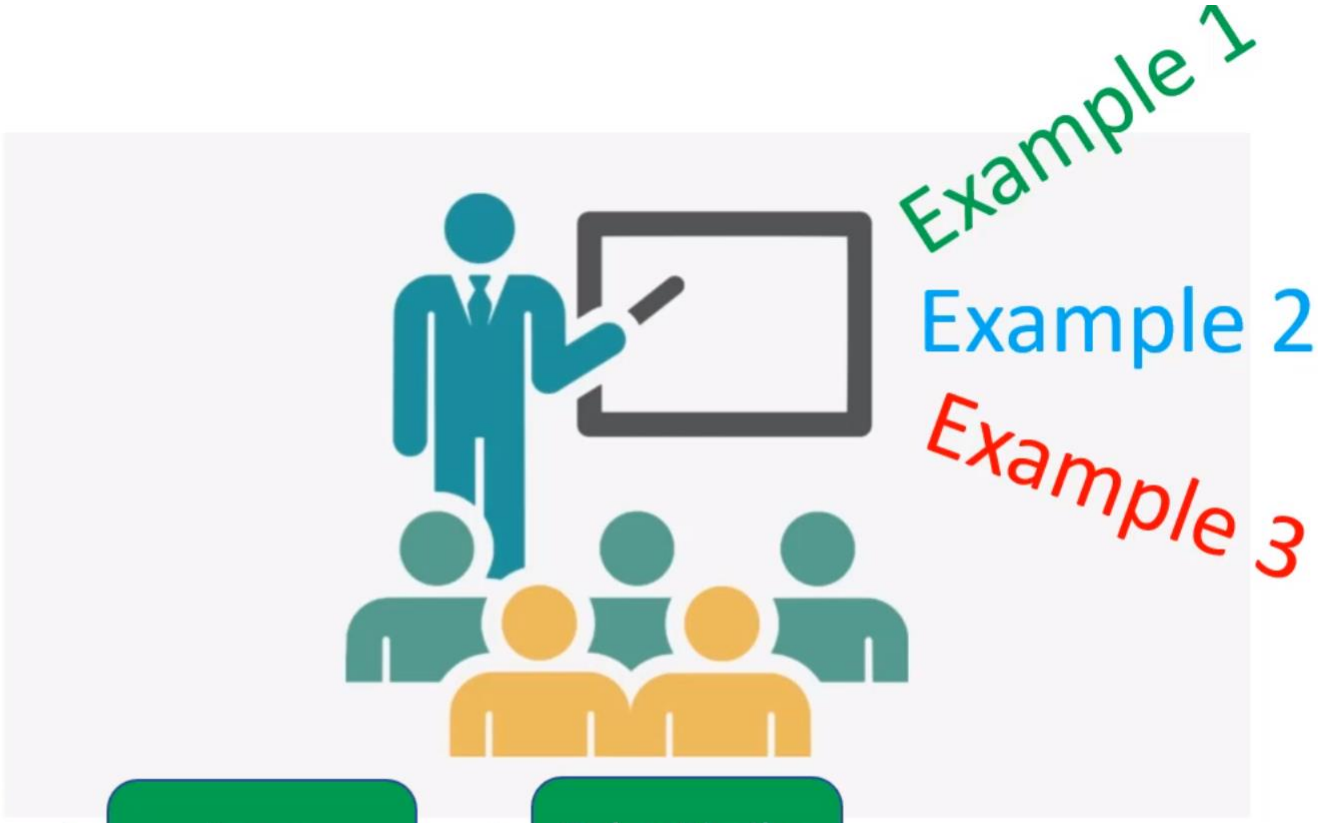
Categories of ML

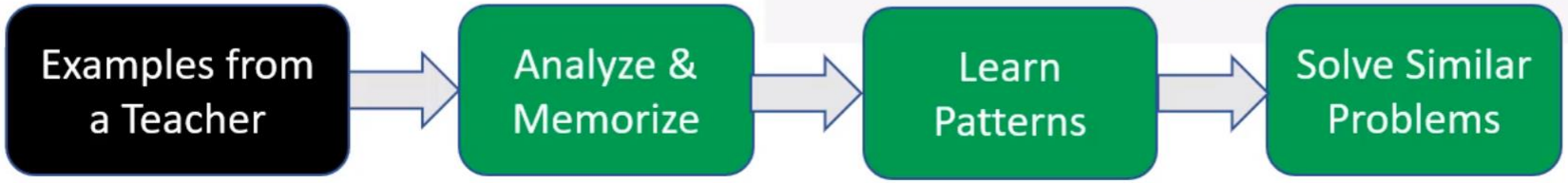


Supervised learning

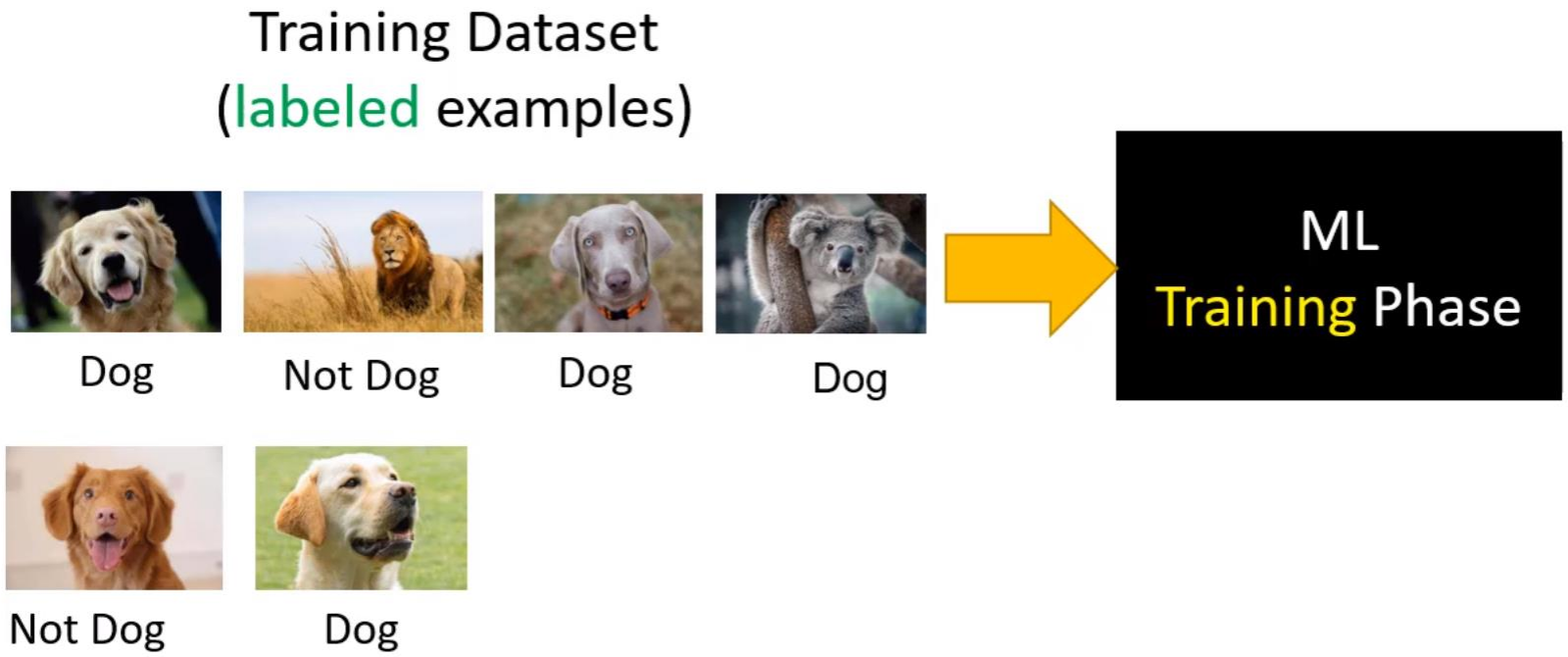
"Supervised"

Learning under the supervision of a Teacher

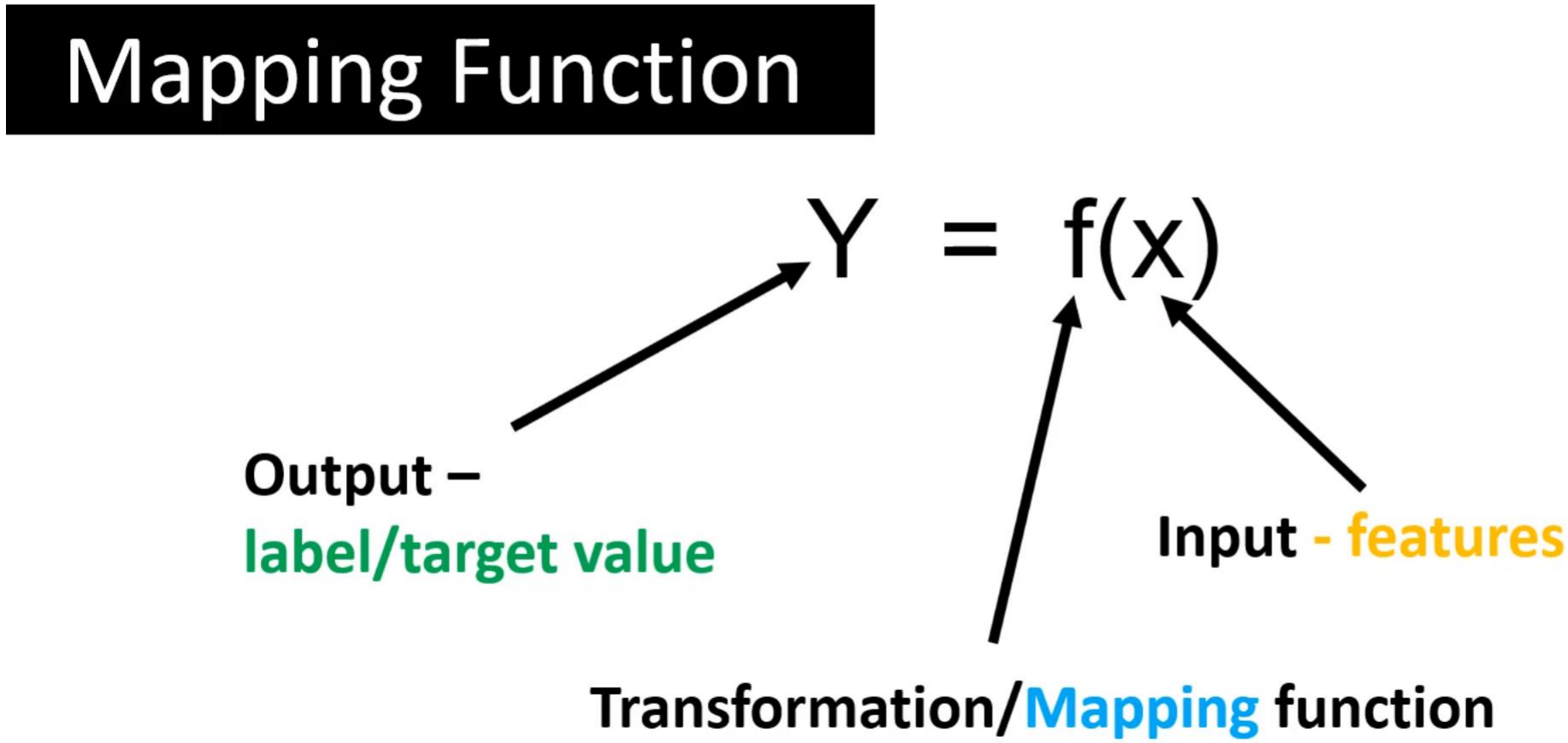




Supervised learning



Supervised learning



Unsupervised Learning

The vast majority of available data in many applications is usually unlabeled

Unsupervised learning is learning without a teacher supervising the learning process.

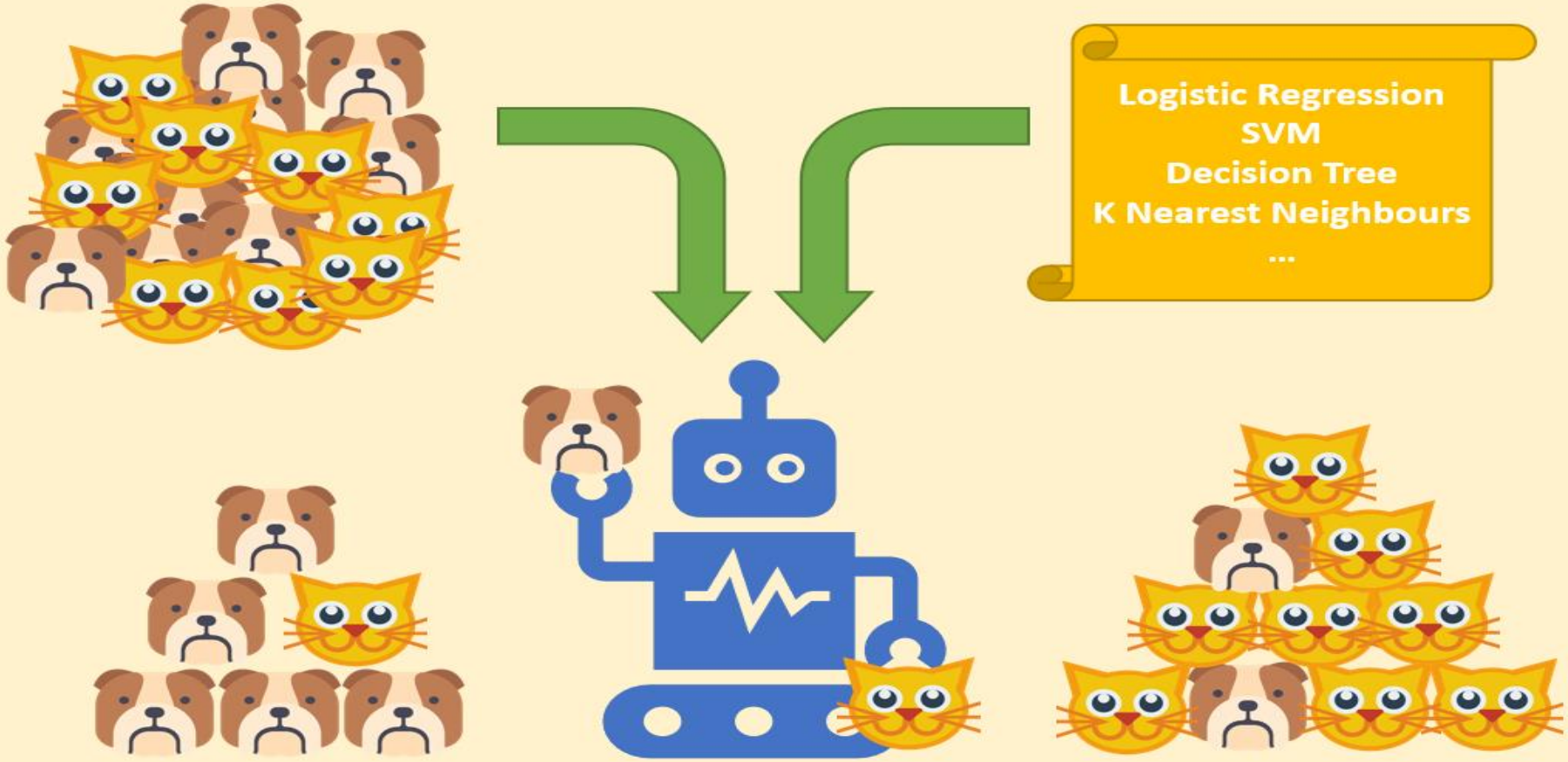
The goal is to identify automatically meaningful patterns in unlabeled data.

Categories of ML

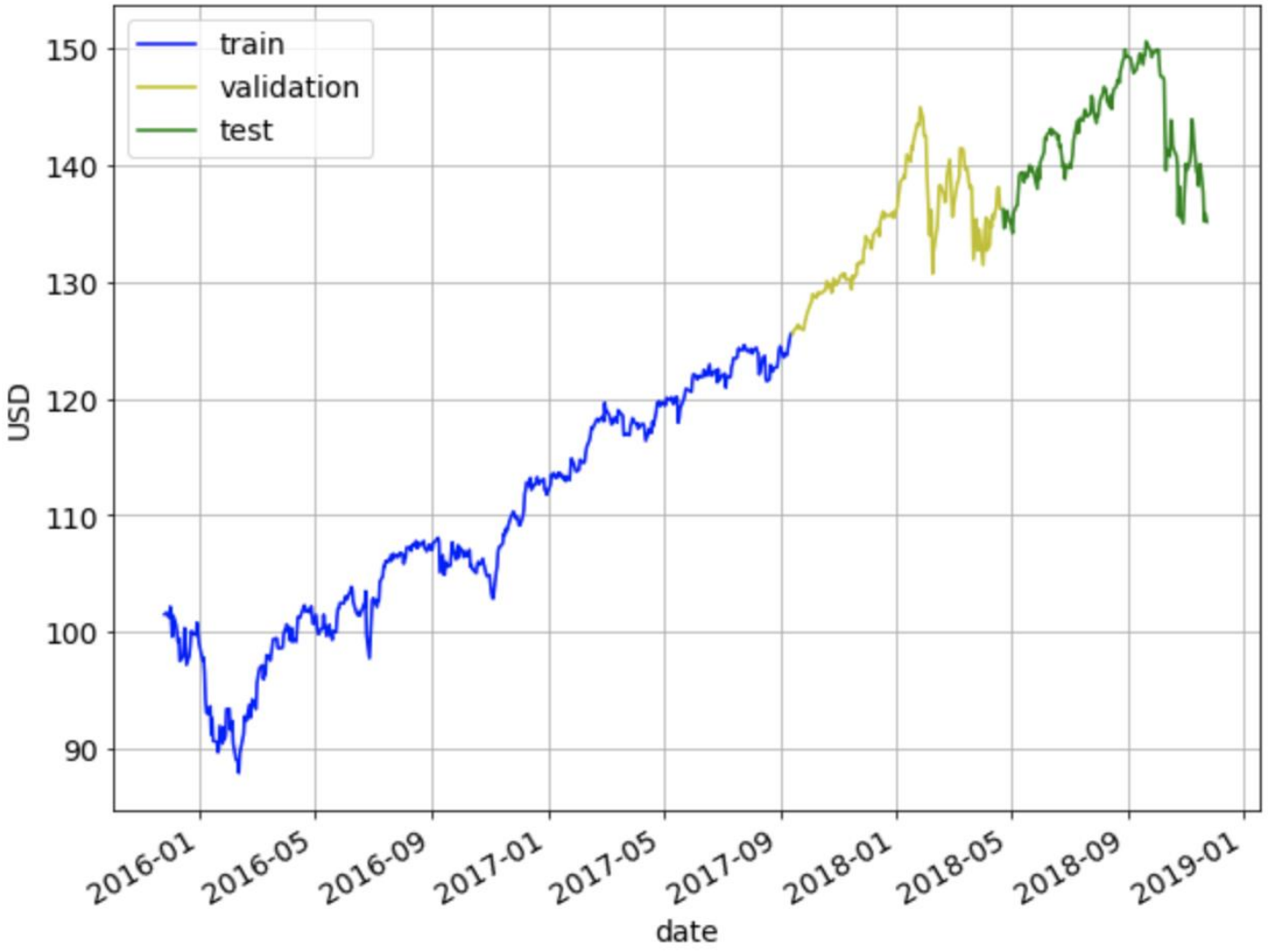
- *Classification*
- *Regression*
- *Clustering*
- *Association*
- *Reinforcement Learning*
- *Optimization*

Classification (Supervised Learning)

Classification (Supervised Learning)

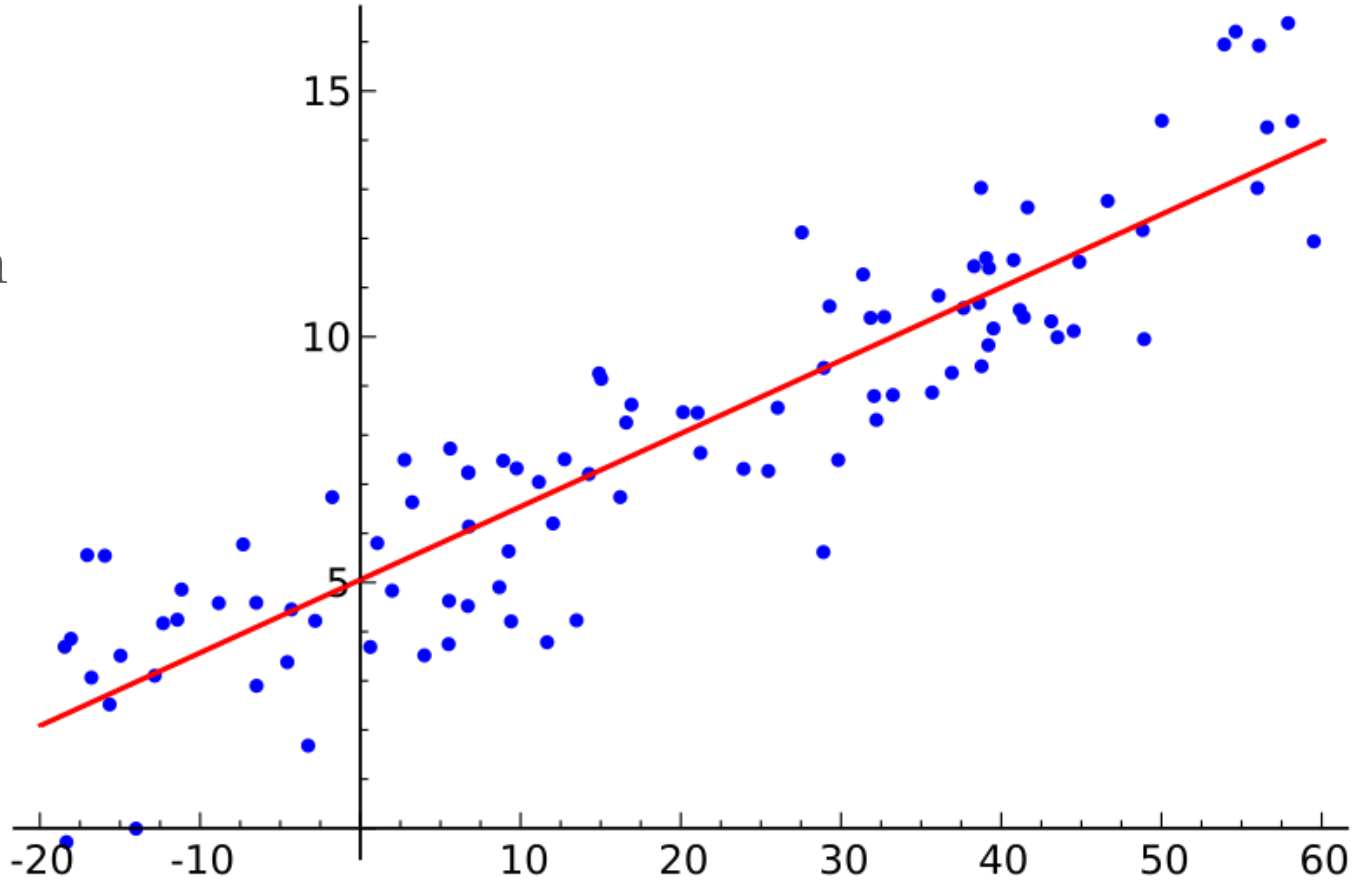


Regression

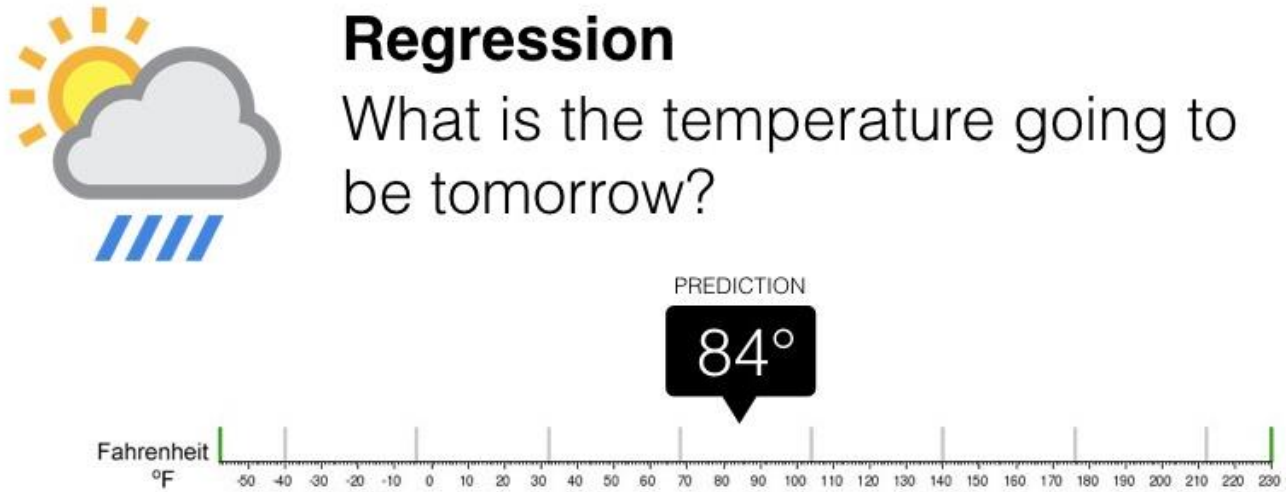

train
validation
test
150
140
130
120
110
100
90
USD
2016-01
2016-05
2016-09
2017-01
2017-05
2017-09
2018-01
2018-05
2018-09
2019-01
date

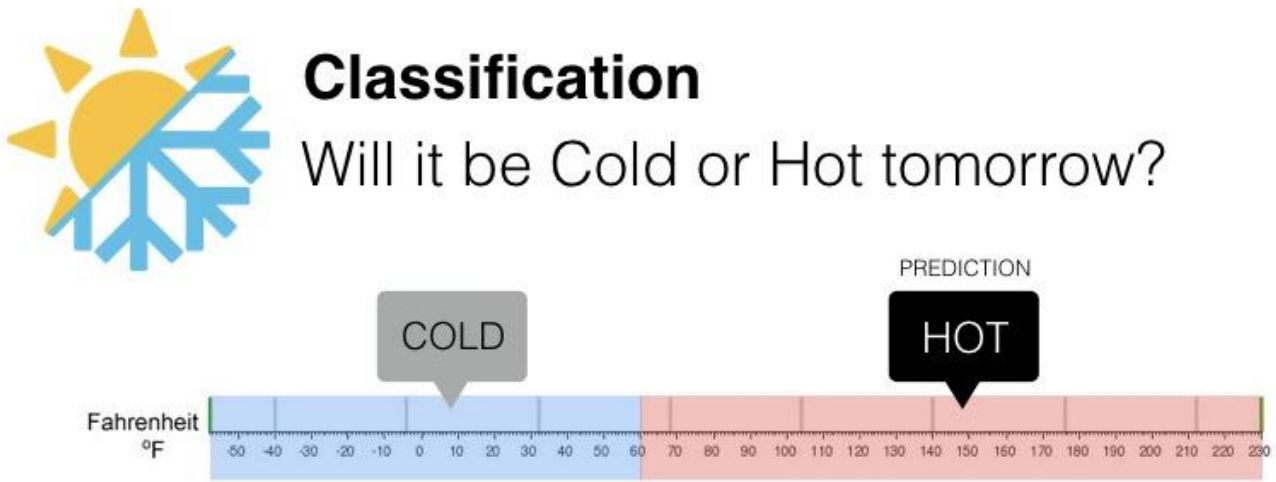
Regression

- Sale's Prediction
- Weather Forecast
- Stock Exchange Prediction
- …

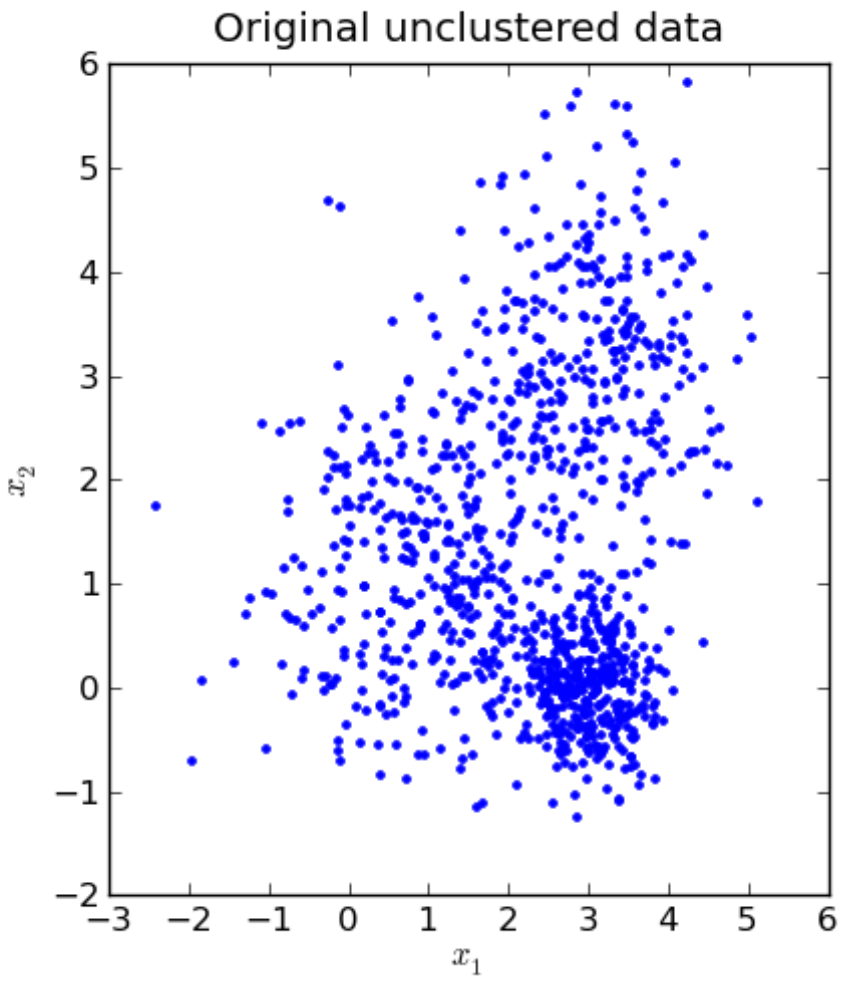


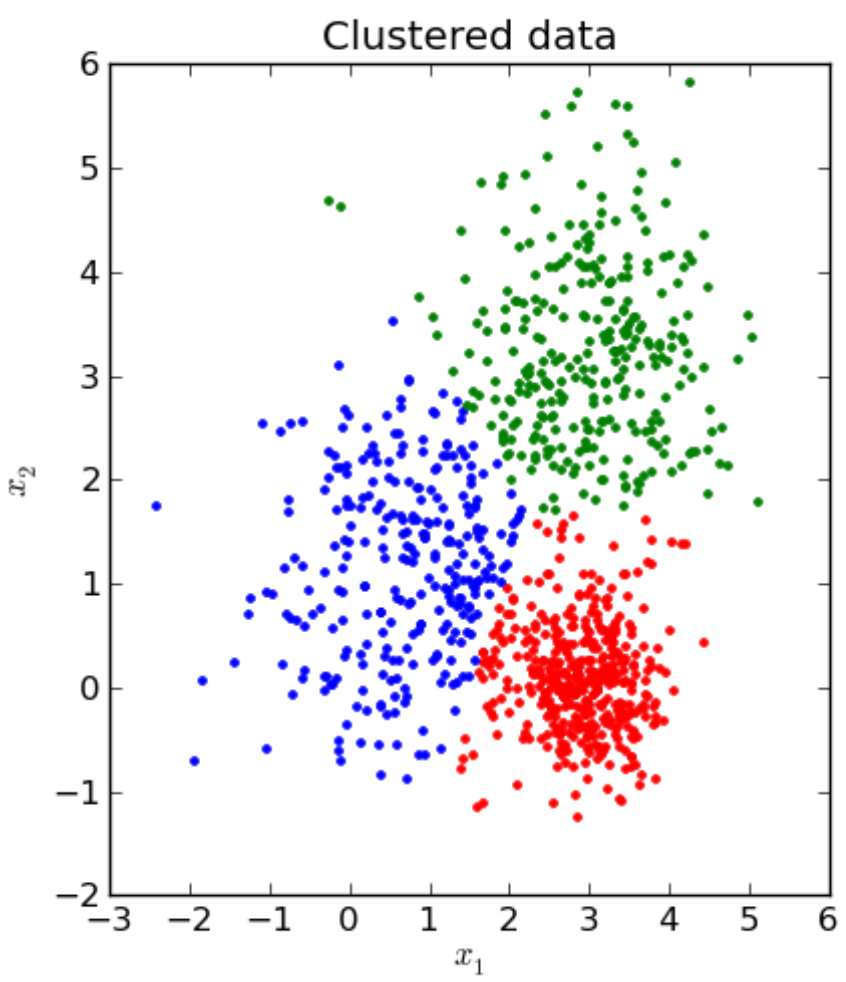
Regression


Regression
What is the temperature going to be tomorrow?
PREDICTION
84°
Fahrenheit
°F
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230

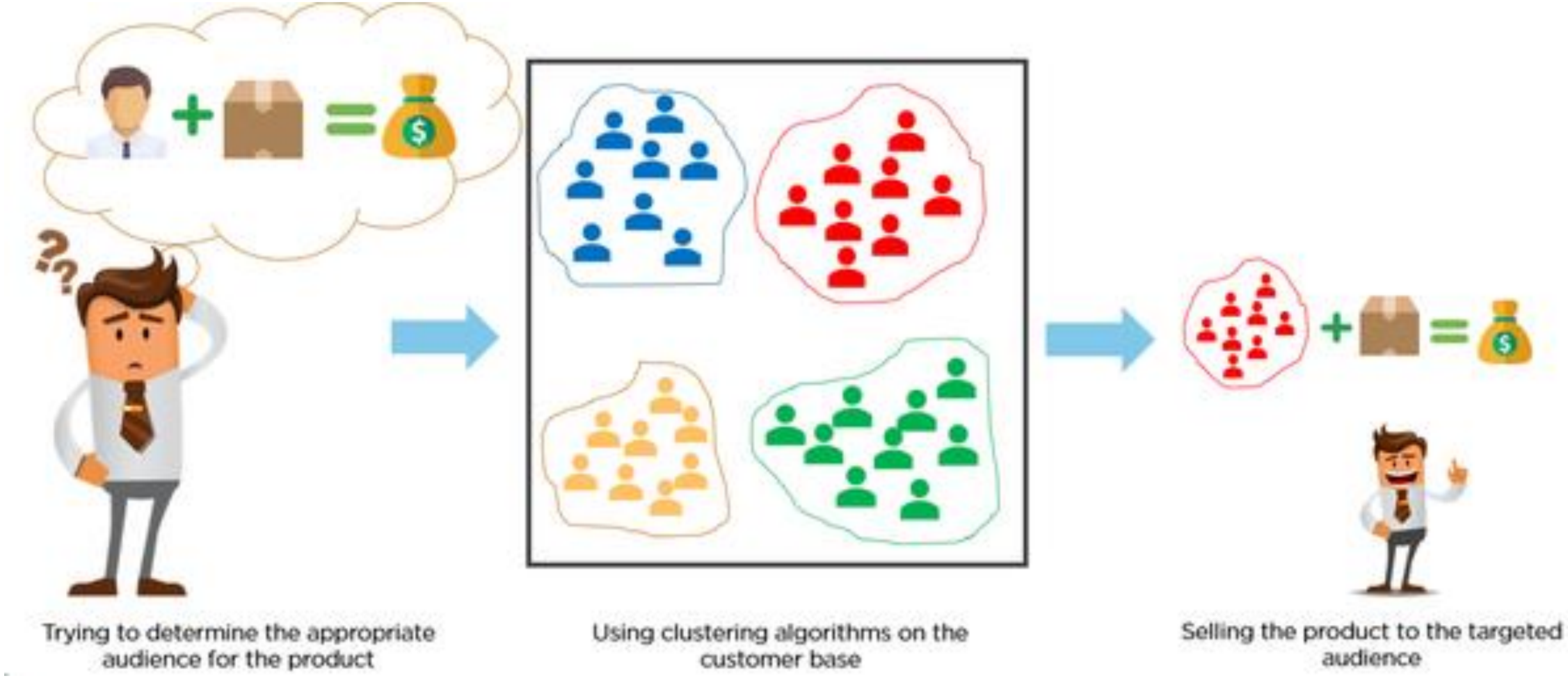

Classification
Will it be Cold or Hot tomorrow?
PREDICTION
COLD
HOT
Fahrenheit
°F
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230

Clustering (Unsupervised Learning)





Clustering

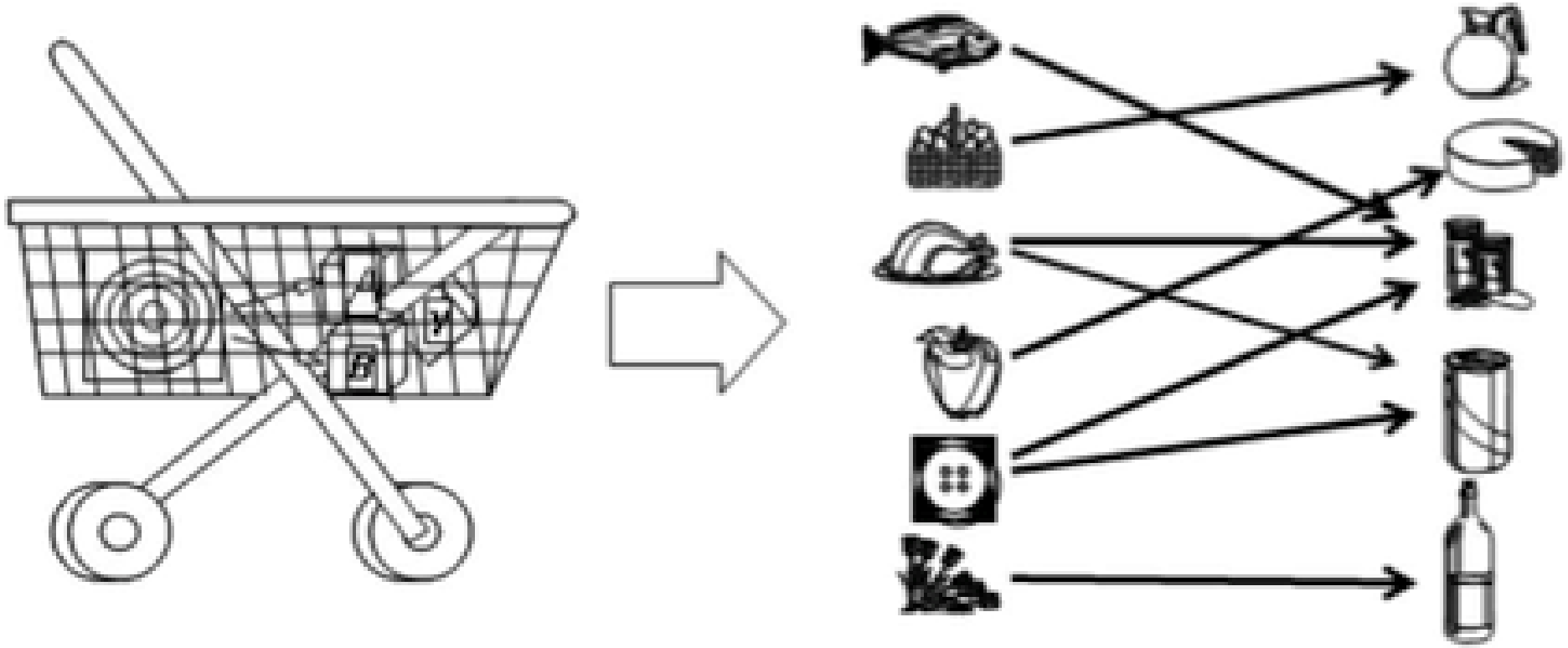


Trying to determine the appropriate audience for the product

Using clustering algorithms on the customer base

Selling the product to the targeted audience

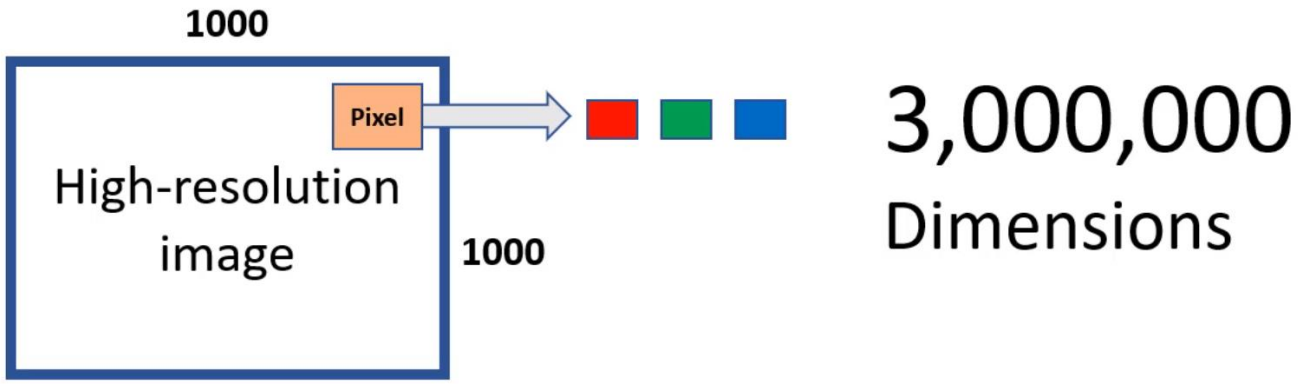
Association rule



98% of people who purchased items A and B also purchased item C

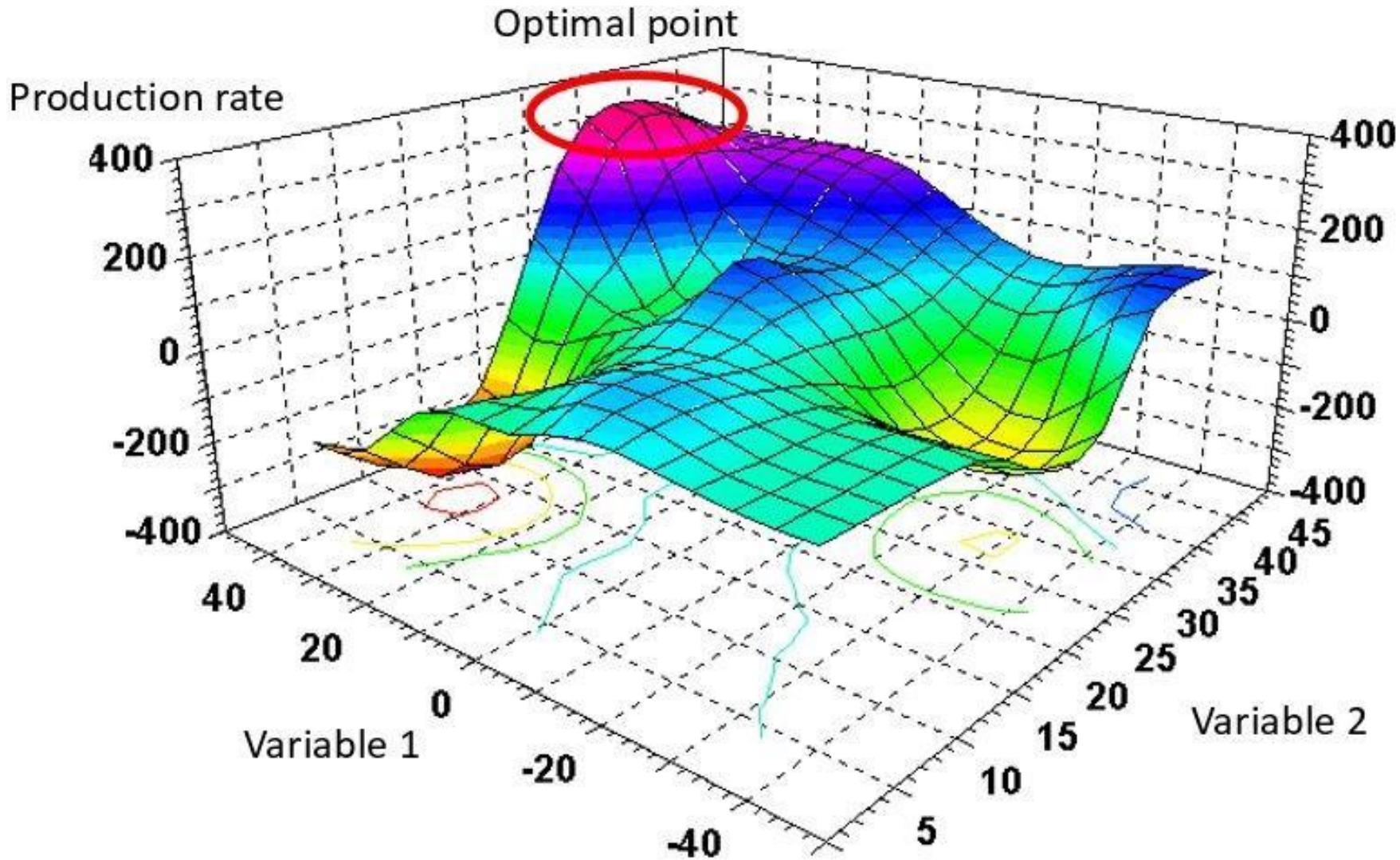
Dimension reduction

In supervised learning, one BIG challenge to handle is the number of input features that the algorithm needs to analyze

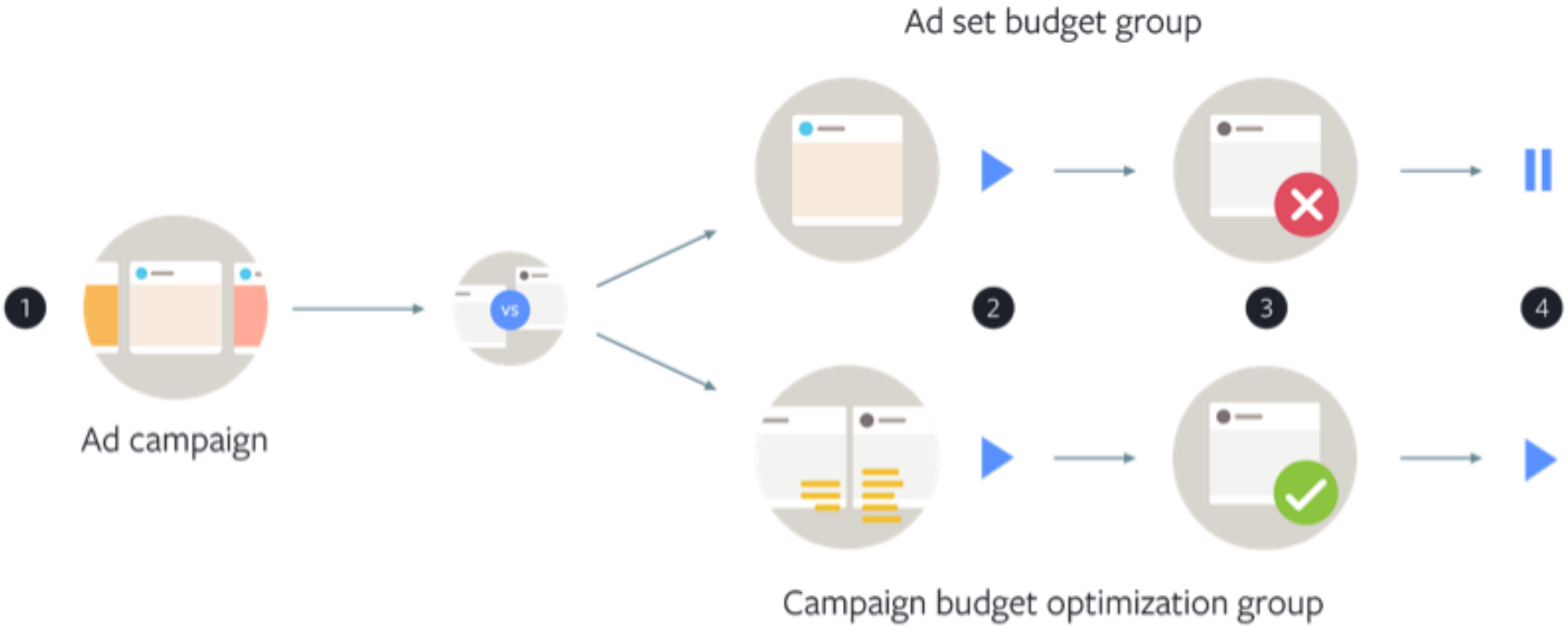


In many cases, not ALL features are needed…

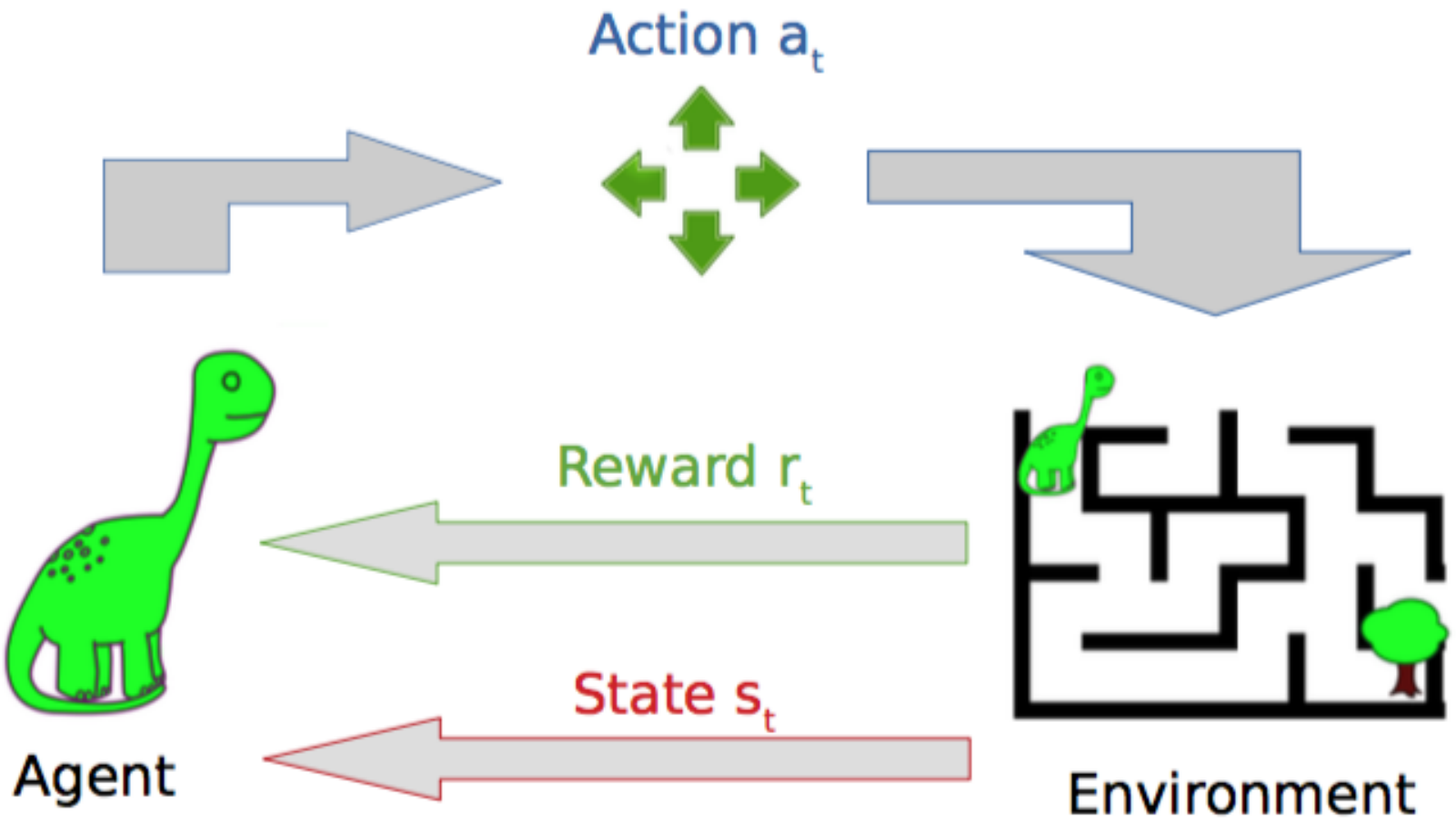
Optimization



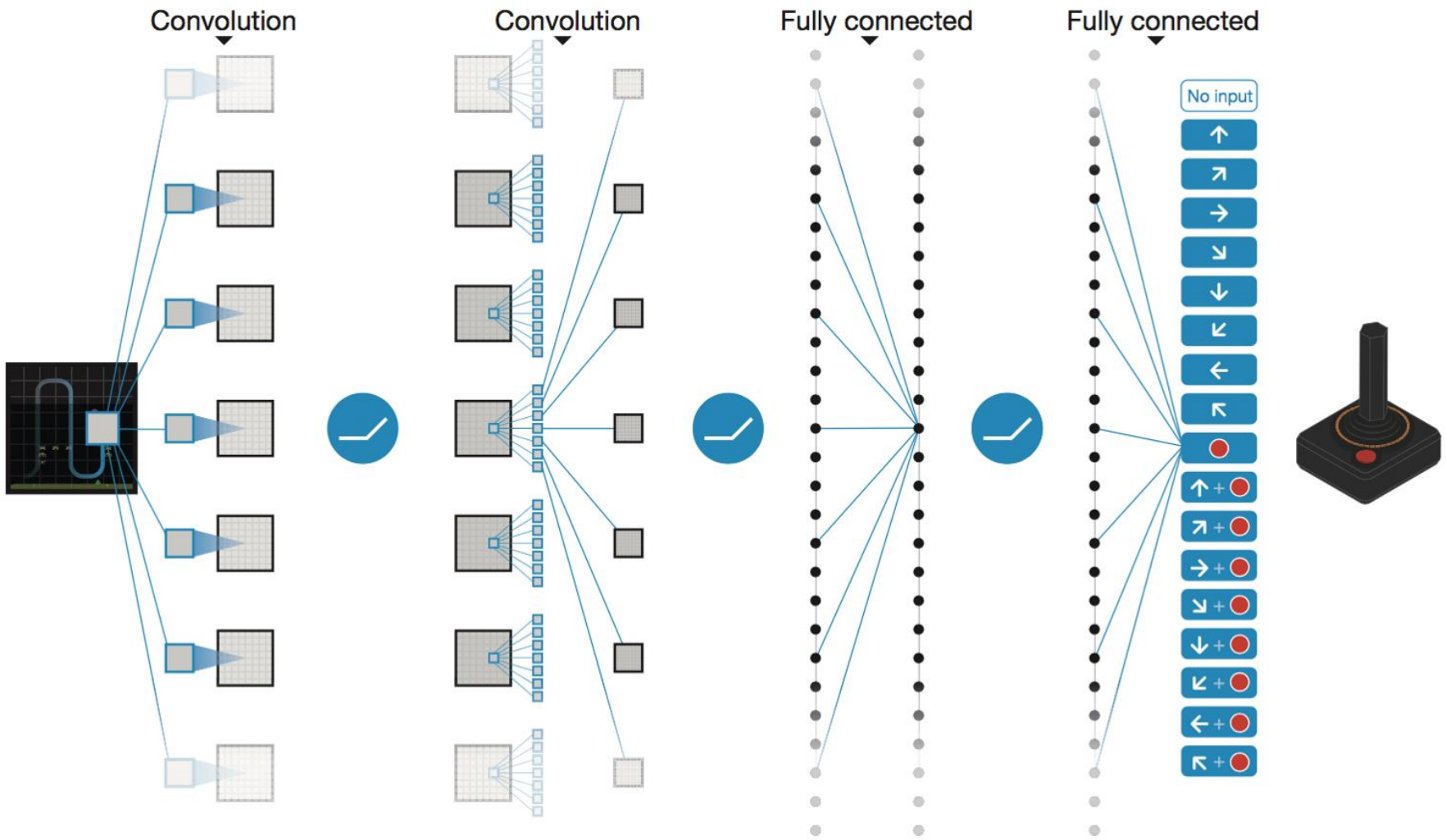
Optimization



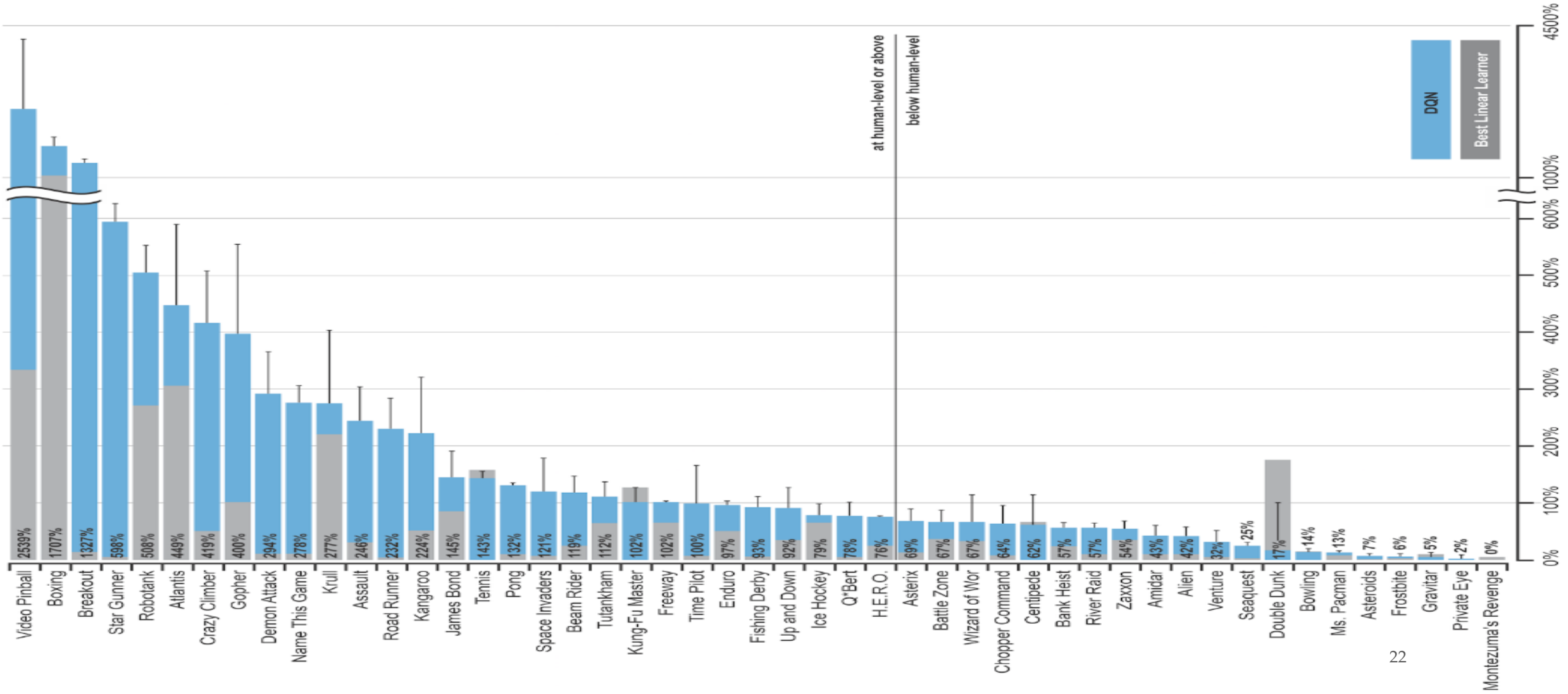
Reinforcement Learning



Reinforcement Learning



Reinforcement Learning



Autonomous Self-Driving Cars

Autonomous Self-Driving Cars

Autonomous Driving

Cars are becoming more and more intelligent to bring more comfort and safety.

- *Pedestrian Detection*
- *Intelligent Cruise Control*
- *Voice Assistance*
- *Auto Parallel Park*