AI 언어지능 중급과정

Day 01 – Basic Machine Learning

Machine Learning

Three Types of Machine Learning

01 **Supervised Learning**

- Labeled data
- Direct feedback
- Predict outcome/future

02 **Unsupervised Learning**

- No labels/targets
- No feedback
- Find hidden structure in data

03 **Reinforcement Learning**

- Decision process
- Reward system
- Learn series of actions

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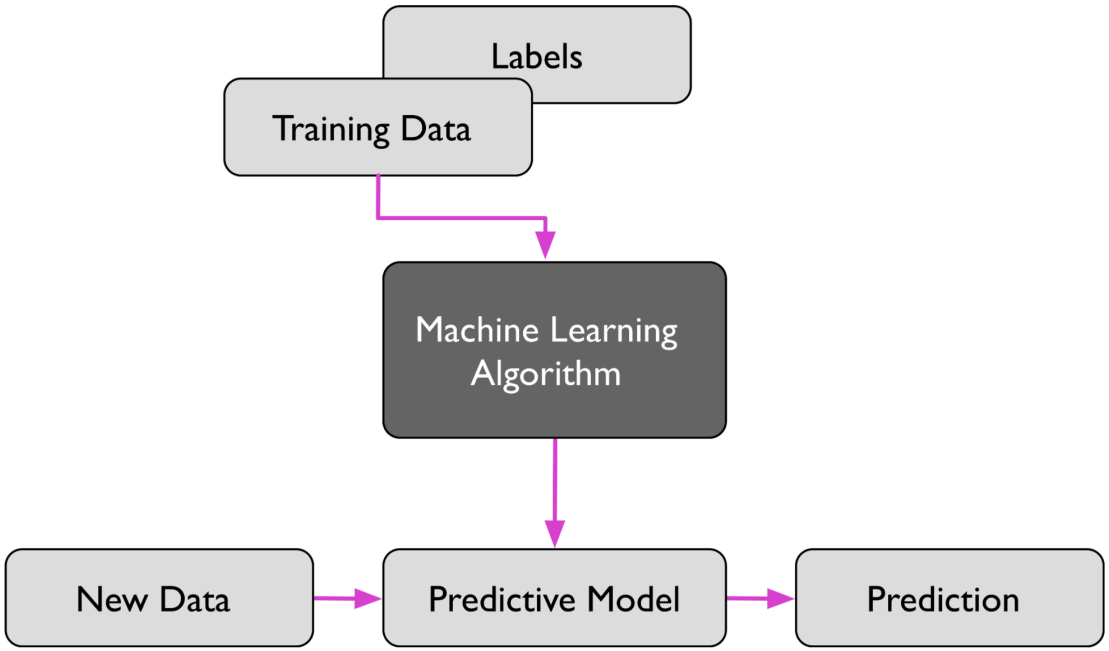
Supervised Learning

Regression & Classification



Classification

- Learn to predict discrete values
- Predict most probable category, class

Regression

- Predict the value of a continuous response variable
- Learn from continuous data

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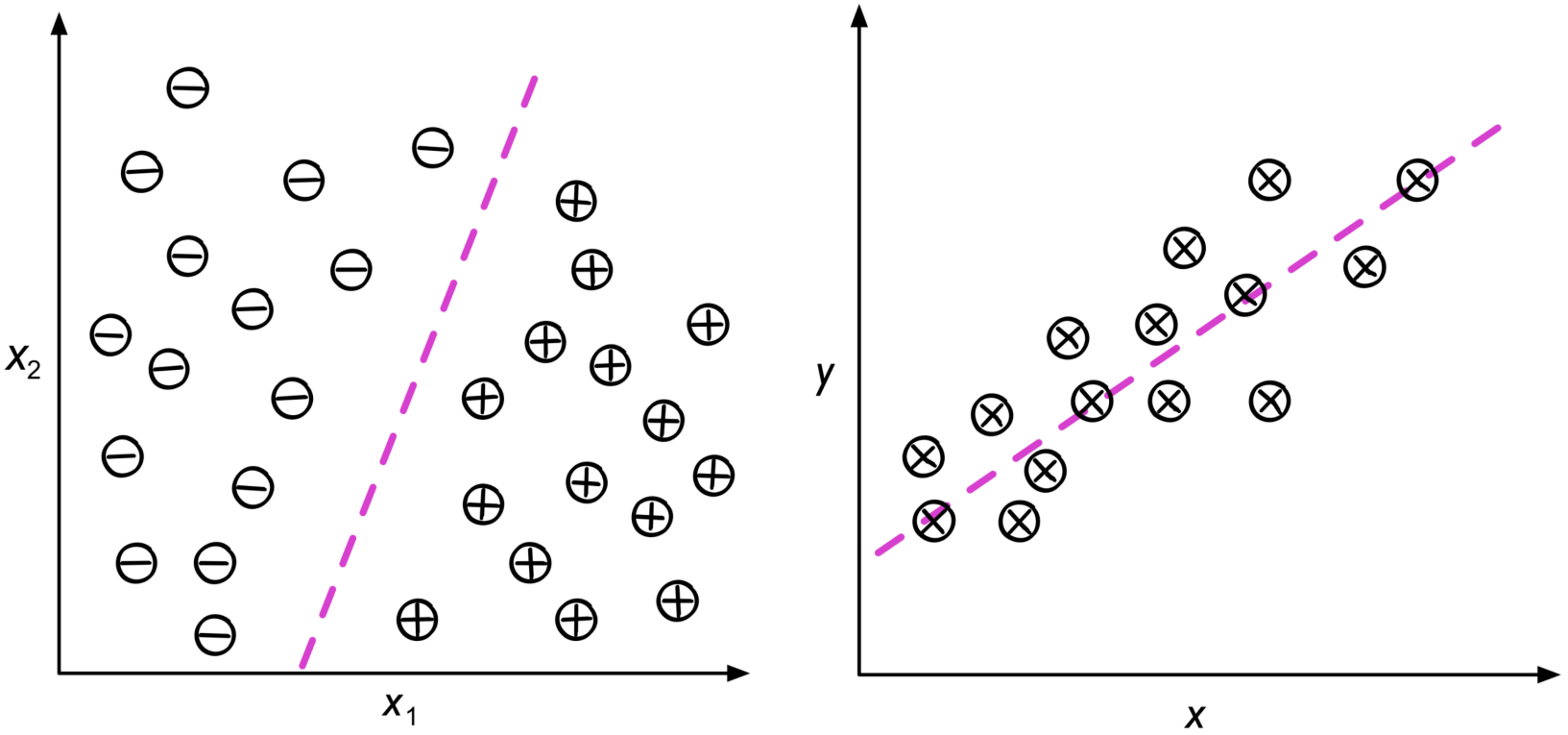
Supervised Learning



Classification

Regression

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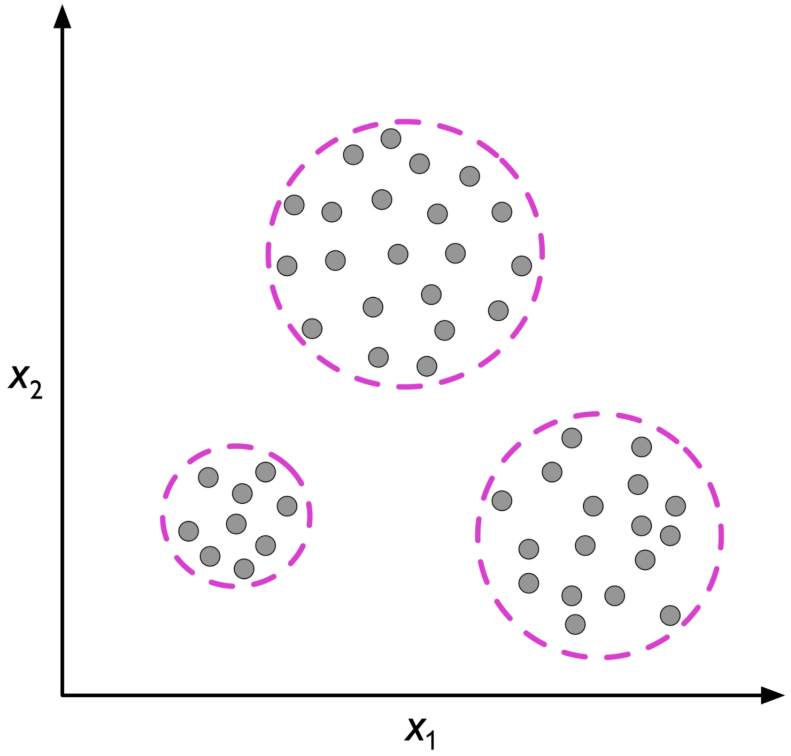
Unsupervised Learning

Unclassified and unlabeled data to uncover patterns from the data



Clustering

- No label or target for given data
- Discovering hidden features

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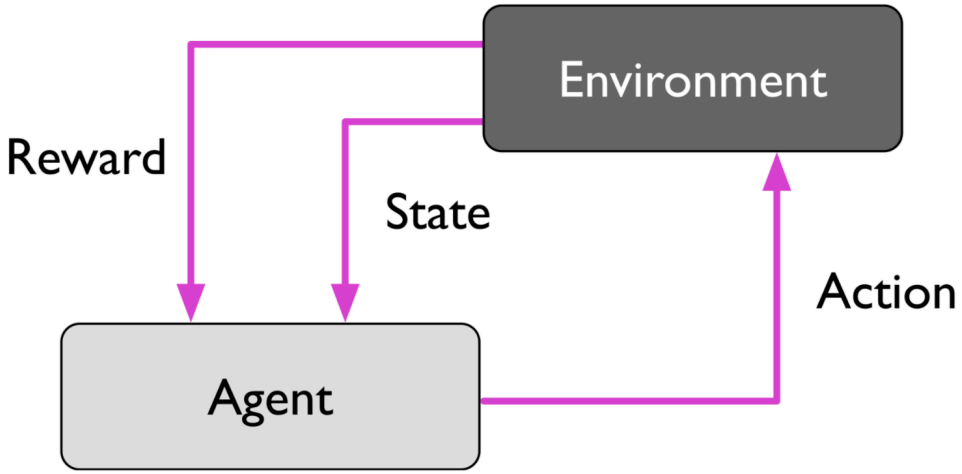
Reinforcement Learning

Goal-oriented Algorithm



- Attain a complex objective or Maximize along a particular dimension over many steps
- Reward feedback to learn which action is best for the agent
- Maximize points won in a game

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Pipeline for Machine Learning System

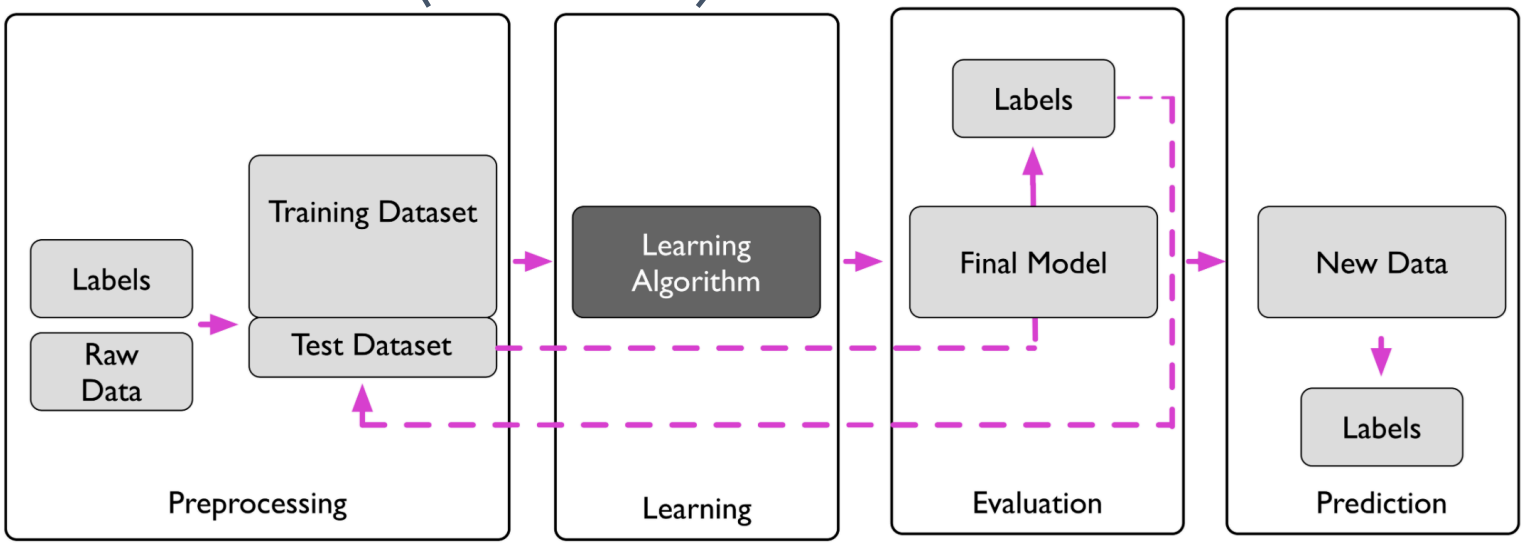
Same for all machine learning and deep learning

Feature Extraction and Scaling
Feature Selection
Dimensionality Reduction
Sampling

01

02

Model Selection
Cross-Validation
Performance Metrics
Hyperparameter Tuning & Optimization



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Examples of Supervised Learning

Linear Regression and Logistic Regression

Linear Regression

Mean Absolute Error

$$MAE = 1/m \sum_i abs(\hat{y}_i - y_i)$$

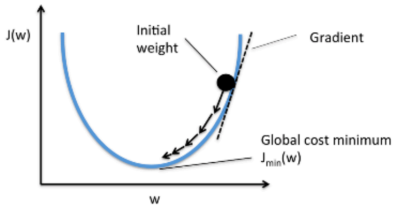
Mean Squared Error

$$MSE = 1/2m \sum_i (\hat{y}_i - y_i)^2$$

- Adjust weights to reduce MAE or MSE

Gradient Descent Algorithm

- Batch Gradient Descent
- Mini-batch Gradient Descent
- Stochastic Gradient



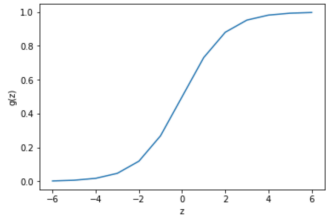
Logistic Regression

$$g(x) = \frac{1}{1 + e^{-(w_0 + w_1 x)}}$$

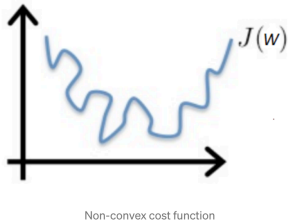
Sigmoid function

$$g(z) = \frac{1}{1 + e^{-z}}$$

$$0 \leq y' \leq 1$$



Cost Function



Non-convex cost function

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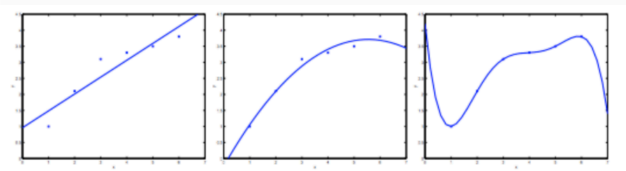
Several terms for Machine Learning

For better models

Under-fitting & Over-fitting



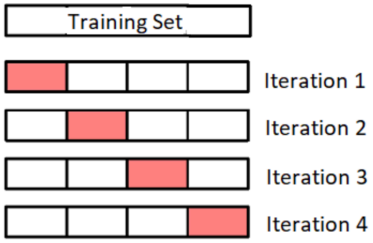
- Reduce number of features
- Regularization
  - L1 & L2 Regularization
- Early Stopping

Hyper-parameters

- Learning rate: alpha
- Regularization: lambda

Cross-Validation

- Training, Validation and Test data
- Split into k parts, or “folds”



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Thank You!