Chapter 1: The Machine Learning Landscape

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1 Types of Machine Learning Systems

Supervised Learning: training data that's fed to the algorithm includes the desired solutions, called *labels*.

- *Classification* and *Regression* are examples of supervised learning.
- *Logistic regression* is commonly used for classification, not to be confused with classification.

Unsupervised Learning: training data is unlabeled.

- Clustering
  - k-Means
  - Hierarchical Cluster Analysis (HCA)
  - Expectation Maximization
- Visualization and dimensionality reduction
  - Principal Component Analysis (PCA)
  - Kernel PCA
  - Locally-Linear Embeddings (LLE)
  - t-distributed Stochastic Neighbor-Embedding (t-SNE)
- Association rule learning
  - Apriori
  - Eclat

A related task is *dimensionality reduction*: simplifying the data without losing too much information. One way to do this is through *feature extraction*, merging several correlated features into one.

Semisupervised Learning: Semisupervised learning algorithms are usually a combination of supervised and unsupervised approaches.

- Deep Belief Networks (DBNs) are based on unsupervised components called *restricted Boltzmann machines (RBMs)* stacked on top of each other and then fine tuned using supervised learning.

Reinforcement Learning: A learning system reacts to rewards or penalties to craft the optimal policy, or course of action.