Machine Learning

Lecture 2

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Course Teacher

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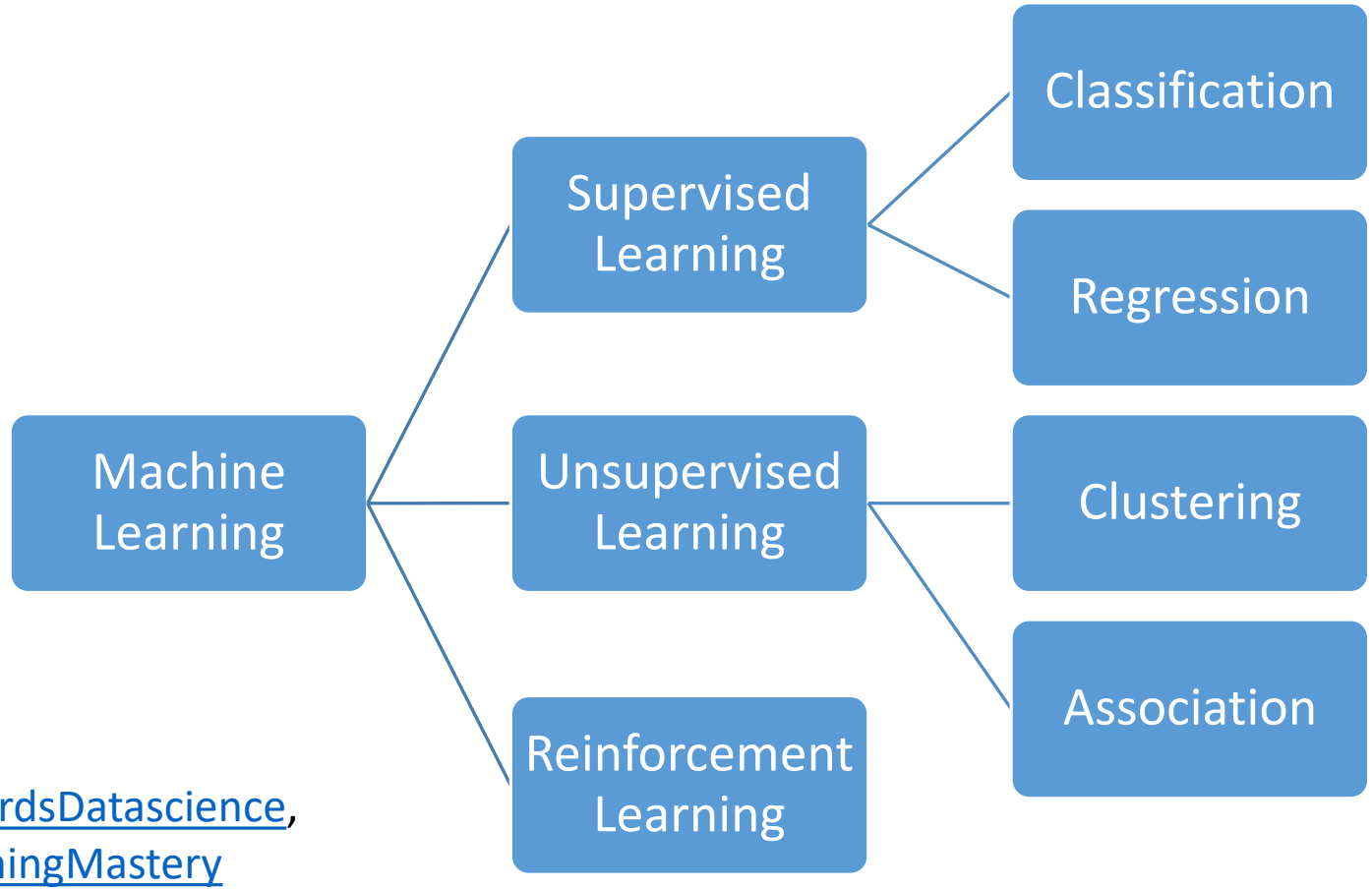
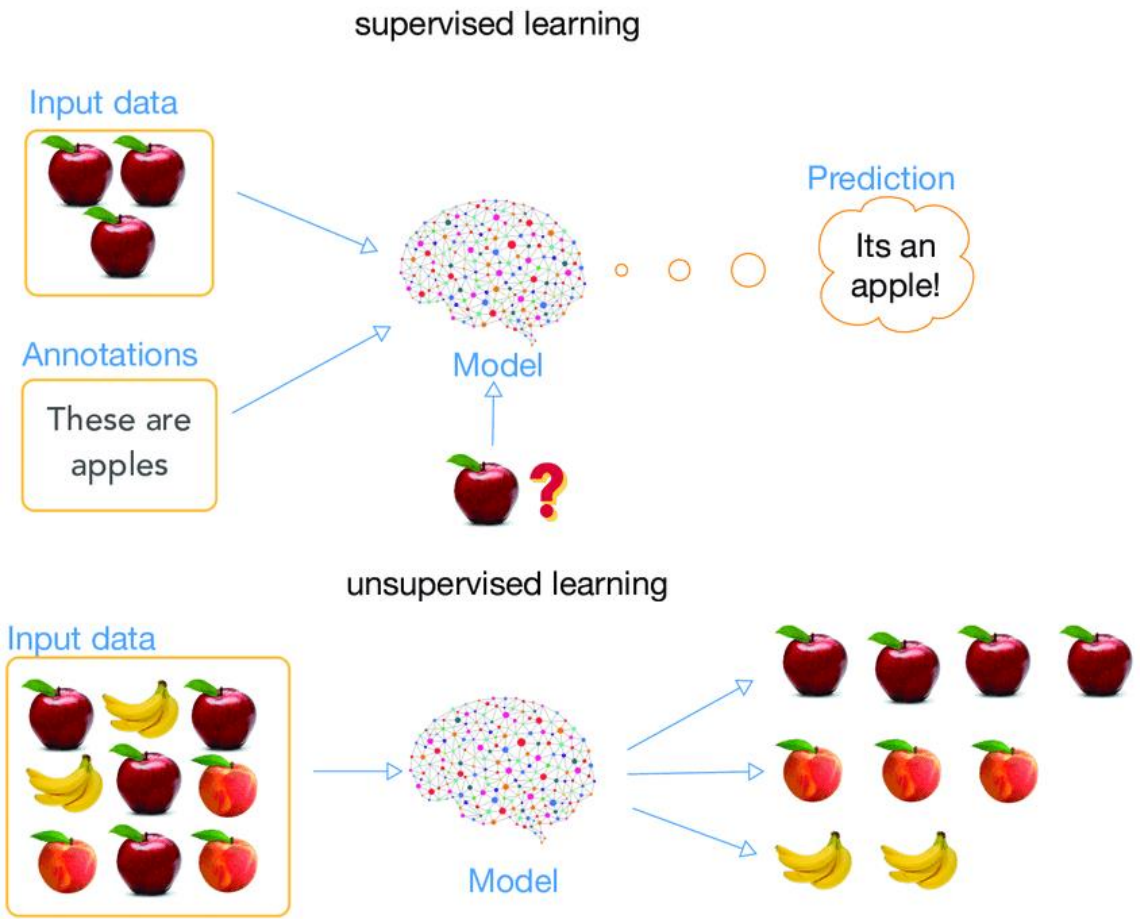
Types of Machine Learning



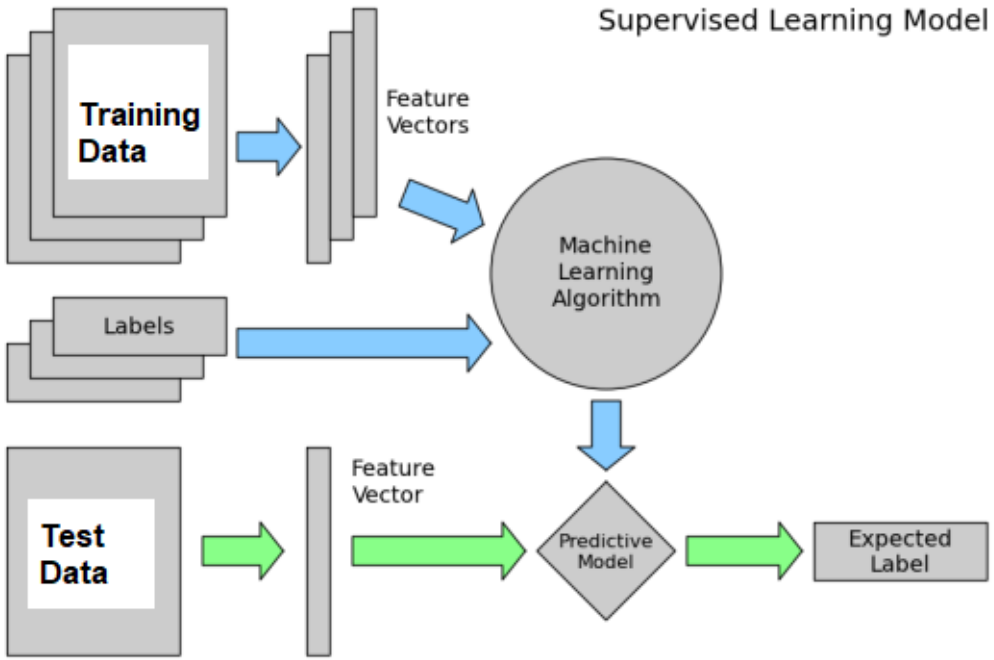
Source: TowardsDatascience, MachineLearningMastery

Supervised Learning vs Unsupervised Learning (An analogy)



Supervised Learning

- Also called Predictive Modeling



Supervised Learning (Cont.)

- Supervised learning is used to learn a mapping function *f* from the input *(X)* to the output *Y* as follows:

$$Y = f(X)$$

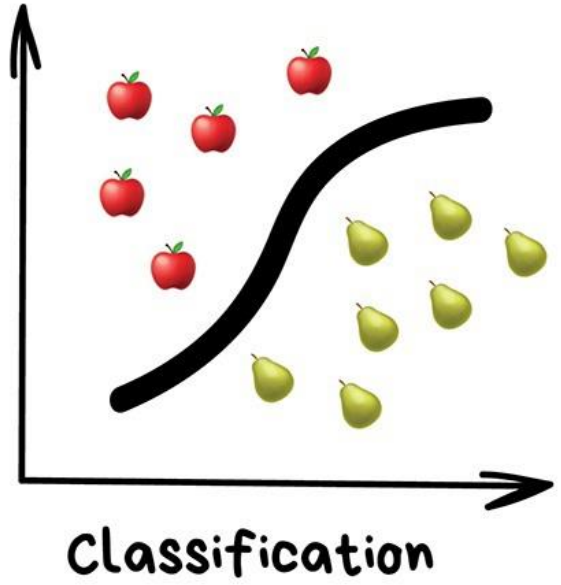
- The goal is to approximate the mapping function *f* so well that when you have new input data *(X)* that it can predict the output variables *(Y)* for that data.
- It is called supervised learning because the process of an algorithm learning from the training dataset can be thought of as a teacher supervising the learning process

Classification

- When the output variable / target variable is a category or a set of categories, such as “disease or no disease”, “red or green or blue” etc.
- Predicts one or more categories/labels/classes for each input/instance
- Binary Classification: Classifying instances into one of two classes/categories
- Multiclass Classification: Classifying instances into one of three or more classes/categories
- Multi-Label Classification: Multiple labels/classes are to be predicted for each instance

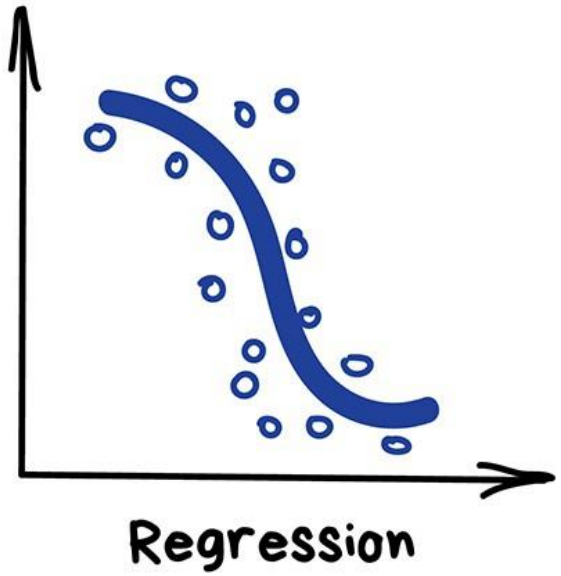
Some Classification Problems

- Spam filtering
- Language detection
- A search of similar documents
- Sentiment analysis
- Recognition of handwritten characters and numbers
- Fraud detection etc.



Regression

- When the output variable is a real/continuous value, such as “dollars” or “weight” or “Score”
- Predicts a single output value
- Why do we use Regression Analysis?
  - Forecasting
  - Demand and sales volume analysis
  - Time series modelling
  - Medical diagnosis etc.
- Linear Regression
- Polynomial Regression

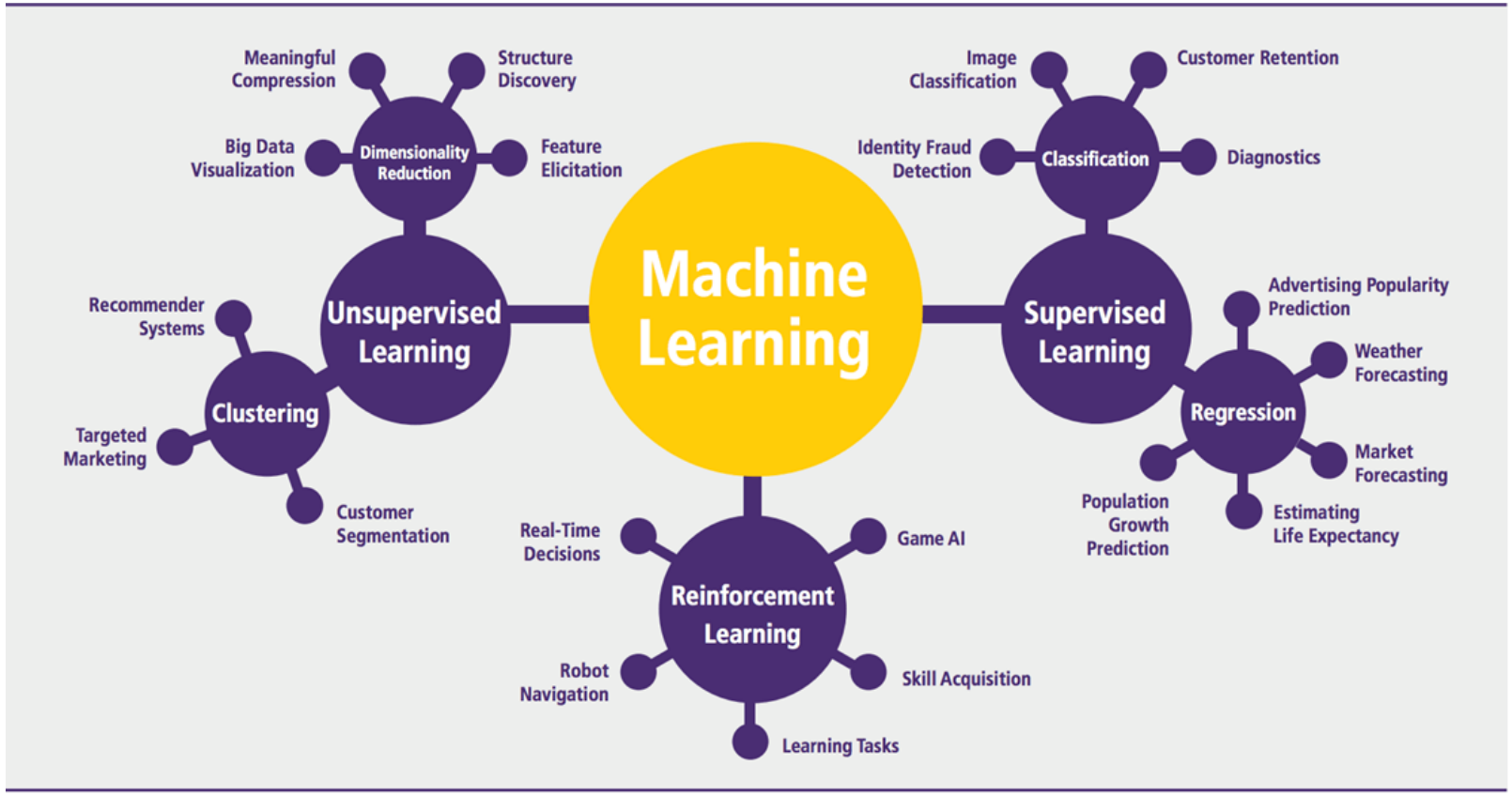


Source: AnalyticsVidhya

List of Common Supervised Learning Algorithms

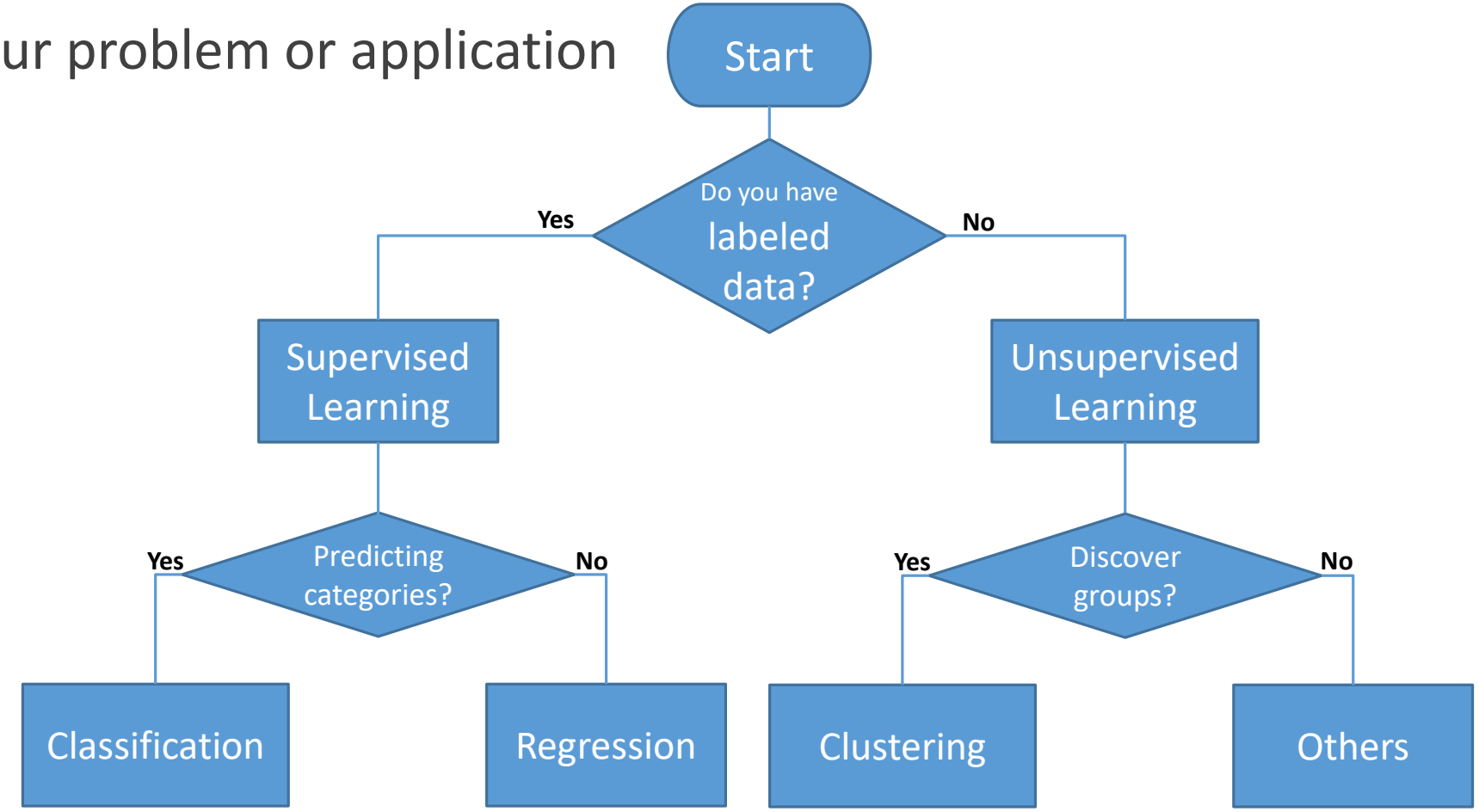
- Linear Regression
- Logistic Regression
- k-Nearest Neighbors (kNN)
- Decision Trees
- Random Forest
- Support Vector Machines (SVM)
- Gradient Boosting Machines (GBM)
- LightGBM
- XGBoost
- Neural Networks

Machine Learning algorithms and where they are used?



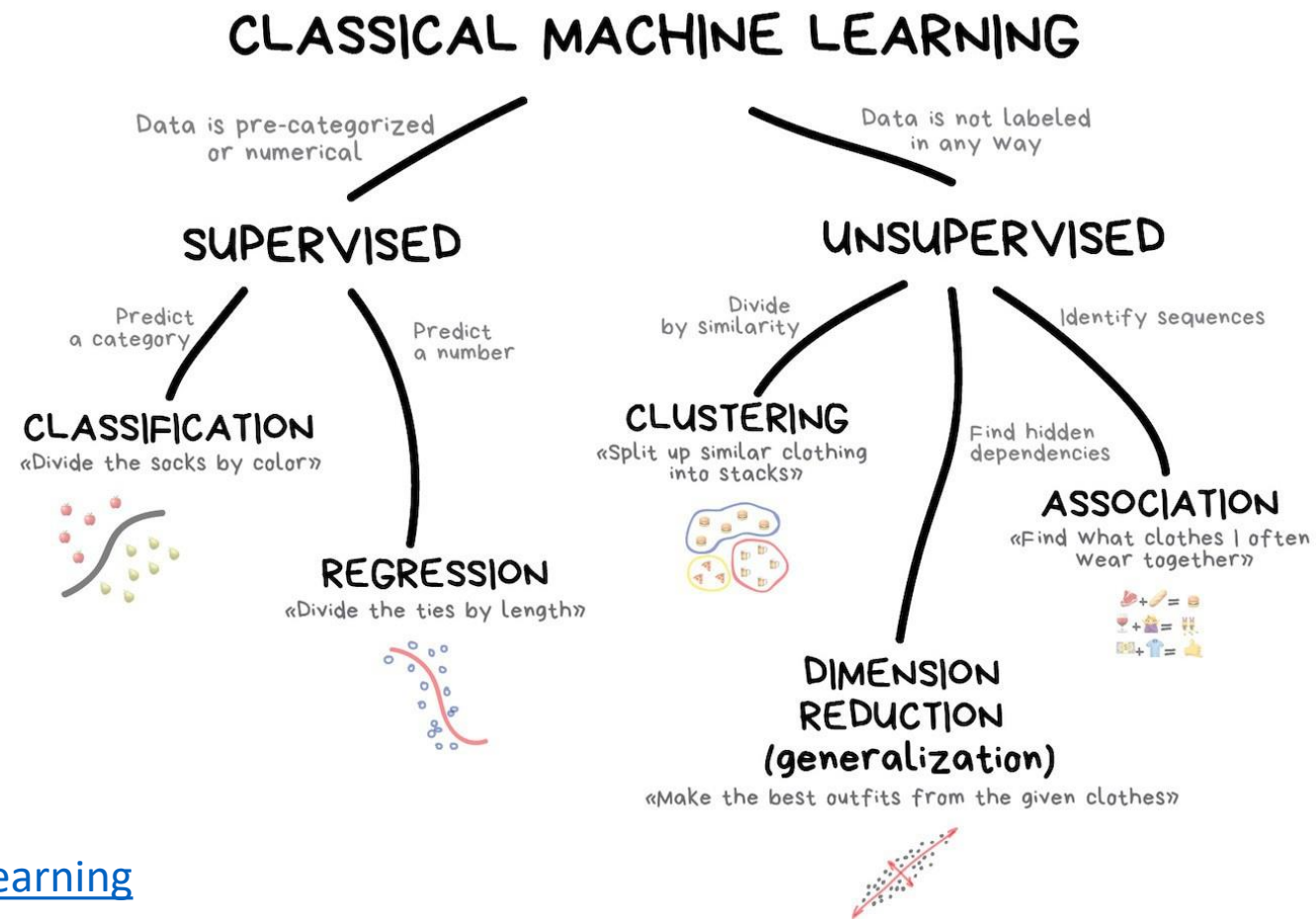
Which type of Machine Learning algorithm should I use?

- It depends on your problem or application



Source: Medium

Which type of Machine Learning algorithm should I use? (Another Figure)



Source: [Machine Learning]

Some Learning Materials

1. Commonly used Machine Learning Algorithms [AnalyticsVidhya]
2. Supervised Machine Learning: What is, Algorithms, Example [Guru99]
3. Unsupervised Machine Learning: What is, Algorithms, Example [Guru99]
4. Introduction to Machine Learning with scikit-learn [Kevin Markham]
5. Build your First Multi-Label Image Classification Model in Python [AnalyticsVidhya]
6. Machine Learning for Everyone [Link]