

# Unsupervised vs Supervised Learning

## Definition



### Supervised learning:

A computer uses given labels as examples to take and sort series of data and thus to predict future events. In supervised learning people teach or train the machine using labeled data.

### Unsupervised learning:

Unsupervised learning sorts data without using predefined labels. The unsupervised machine learning algorithms act without human guidance.

### Input Data

Uses known and labeled input data

Uses unknown input data

### Computational Complexity

More complex in computation

Less complex in computation

### Number of Classes

Number of classes is known

Number of classes is not known

### Real Time

Uses off-line analysis

Uses real-time analysis of data

### Types

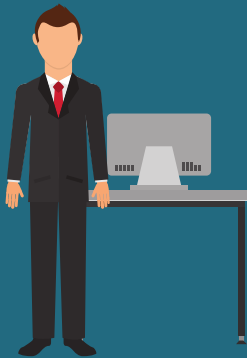
Two types of supervised machine learning:

- Classification
- Regression

Two types of unsupervised machine learning:

- Clustering
- Association

## List of popular algorithms



- Decision Trees
- K Nearest Neighbors
- Linear SVC (Support vector Classifier)
- Logistic Regression
- Naive Bayes
- Neural Networks
- Linear Regression
- Support Vector Regression (SVR)
- Regression Trees (e.g. Random Forest)
- Gradient boosting
- Fisher linear discriminant.

- K-means clustering
- K-NN (k nearest neighbors)
- Dimensionality Reduction
- Neural networks / Deep Learning
- Principal Component Analysis
- Singular Value Decomposition
- Independent Component Analysis
- Distribution models
- Hierarchical clustering
- Mixture models

## Examples of application



- Credit card fraud detection (fraud, not fraud)
- Email spam detection (spam, not spam)
- Text sentiment analysis (happy, not happy)
- For predicting patient risk (such as high-risk patient, low-risk patient)

- In marketing segmentation, when a company wants to segment its customers to better adjust products and offerings
- Social network analysis
- Image Segmentation
- Anomaly detection and etc.