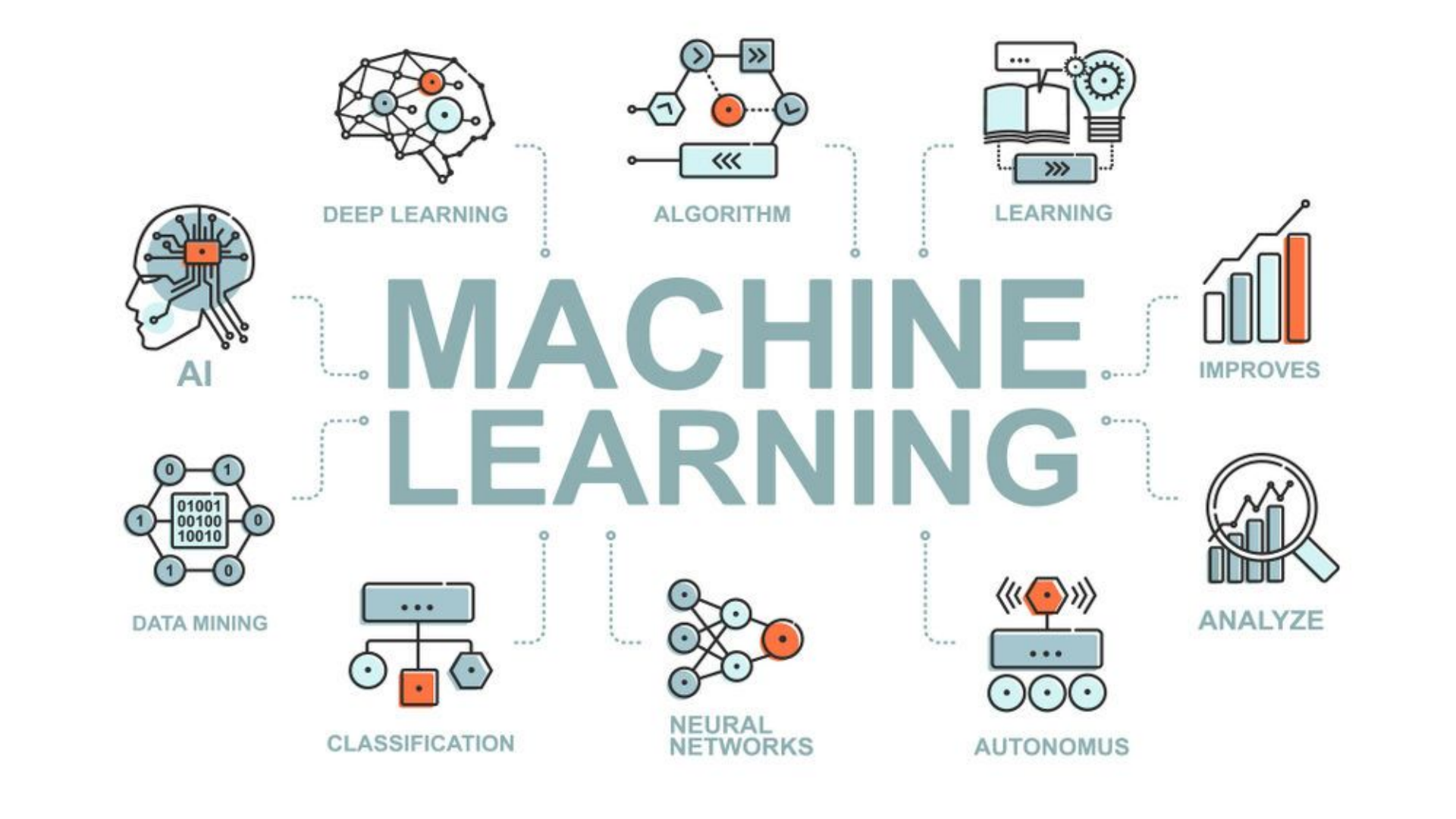
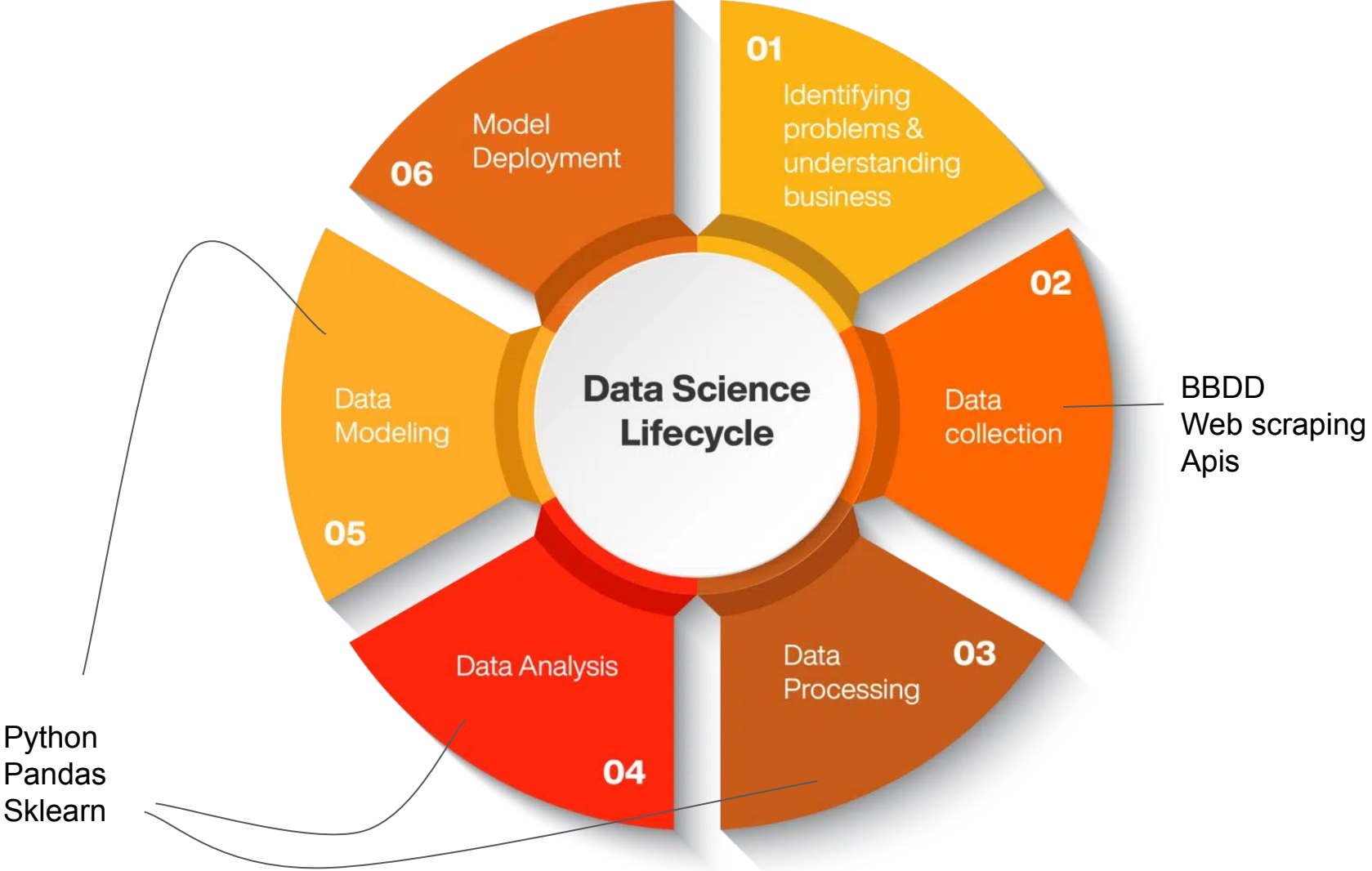
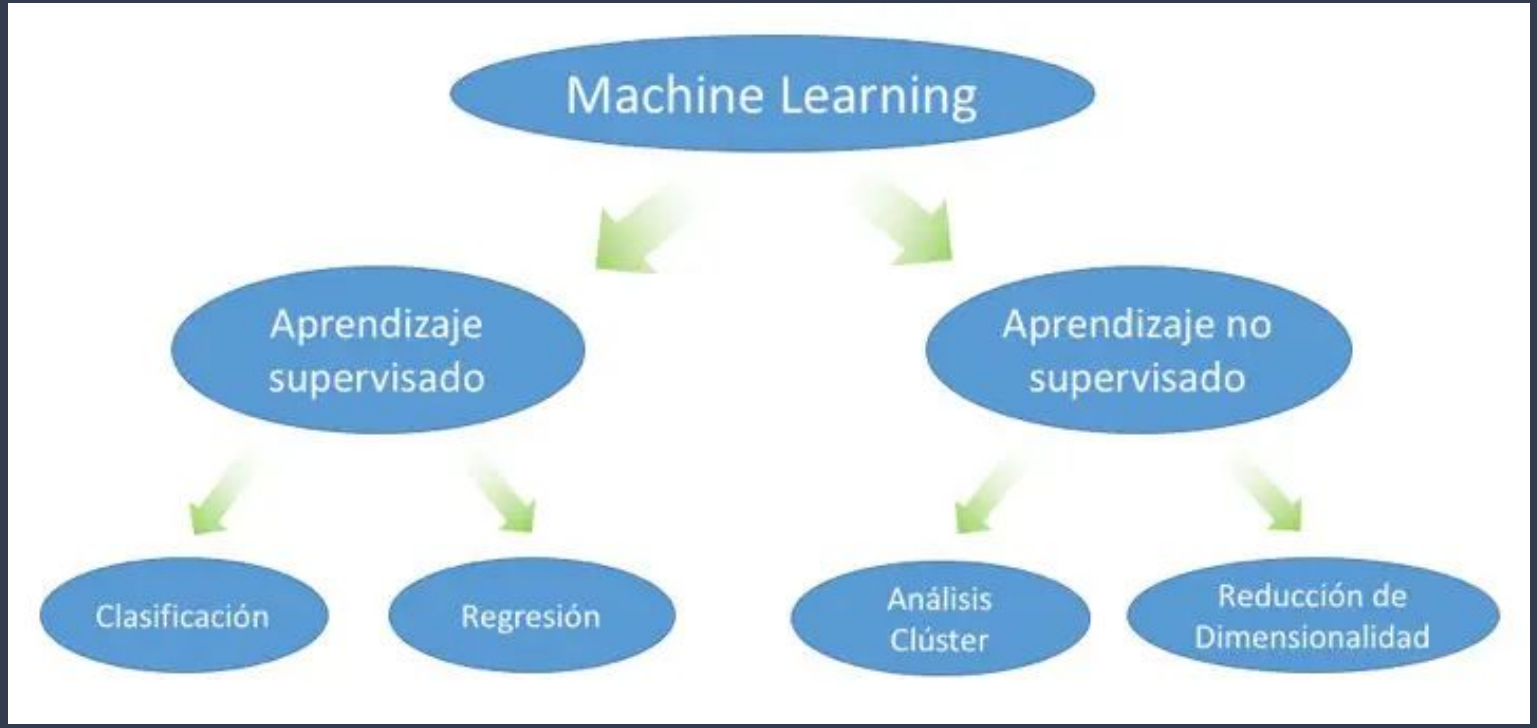
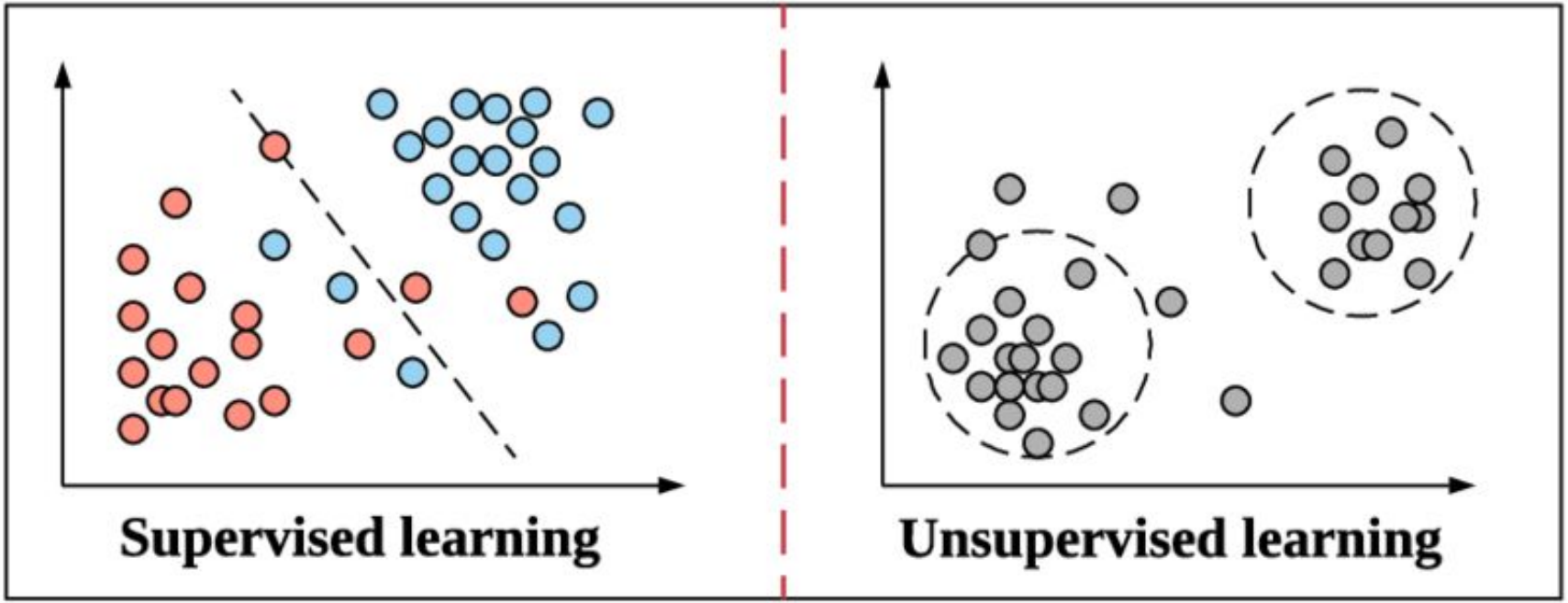

DEEP LEARNING
ALGORITHM
LEARNING
AI
MACHINE
LEARNING
IMPROVES
01001
00100
10010
DATA MINING
ANALYZE
CLASSIFICATION
NEURAL
NETWORKS
AUTONOMUS

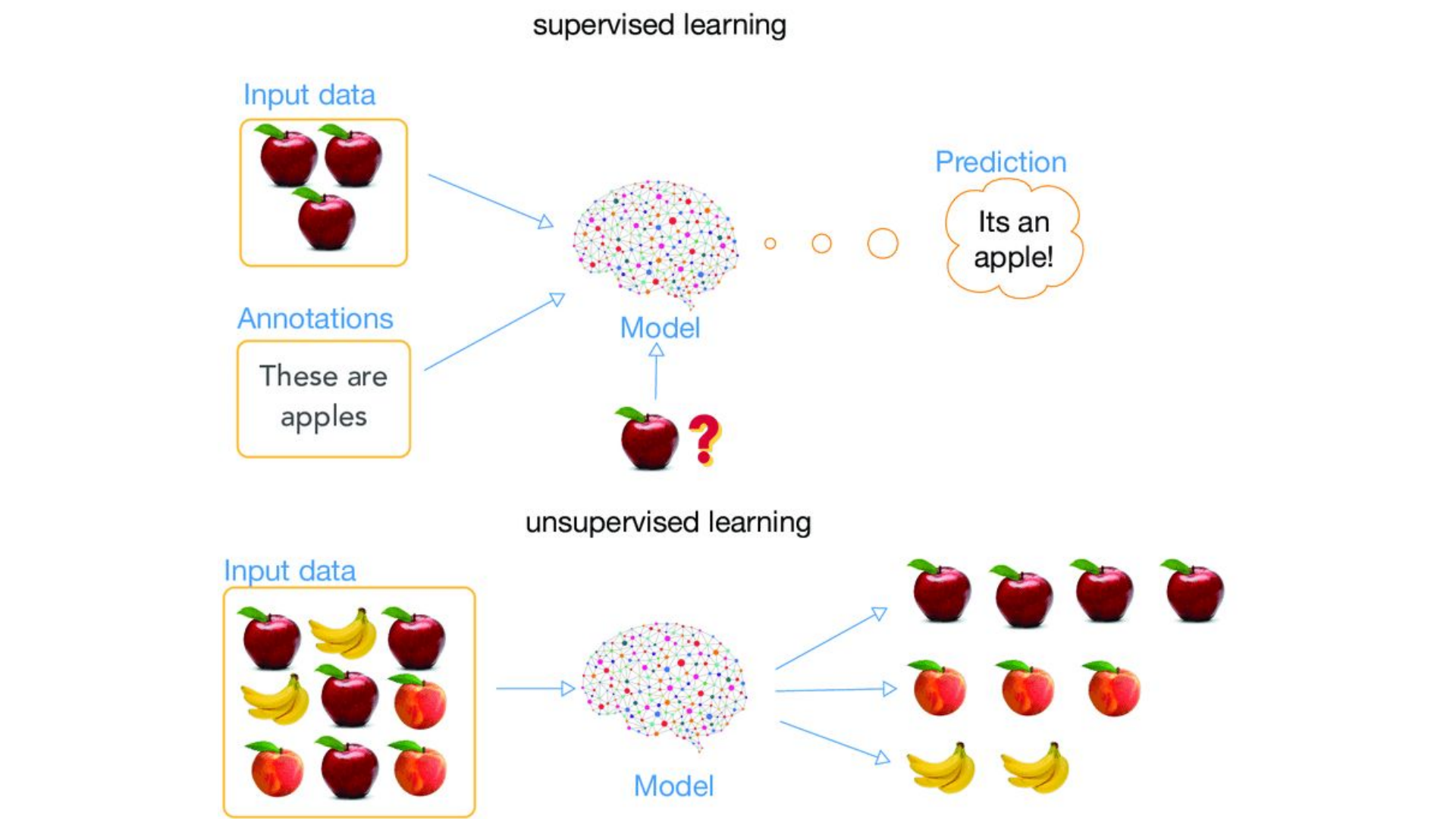

01
Identifying problems & understanding business
02
Data collection
03
Data Processing
04
Data Analysis
05
Data Modeling
06
Model Deployment
Data Science Lifecycle
BBDD
Web scraping
Apis
Python
Pandas
Sklearn

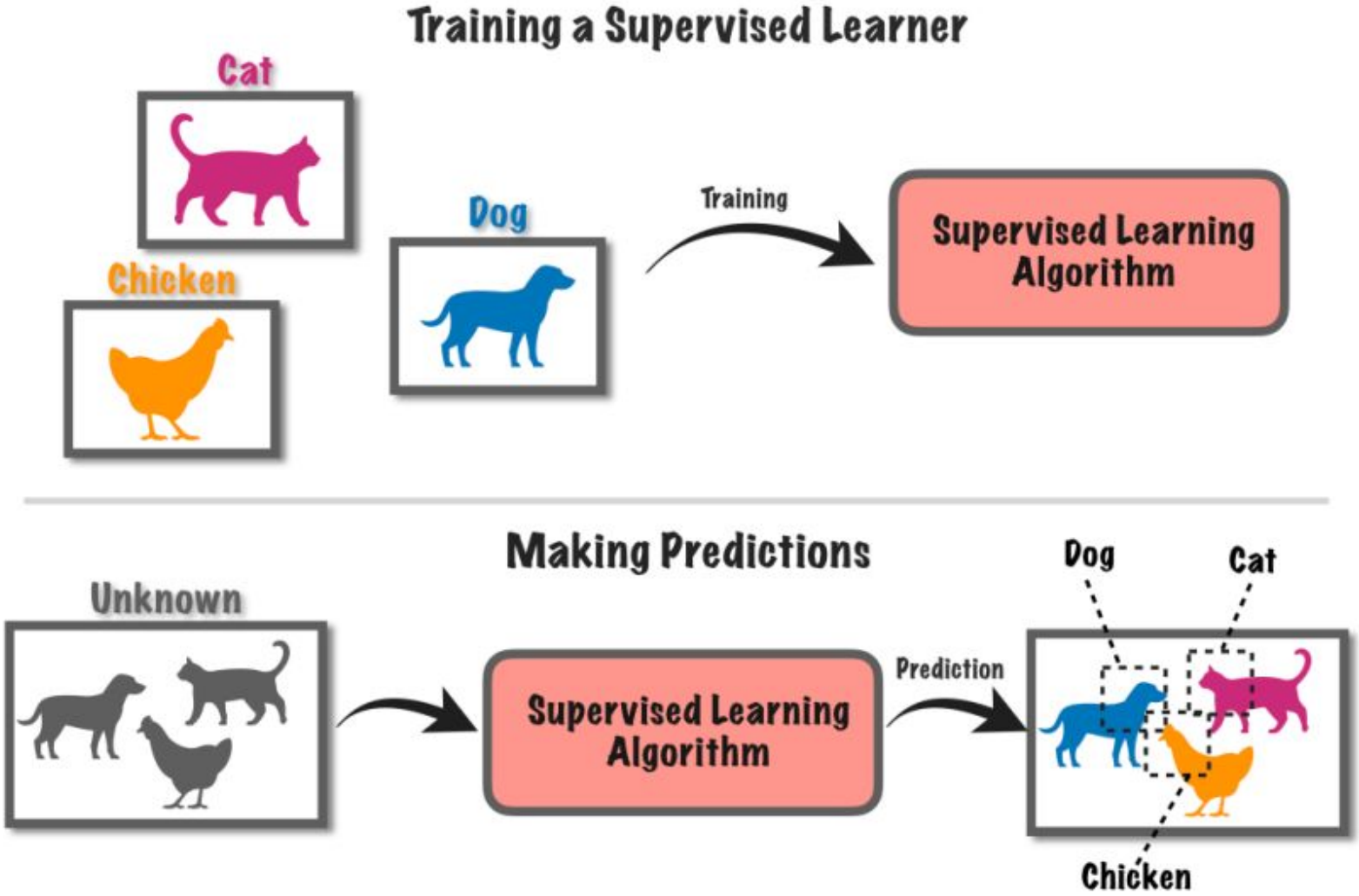
Machine learning

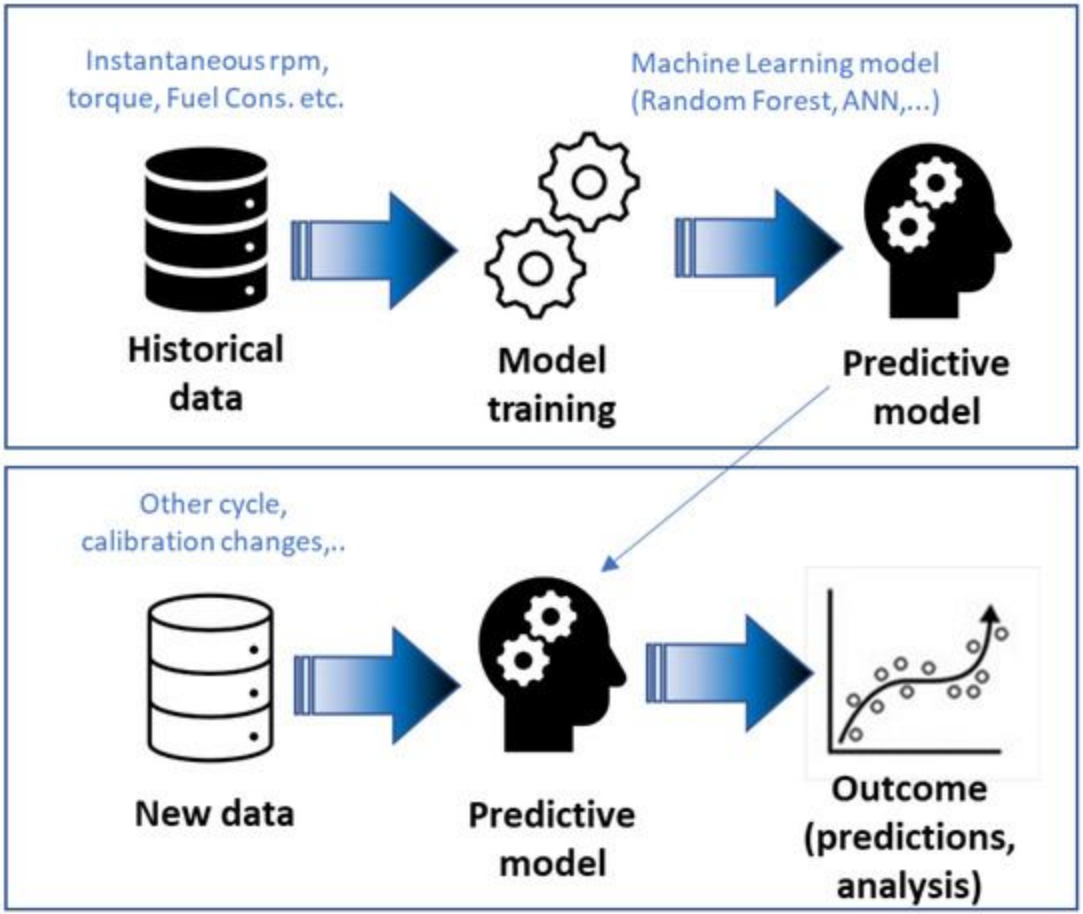


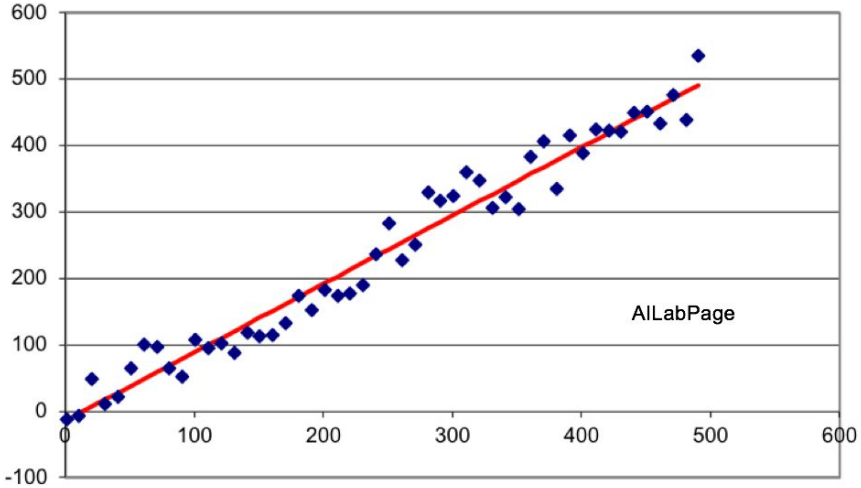
Types of algorithms

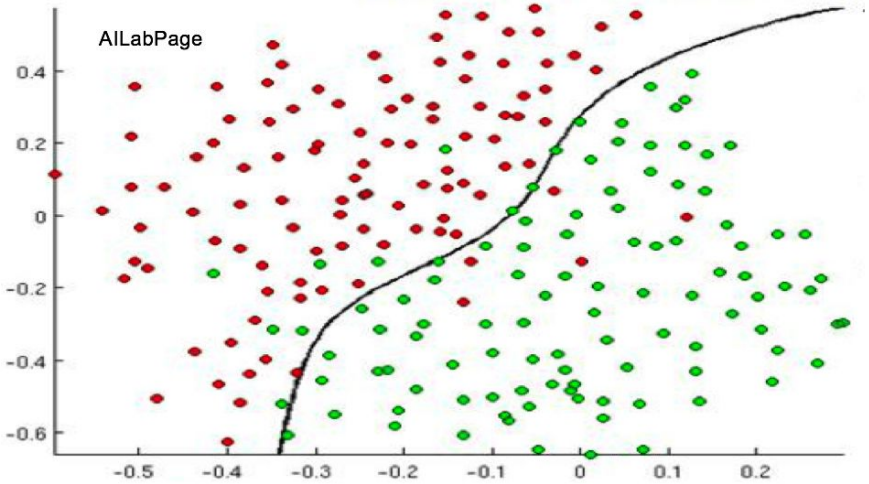



supervised learning
Input data
Annotations
These are apples
Model
Prediction
Its an apple!
unsupervised learning
Input data
Model


Training a Supervised Learner
Cat
Dog
Chicken
Training
Supervised Learning Algorithm
Making Predictions
Unknown
Supervised Learning Algorithm
Prediction
Dog
Cat
Chicken


Instantaneous rpm, torque, Fuel Cons. etc.
Machine Learning model (Random Forest, ANN,...)
Historical data
Model training
Predictive model
Other cycle, calibration changes,..
New data
Predictive model
Outcome (predictions, analysis)





Regression

The system attempts to predict a value for an input based on past data.

Example – 1. Temperature for tomorrow

Classification

In classification, predictions are made by classifying them into different categories.

Example – 1. Type of cancer 2. Cancer Y/N

Machine learning

Machine learning means learning from data:

- We have a quantitative outcome (regression) or categorical outcome (classification)
- We want to predict the *outcome* based on a set of *features* (supervised)
- We have a *training set*
- We build a prediction model for new unseen objects. The objective is to predict accurately

Vocabulary

Outcome: Usually denoted by Y

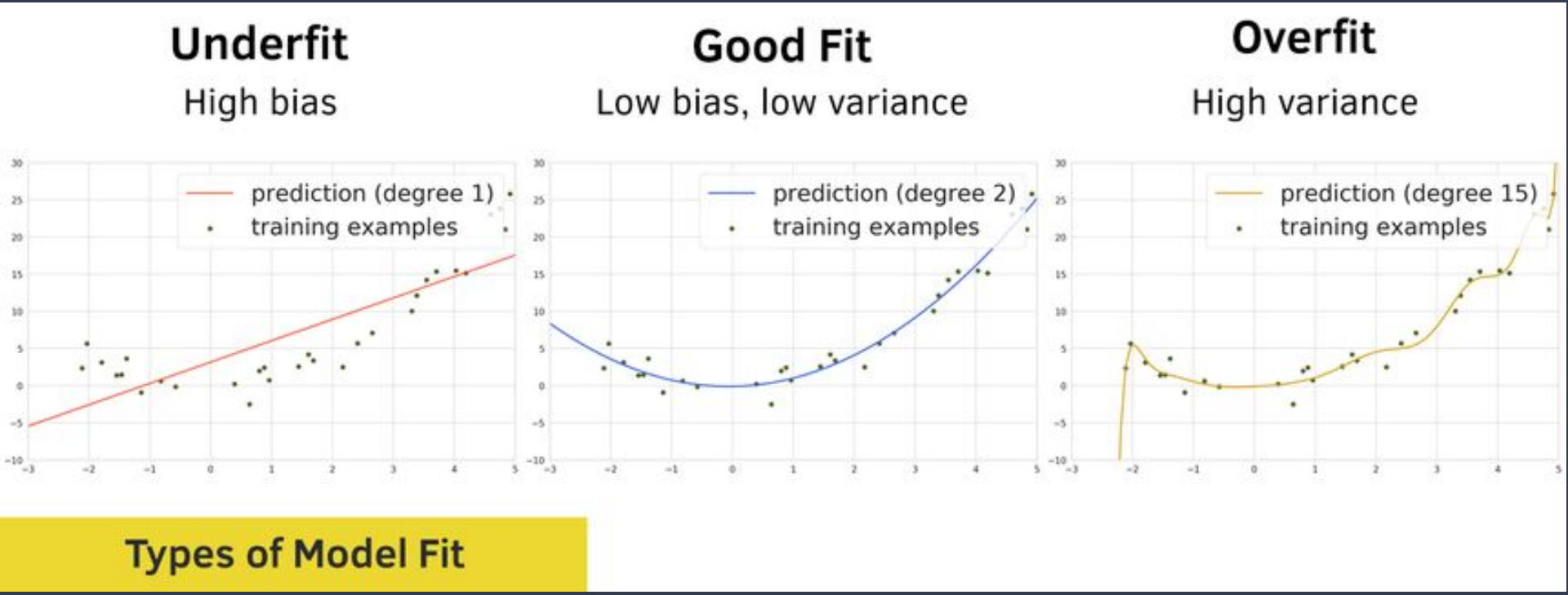
Features: Usually denoted by X (X is a vector of k features)

Training set: (x1, y1), ..., (xn, yn)

Objective: **get a good prediction of Y called $\hat{Y} = f(X)$.**

LOSS FUNCTION for penalizing errors (**cost function**)
Squared loss error $(Y - f(X))^2$ $(Y- \hat{Y})^2$

Types of Fit


Underfit
High bias
prediction (degree 1)
training examples
Good Fit
Low bias, low variance
prediction (degree 2)
training examples
Overfit
High variance
prediction (degree 15)
training examples
Types of Model Fit

Metrics

R2:

$$R^2 = 1 - \frac{\Sigma(y - \hat{y})^2}{\Sigma\left(y - \bar{y}\right)^2}$$

Adjusted R2:

$$R^2_{adj} = 1 - \left[\frac{\left(1 - R^2\right)(n-1)}{n-k-1}\right]$$

RMSE:

$$\mathrm{RMSE} = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}$$