## 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

- **Supervised learning:** Uses known and labeled input data
- **Unsupervised learning:** Uses unknown input data

### Computational Complexity

- **Supervised learning:** More complex in computation
- **Unsupervised learning:** Less complex in computation

### Number of Classes

- **Supervised learning:** Number of classes is known
- **Unsupervised learning:** Number of classes is not known

### Real Time

- **Supervised learning:** Uses off-line analysis
- **Unsupervised learning:** Uses real-time analysis of data

### Types

#### Supervised machine learning:
- Classification
- Regression

#### 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.

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.

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