Presentation
On
Machine Learning

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Outline

History of ML

➤ The name *machine learning* was coined in 1959 by Arthur Samuel Tom M. Mitchell provided a widely quoted, more formal definition of the algorithms studied in the machine learning field:

➤ A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P if its performance at tasks in T, as measured by P, improves with experience E.

➤ Alan Turing's proposal in his paper "Computing Machinery and Intelligence", in which the question "Can machines think?" is replaced with the question "Can machines do what we (as thinking entities) can do?".

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Bloombench **History of Machine Learning**

|			
1642 Mechanical Adder	**1801** First storage of data	**1847** Boolean Logic	**1890** Mechanical system for statistical calculations
1950 Turing Test	**1952** First computer learning program	**1957** The Perceptron	**1967** Pattern Recognition
1979 Stanford Cart	**1981** Explanation Based Learning	**1990s** Machine Learning Applications	**2000s** Adaptive Programming

What is ML

➢ A branch of artificial intelligence, concerned with the design and development of algorithms that allow computers to evolve behaviors based on empirical data.

➢ As intelligence requires knowledge, it is necessary for the computers to acquire knowledge.

➢ *Machine learning refers to a system capable of the autonomous acquisition and integration of knowledge*

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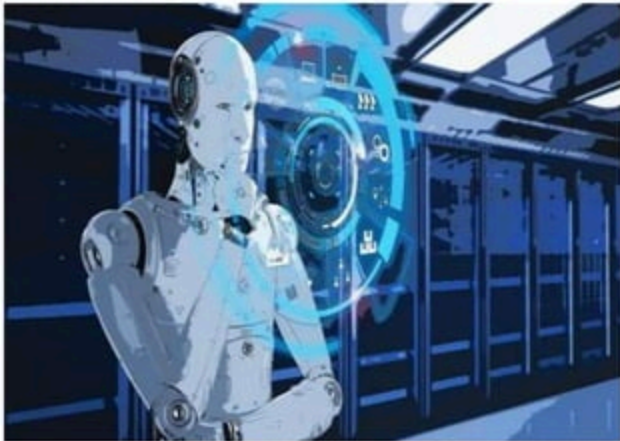
Why ML

❑ **No human experts**
  ➢ industrial/manufacturing control.
  ➢ mass spectrometer analysis, drug design, astronomic discovery.
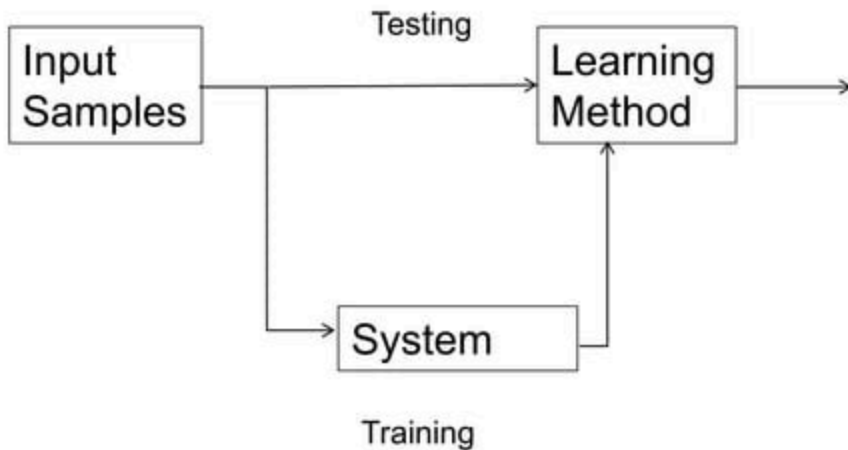
❑ **Black-box human expertise**
  ➢ face/handwriting/speech recognition.
  ➢ driving a car, flying a plane.
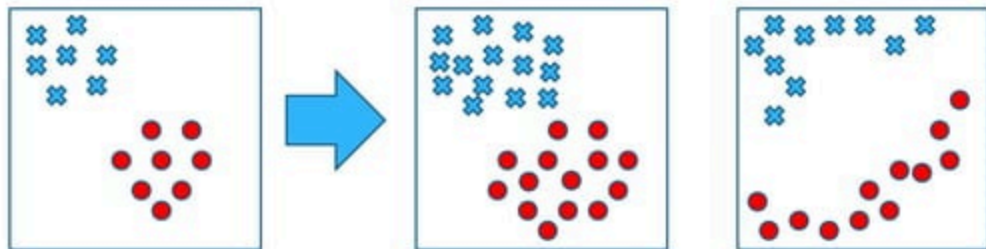
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- ❑ **Rapidly changing phenomena**
  - ➢ **credit scoring, financial modeling.**
  - ➢ **diagnosis, fraud detection.**
- ❑ **Need for customization/personalization**
  - ➢ **personalized news reader.**
  - ➢ **movie/book recommendation.**
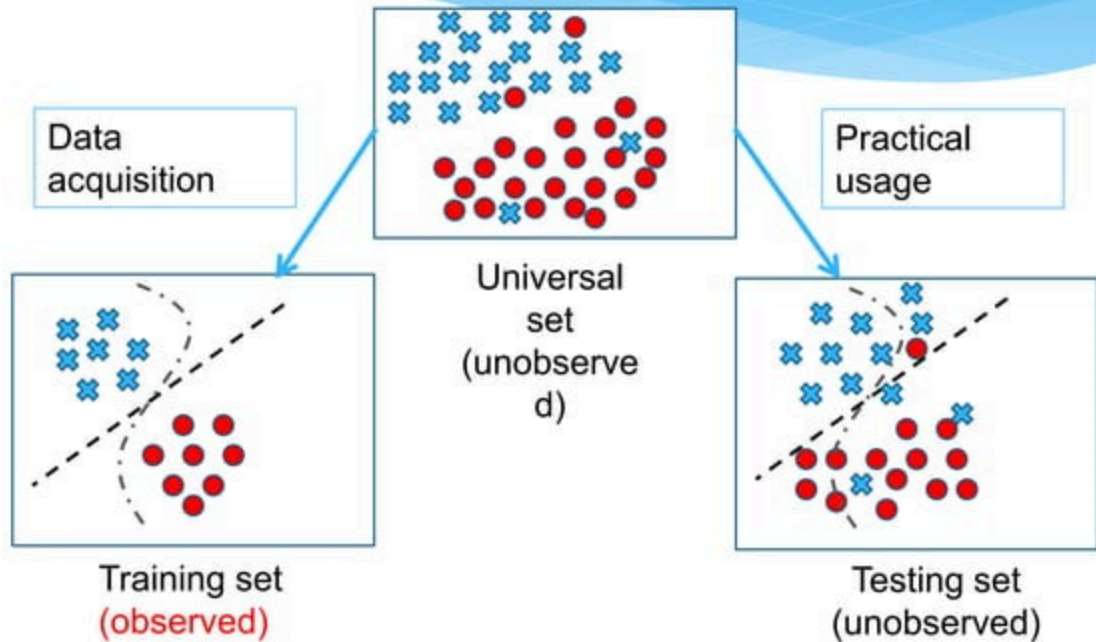
Learning System Model

Training and Testing.

❑ **Training is the process of making the system able to learn.**

❑ **No free lunch rule:**
  ➤ **Training set and testing set come from the same distribution**
  ➤ **Need to make some assumptions or bias**

Contd.

Data acquisition

Practical usage

Universal set (unobserved)

Training set (observed)

Testing set (unobserved)

Performance

❑ **There are several factors affecting the performance:**
  ➢ **Types of training provided**
  ➢ **The form and extent of any initial background knowledge**
  ➢ **The type of feedback provided**
  ➢ **The learning algorithms used**

❑ **Two important factors:**
  ➢ **Modeling**
  ➢ **Optimization**

Algorithm

➤ The success of machine learning system also depends on the algorithms.

➤ The algorithms control the search to find and build the knowledge structures.

➤ The learning algorithms should extract useful information from training examples.

Types of Algorithm in ML

❑ **Supervised learning .**
  ➢ **Prediction**
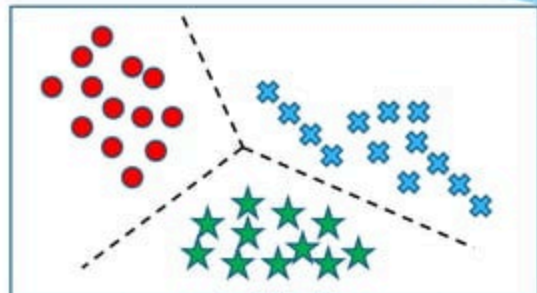 ➢ **Classification (discrete labels), Regression (real values)**

❑ **Unsupervised learning.**
  ➢ **Clustering**
  ➢ **Probability distribution estimation**
  ➢ **Finding association (in features)**
  ➢ **Dimension reduction**

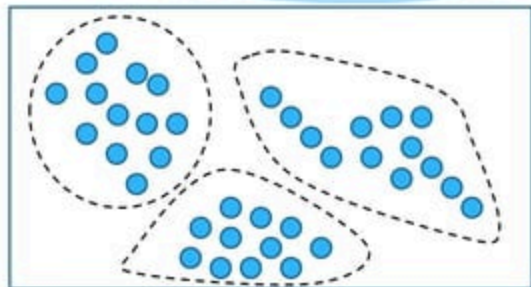❑ **Semi-supervised learning.**

❑ **Reinforcement learning.**
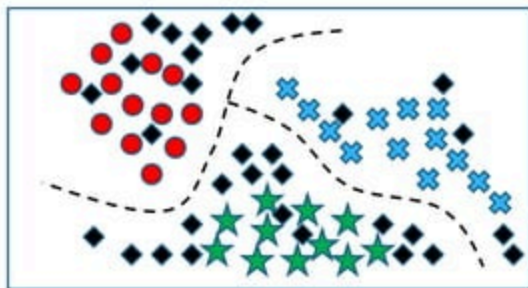 ➢ **Decision making (robot, chess machine)**
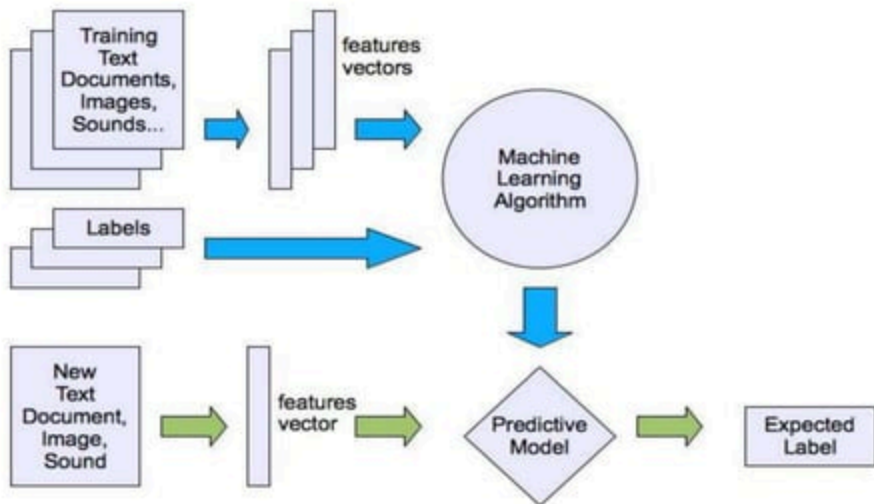
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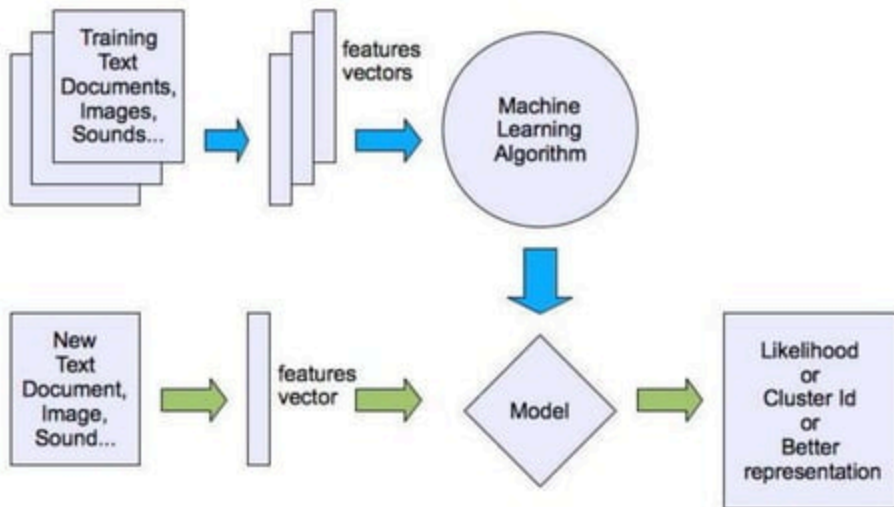Supervised learning

Unsupervised learning

Semi-supervised learning

Machine Learning Structure

☐ **Supervised learning**

Contd.

Unsupervised learning

Application

- ❑ Face detection.

- ❑ Object detection and recognition.

- ❑ Image segmentation.

- ❑ Multimedia event detection.

- ❑ Economical and commercial usage.

Conclusion

❑ We have a simple overview of some techniques and algorithms in machine learning. Furthermore, there are more and more techniques apply machine learning as a solution. In the future, machine learning will play an important role in our daily life.

THANK YOU