

INTRODUCTION

MACHINE LEARNING

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Topic

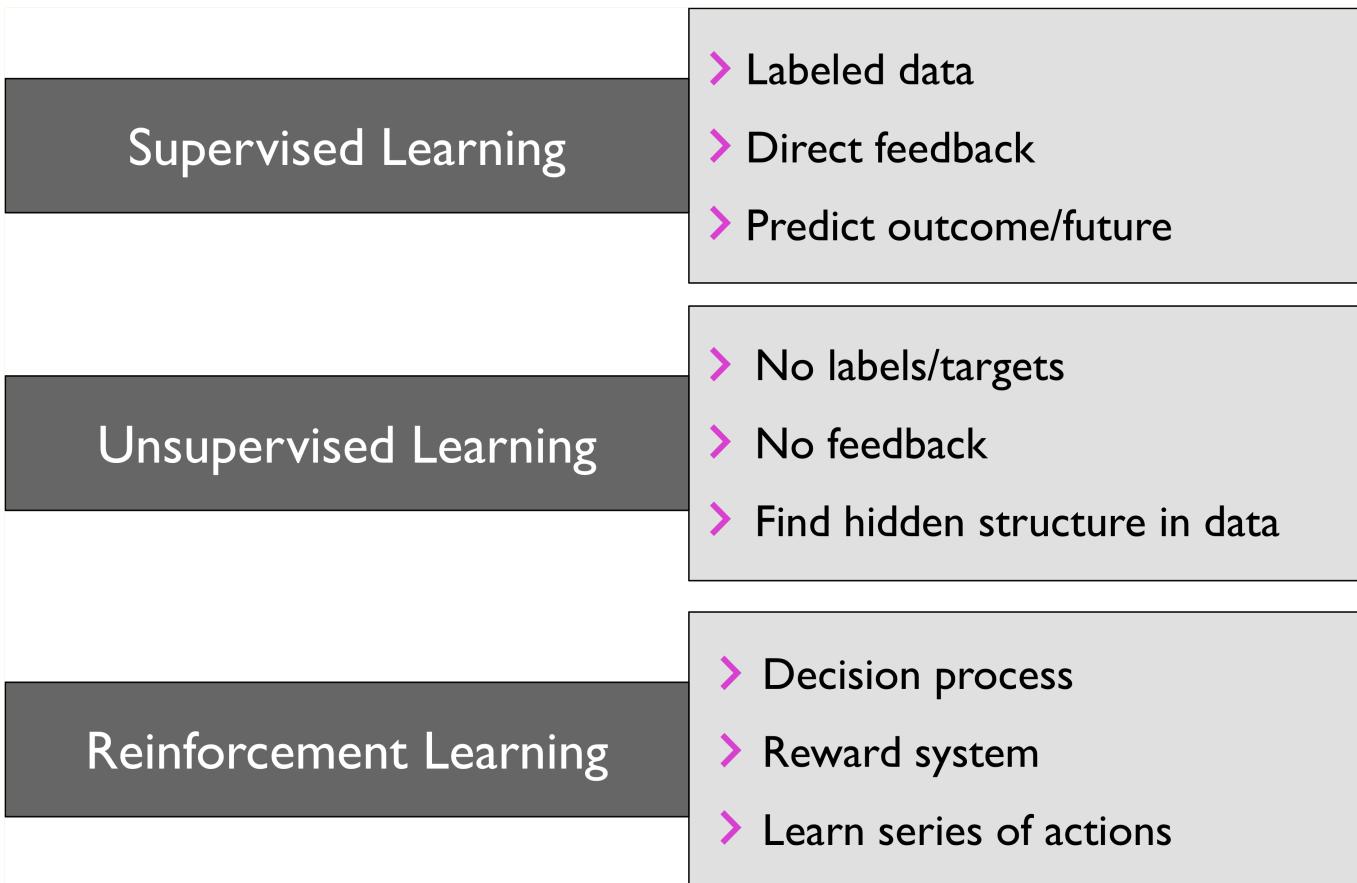
- What is Machine Learning?
- Types of Learning
- Terminology
- Pipeline

What is Machine Learning?

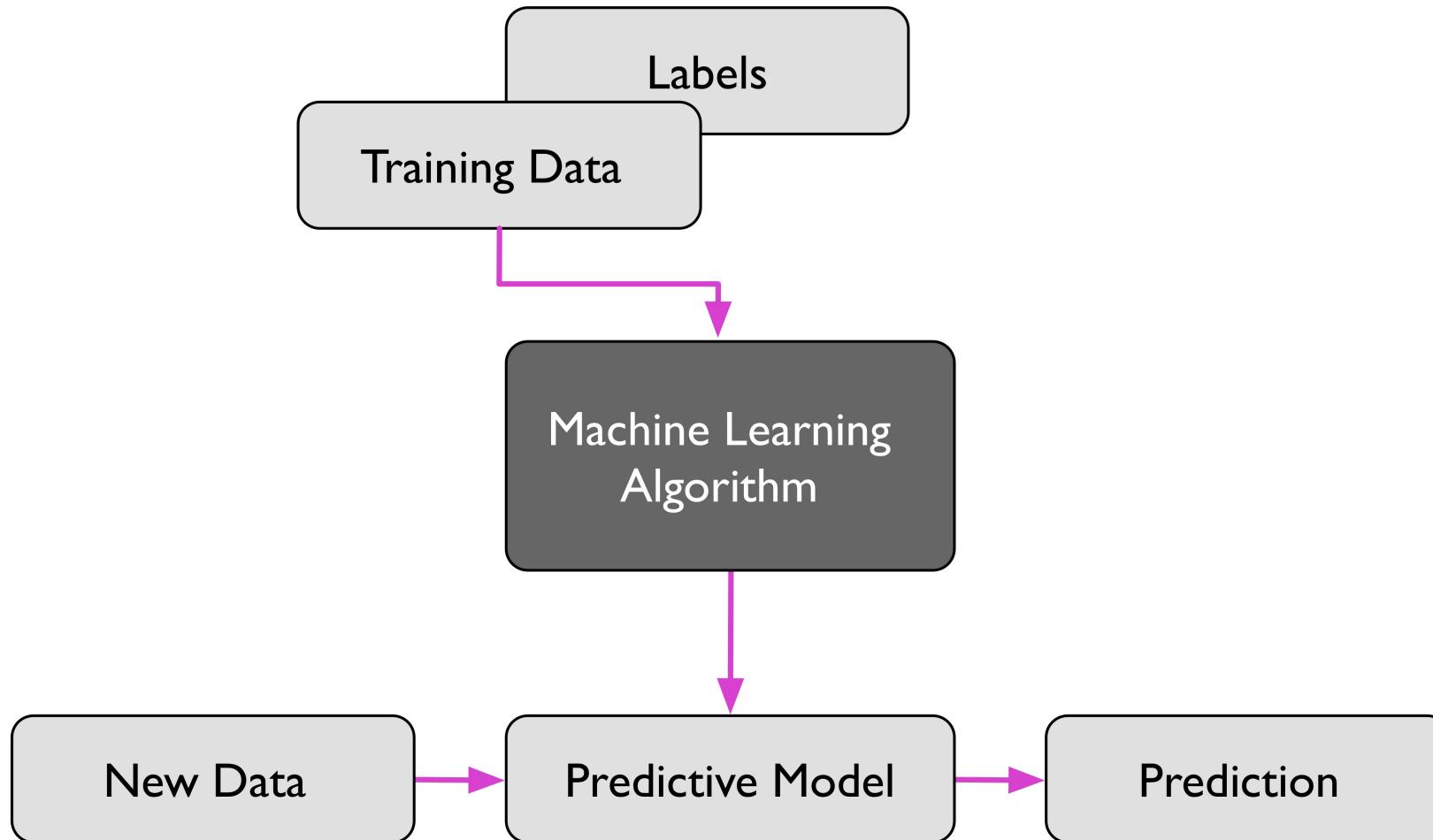
“Machine learning is the science of getting computers to act without being explicitly programmed.” – Andrew Ng, Machine Learning course on coursera.org

“Machine Learning is the science of getting computers to learn and act like humans do, and improve their learning over time in autonomous fashion, by feeding them data and information in the form of observations and real-world interactions.” - <https://emerj.com/ai-glossary-terms/what-is-machine-learning/>

Types of Learning

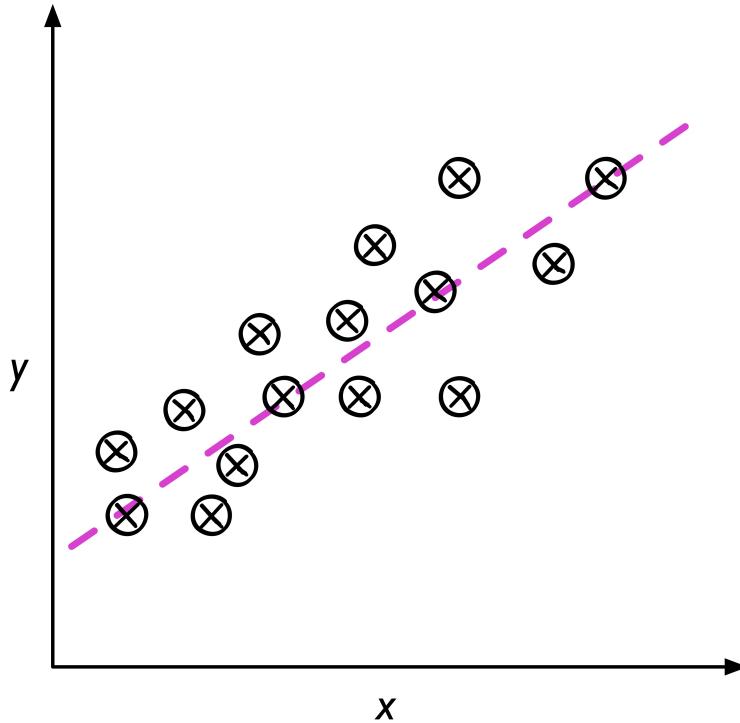


Supervised Learning

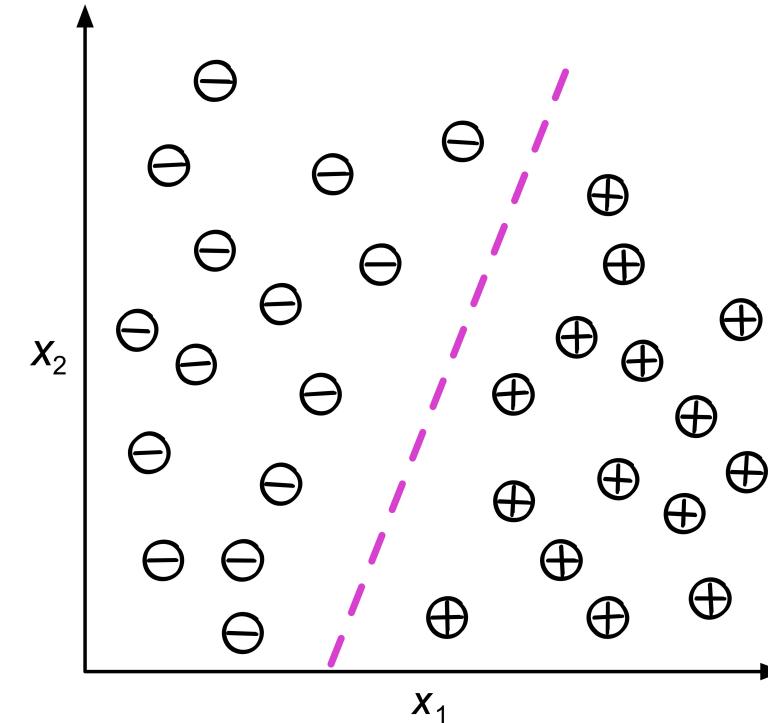


Supervised Learning

Regression

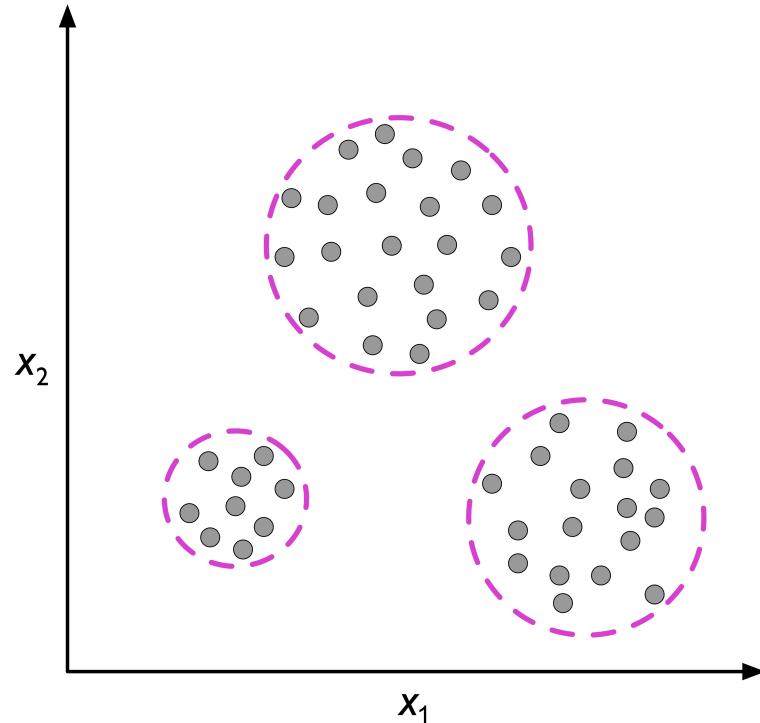


Classification

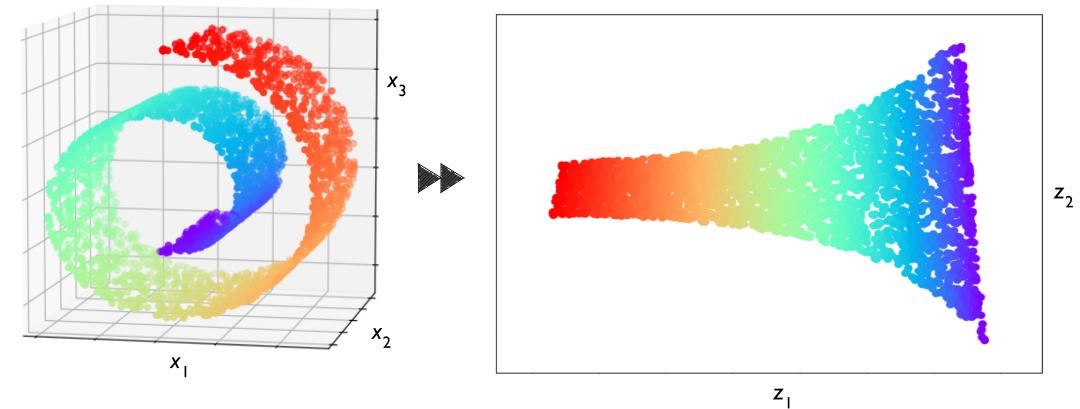


Unsupervised Learning

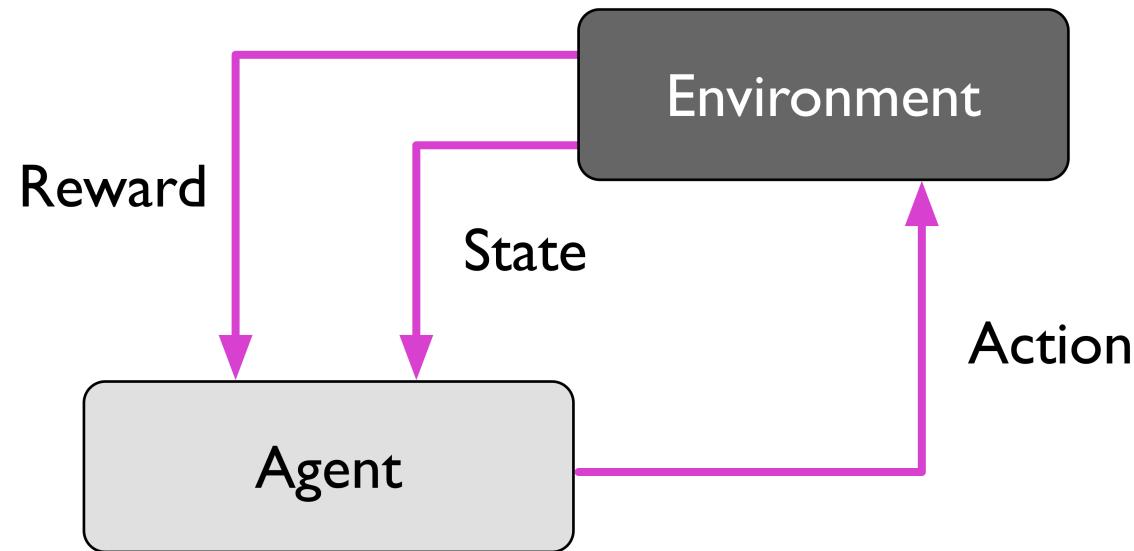
Clustering



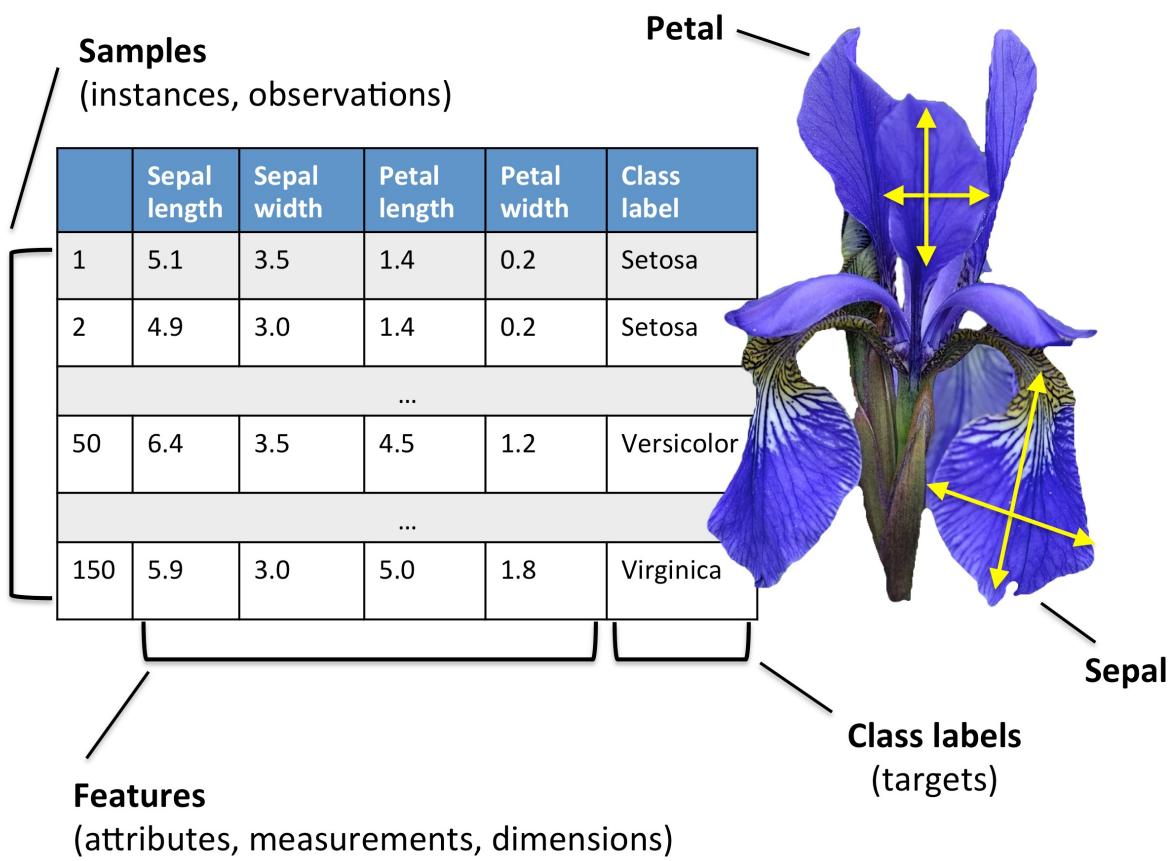
Dimensionality Reduction



Reinforcement Learning



Terminology – Simple Structured Data



Assume 150 samples and 4 features:

$$X \in \mathbb{R}^{150 \times 4}$$

$$\begin{bmatrix} x_1^{(1)} & x_2^{(1)} & x_3^{(1)} & x_4^{(1)} \\ x_1^{(2)} & x_2^{(2)} & x_3^{(2)} & x_4^{(2)} \\ \vdots & \vdots & \vdots & \vdots \\ x_1^{(150)} & x_2^{(150)} & x_3^{(150)} & x_4^{(150)} \end{bmatrix}$$

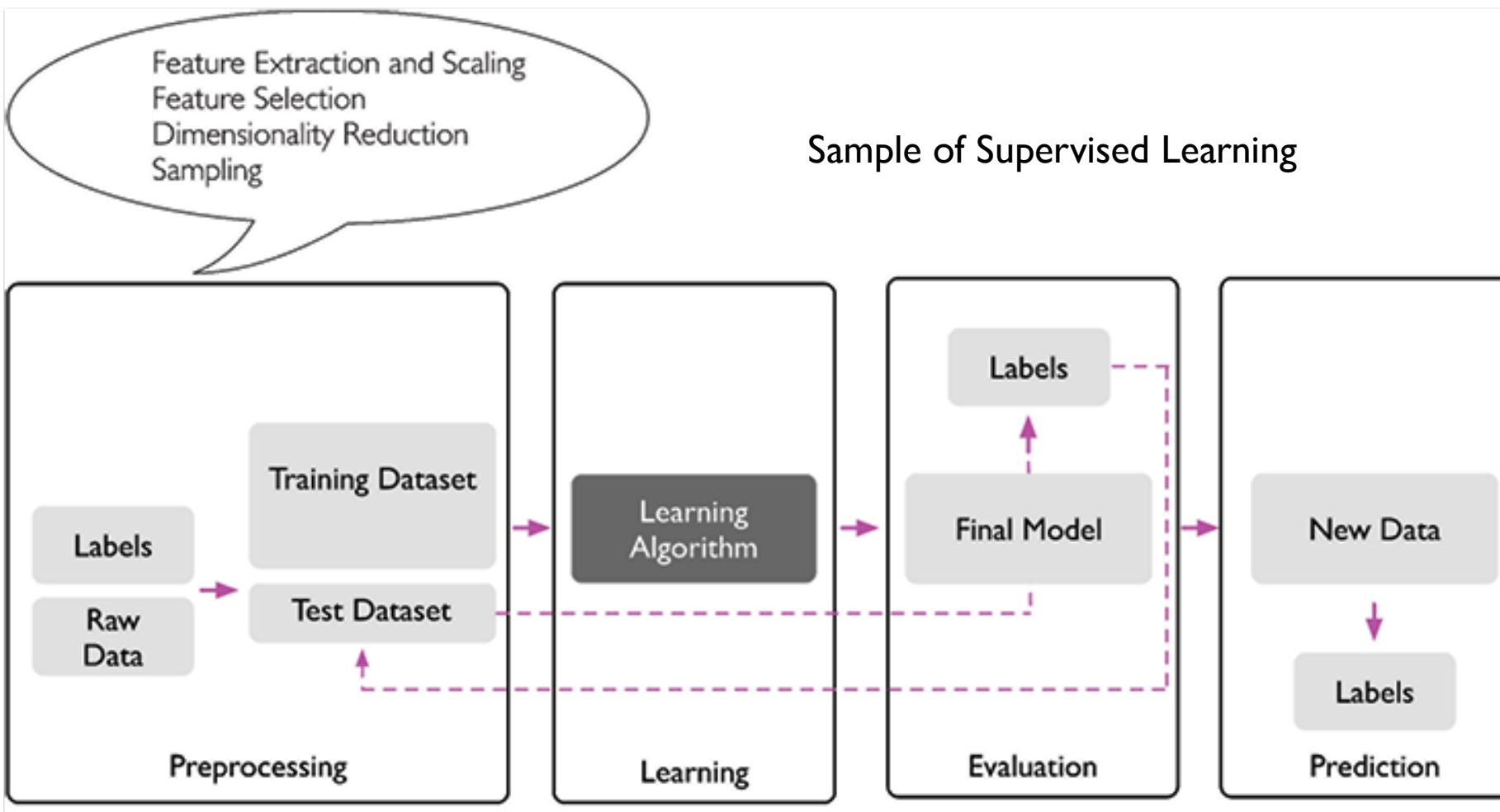
Row i : $\boldsymbol{x}^{(i)} = [x_1^{(i)} \ x_2^{(i)} \ x_3^{(i)} \ x_4^{(i)}]$

Column j : $\boldsymbol{x}_j = \begin{bmatrix} x_j^{(1)} \\ x_j^{(2)} \\ \vdots \\ x_j^{(150)} \end{bmatrix}$

Terminology

- **Training example:** A row in a table representing the dataset and synonymous with an observation, record, instance, or sample (in most contexts, sample refers to a collection of training examples).
- **Training:** Model fitting, for parametric models similar to parameter estimation.
- **Feature, abbrev. x:** A column in a data table or data (design) matrix. Synonymous with predictor, variable, input, attribute, or covariate.
- **Target, abbrev. y:** Synonymous with outcome, output, response variable, dependent variable, (class) label, and ground truth.
- **Loss function:** Often used synonymously with a cost function. Sometimes the loss function is also called an error function. In some literature, the term "loss" refers to the loss measured for a single data point, and the cost is a measurement that computes the loss (average or summed) over the entire dataset.

Pipeline



Q & A



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