

Idea Factory Intensive Program #2

딥러닝 홀로서기

이론강의/PyTorch실습/코드리뷰

딥러닝(Deep Learning)에 관심이 있는 학생 발굴을 통한
딥러닝의 이론적 배경 강의 및 오픈소스 딥러닝 라이브러리 PyTorch를 활용한 실습

#1

Acknowledgement

Sung Kim's 모두를 위한 머신러닝/딥러닝 강의

- <https://hunkim.github.io/ml/>
- https://www.youtube.com/playlist?list=PLIMkM4tgfjnLSOjrEJN31gZATbcj_MpUm

Andrew Ng's and other ML tutorials

- <https://class.coursera.org/ml-003/lecture>
- <http://www.holehouse.org/mlclass/> (note)
- [Deep Learning Tutorial](#)
- [Andrej Karpathy's Youtube channel](#)

WooYeon Kim & SeongOk Ryu's KAIST CH485 Artificial Intelligence and Chemistry

- <https://github.com/SeongokRyu/CH485---Artificial-Intelligence-and-Chemistry>

SungJu Hwang's KAIST CS492 Deep Learning Course Material

Many insightful articles, blog posts and Youtube channels

Facebook community

- Tensorflow KR (<https://www.facebook.com/groups/TensorFlowKR/>)
- Pytorch KR (<https://www.facebook.com/groups/PyTorchKR/>)

Medium Channel and Writers

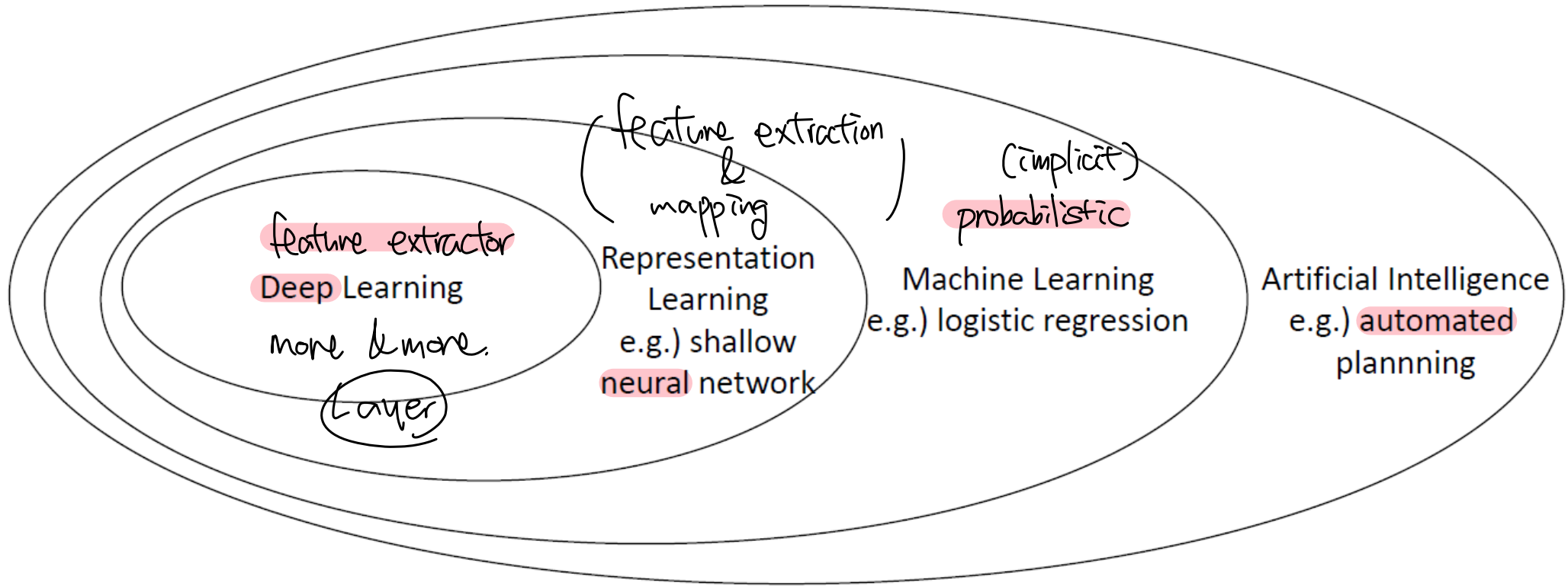
- Toward Data Science (<https://towardsdatascience.com/>)

What is Machine Learning?

“A Field of study that gives computer the ability to learn without being explicitly programmed”
if else (x)

– Arthur Samuel, 1959

Deep Learning, Machine Learning, Artificial Intelligence



Categories of ML Problems

Learning method Output Space	(x, y) Supervised Learning	$x \rightarrow y$ Unsupervised Learning	$x \rightarrow \text{reward function}$ Reinforcement Learning
Discrete	Classification	Clustering	Discrete Action Space Agent
Continuous	Regression	Dimensionality Reduction	Continuous Action Space Agent

mixing

Semi-Supervised Learning

ex), music
 → clustering : 나누기만
 → Semi-SL : 'Rock', 'Ballad' 등 라벨 일부 지정
 → 그에 맞춰 섞어줌

Categories of ML Problems

	Supervised Learning	Unsupervised Learning	Reinforcement Learning
Discrete	Classification	Clustering	Discrete Action Space Agent
Continuous	Regression 상관관계	Dimensionality Reduction	Continuous Action Space Agent

Semi-Supervised Learning

Regression Problem

0.00000688 BTC 148 KRW
전일대비 +14.67% ▲0.00000088



고가 **0.00000745** 161 KRW 거래량(24H) 102,364,720.519BAY
저가 **0.00000576** 124 KRW 거래대금(24H) 675.206BTC

도구 ▾

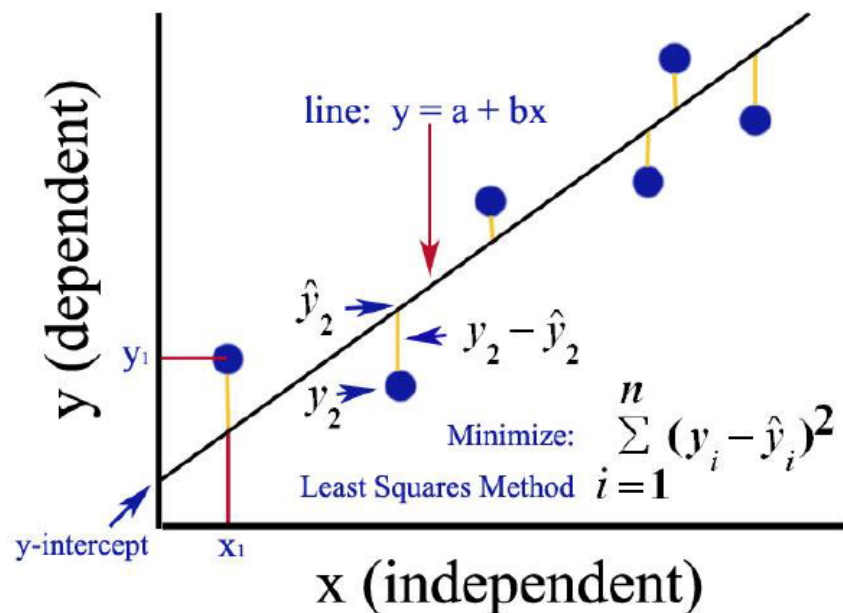
KST ▾ 5분 ▾ 캔들 ▾ 지표 ▾ 테마 ▾ 설정 초기화



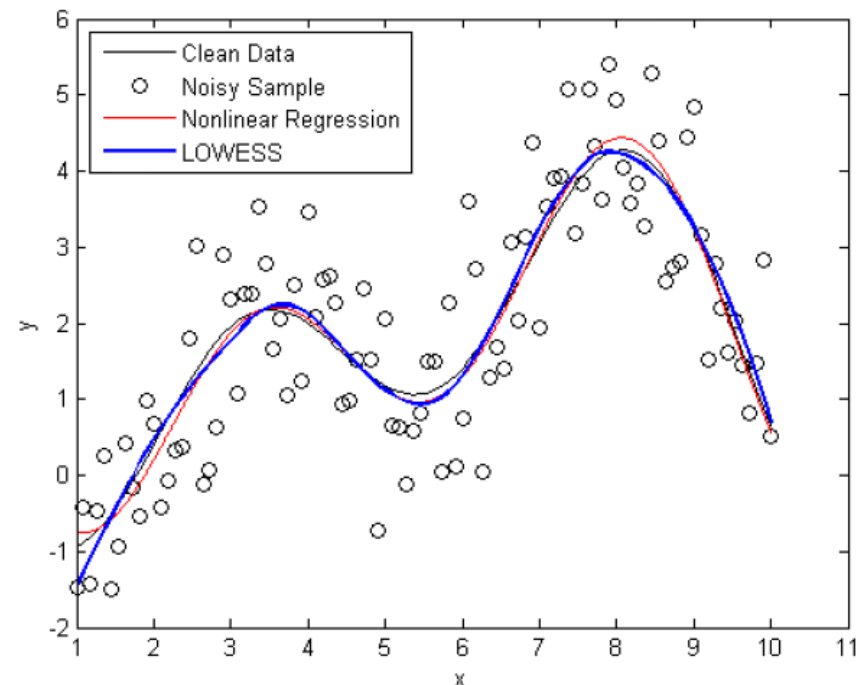
Price Prediction Based on Gi-Young Style Chart Analysis

Regression Problem

Fit the prediction function $f(x)$ to the training data, to predict continuous real value



Linear regression



Nonlinear regression

사상의 가설

overfitting과 한 후에 regularization
underfitting의 적절한 타점?

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Semi-Supervised Learning

Classification Problem

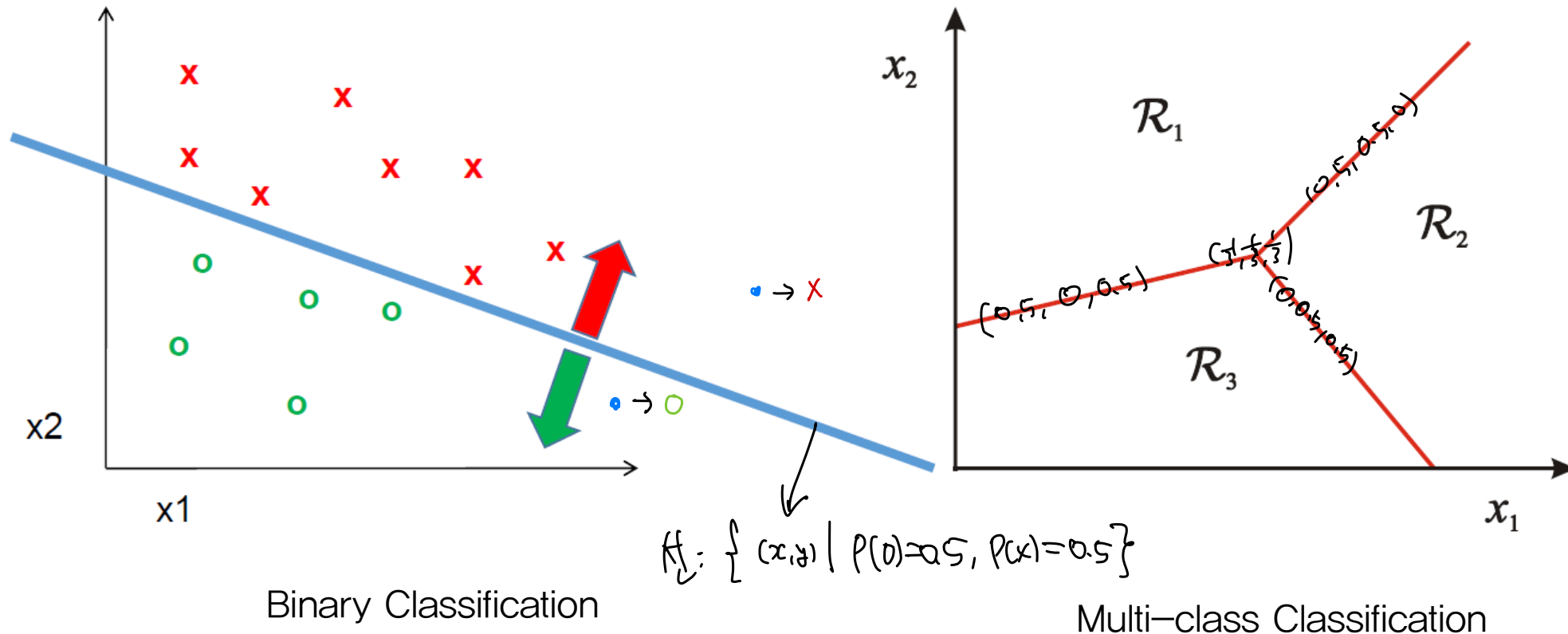
$X \rightarrow Y$
image $\left\{ \begin{array}{l} \text{Chihuahua} \\ \text{muffin} \end{array} \right.$



Chihuahua or Muffin?

Classification Problem

Identifying which of a set of categories a new instance belongs

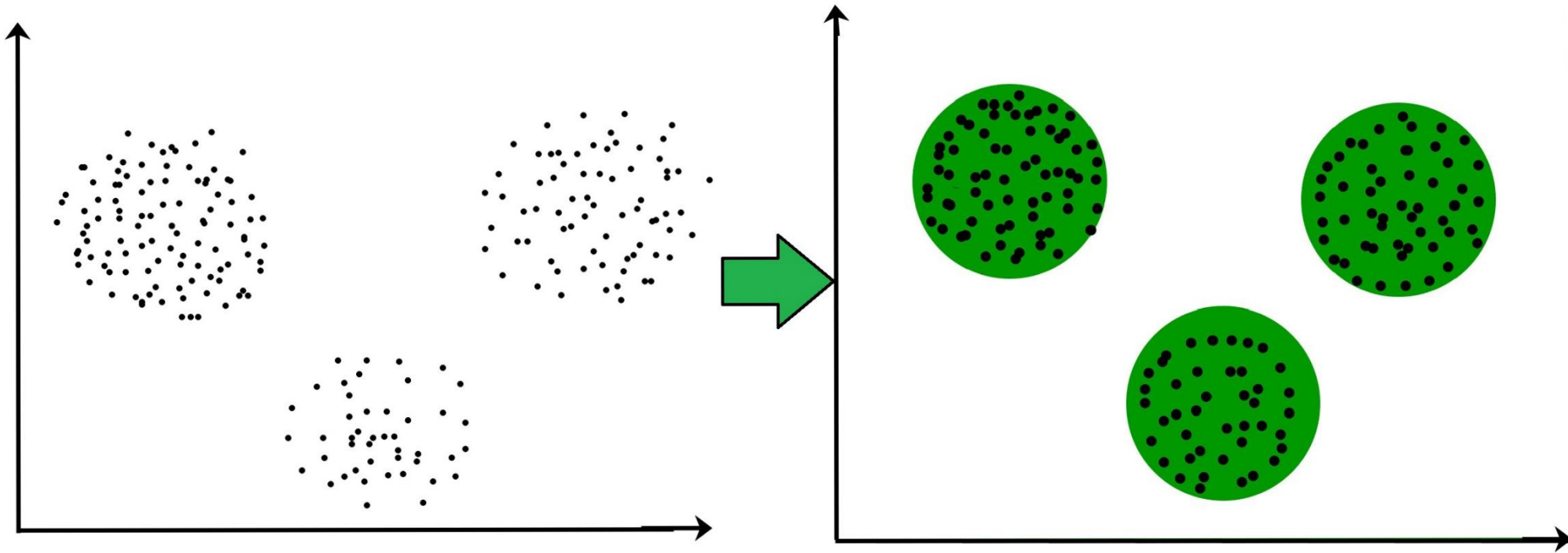


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Semi-Supervised Learning

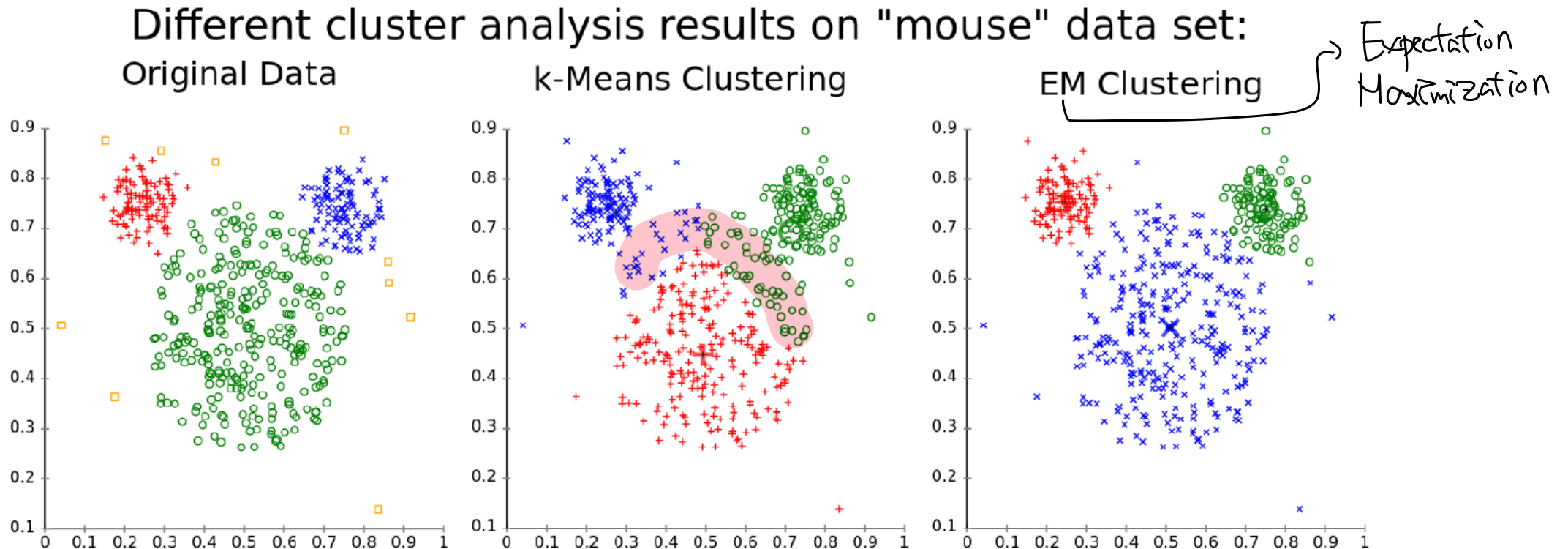
Clustering Problem



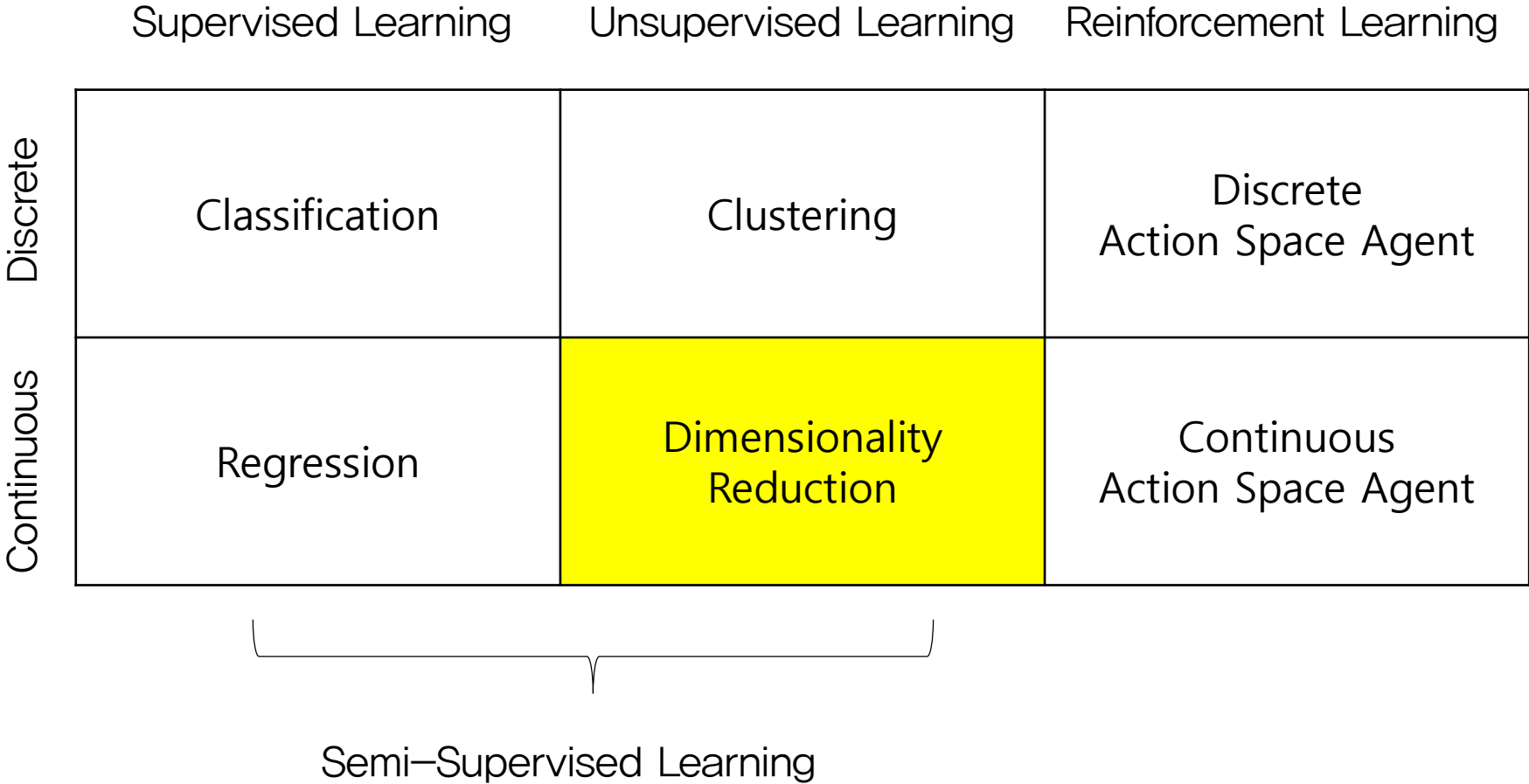
Grouping similar samples into K groups

Clustering Problem

Automatic grouping of instances, such that the instances that belong to the same clusters are more similar to each other than to those in the other groups



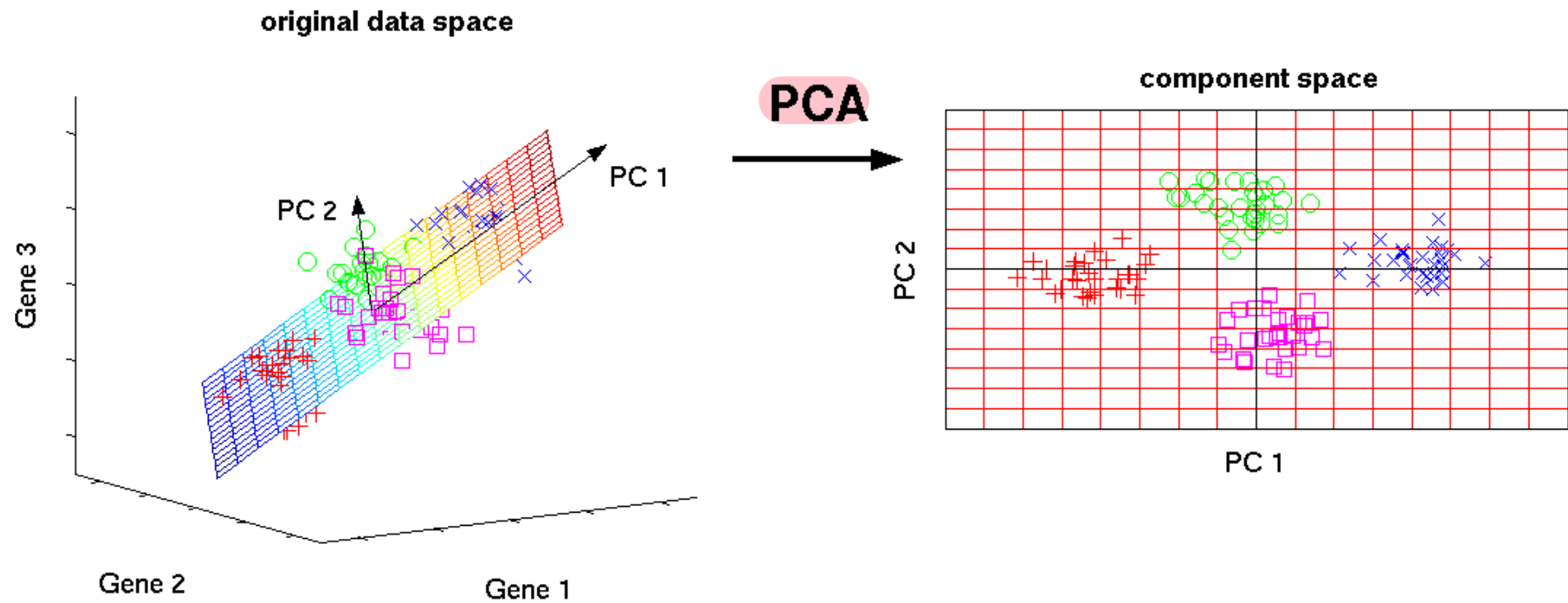
Categories of ML Problems



Dimensionality Reduction Problem

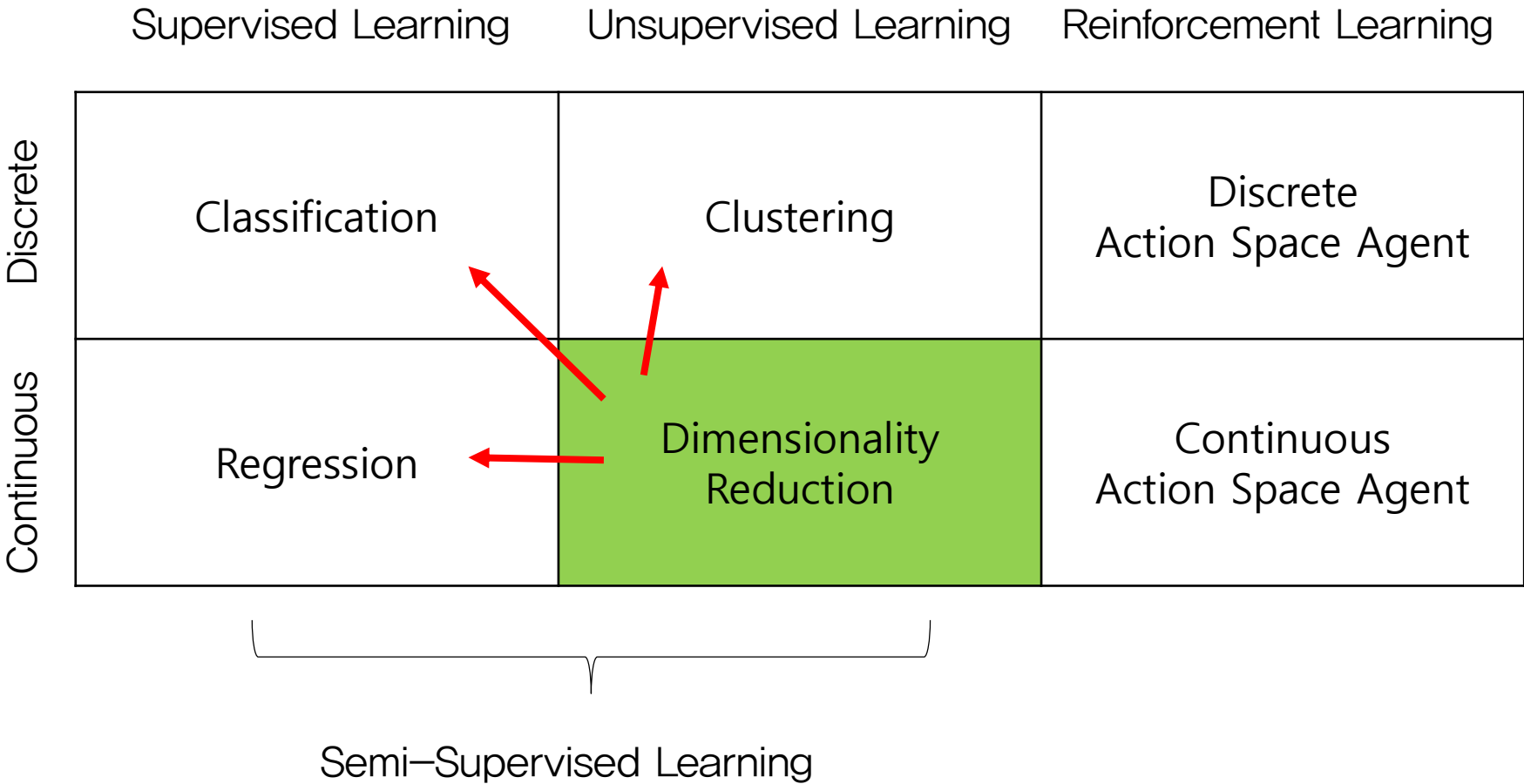
Curse of Dimension : feature increases *Exponentially* as dimension increases

Reduce the dimension of input data, to avoid the effect of the curse of dimensionality

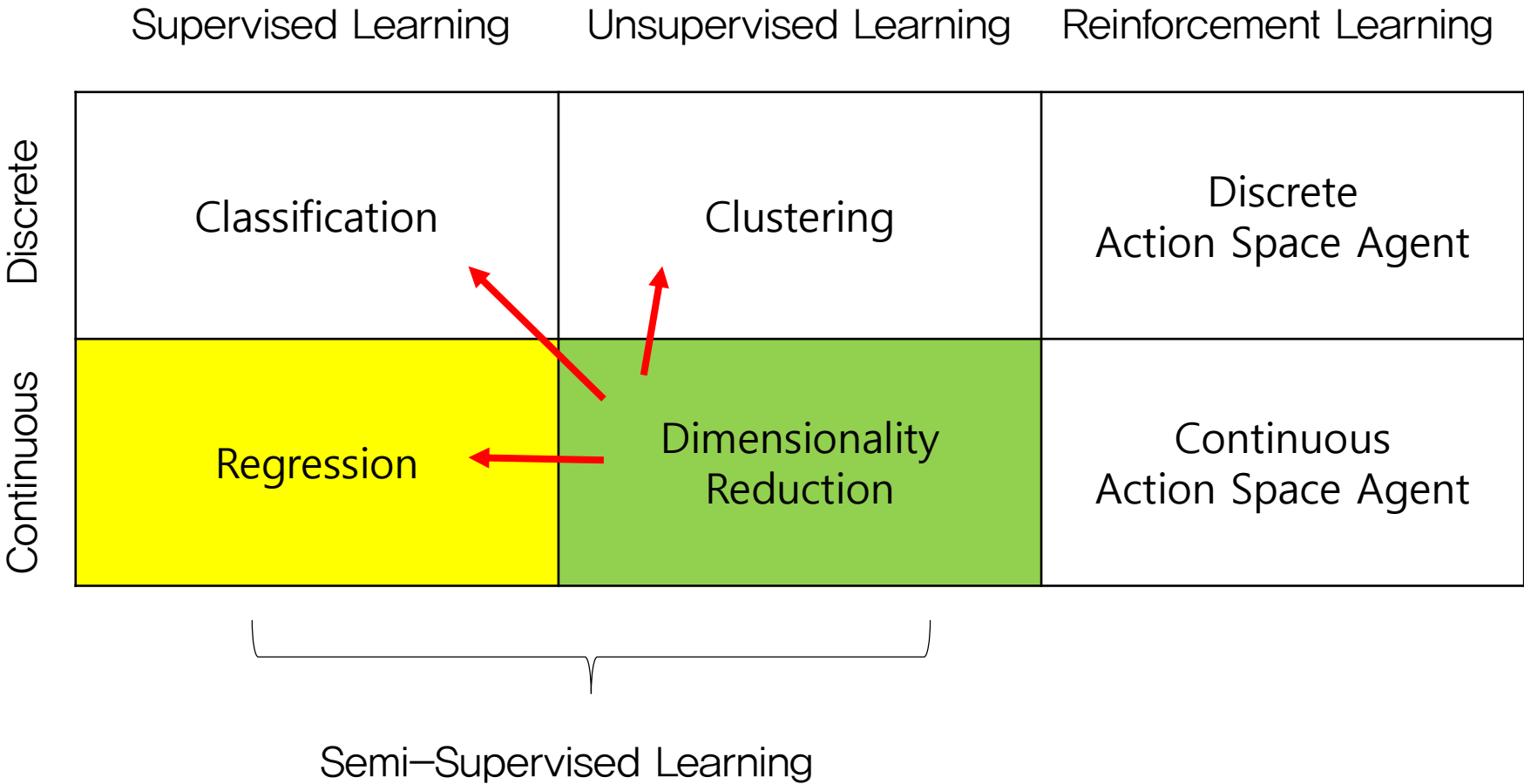


Reduce unnecessary representation axis

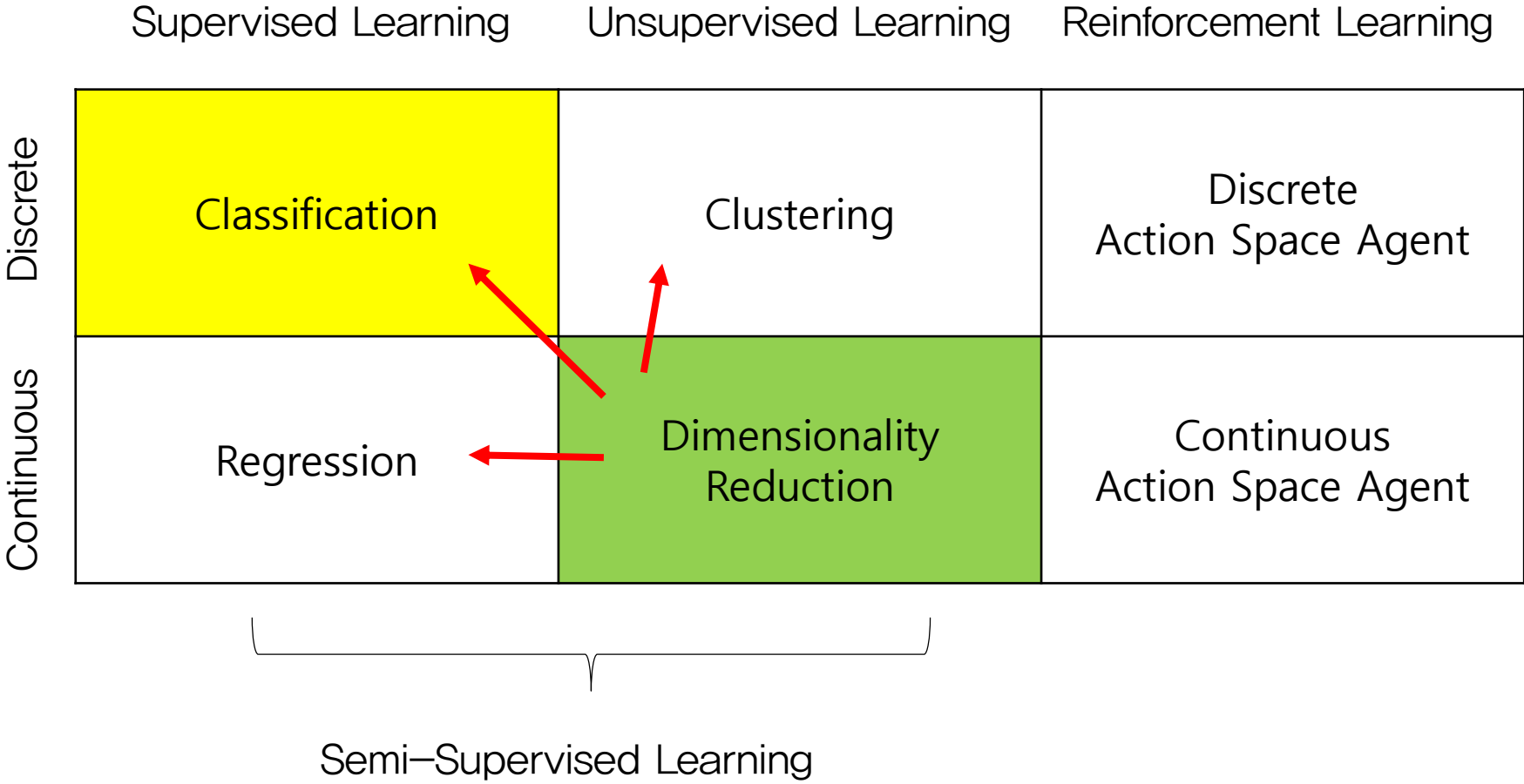
Categories of ML Problems



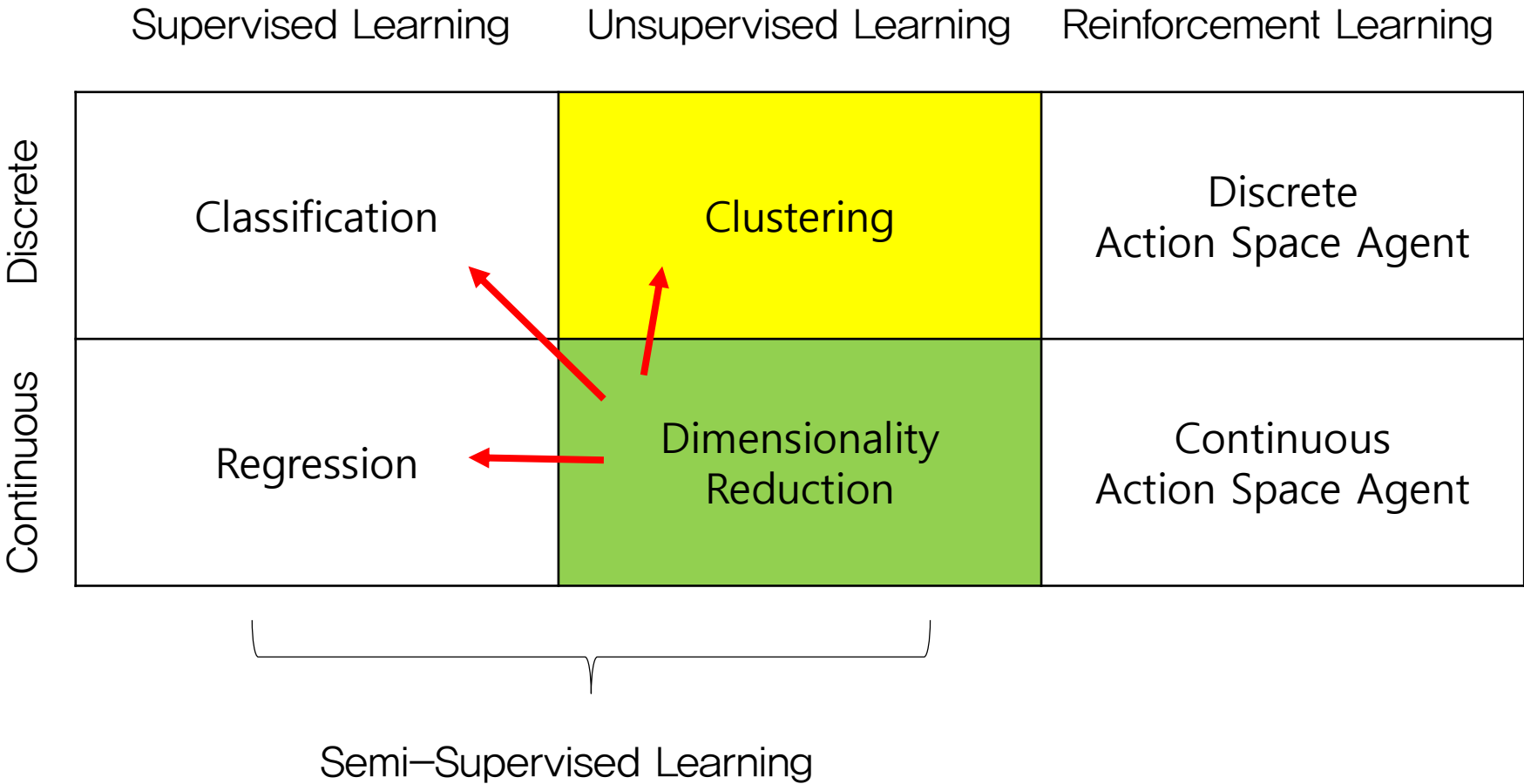
Categories of ML Problems



Categories of ML Problems



Categories of ML Problems



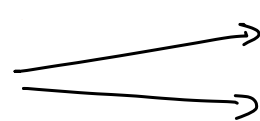
Feature & Data Representation

Case 1

X

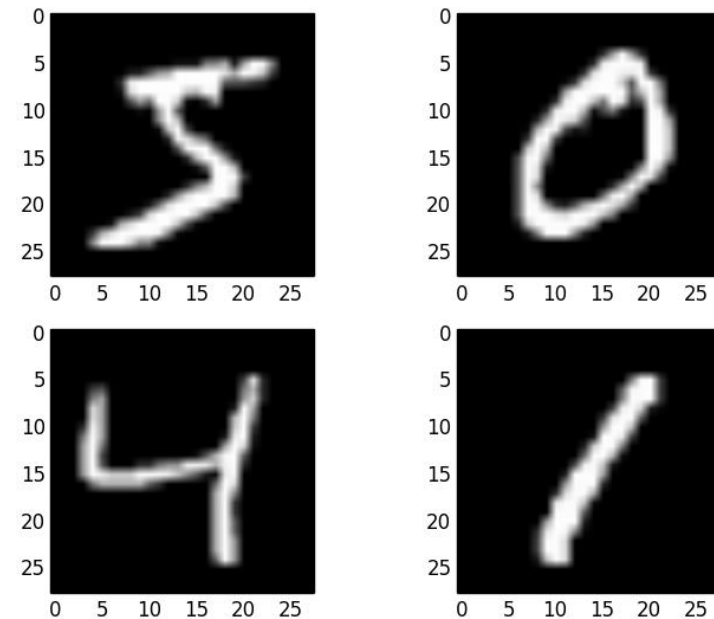
Y

x1: quiz 1 score
x2: quiz 2 score
x3: study hour



y1: final exam score
y2: grade

Feature & Data Representation



Case 2

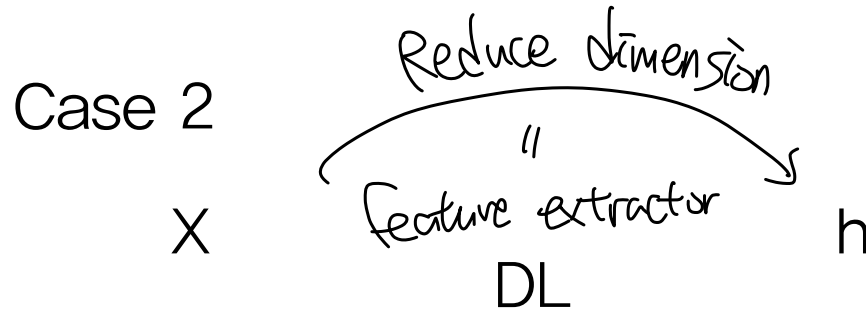
X

Y

x1: first pixel value
x2: second pixel value
x3: third pixel value
...
x784: 784th pixel value

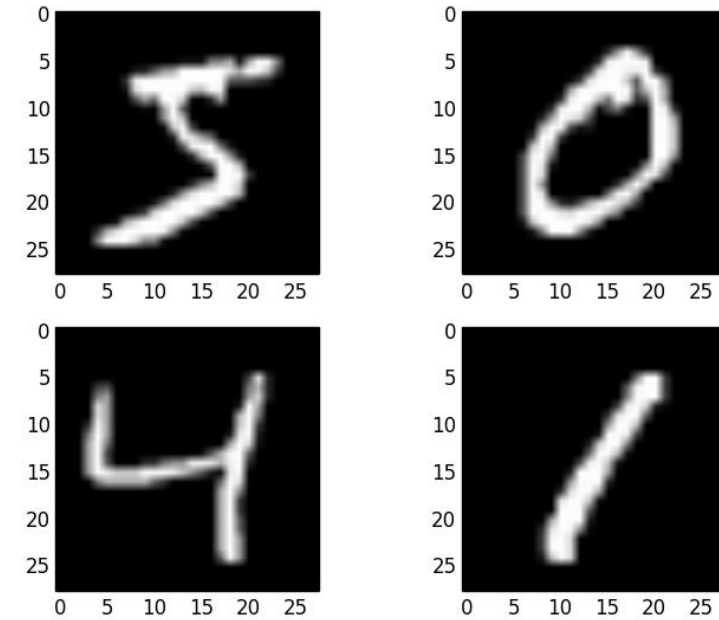
} ?
y1: digit

Feature & Data Representation



x1: first pixel value
x2: second pixel value
x3: third pixel value
...
x784: 784th pixel value

h1: feature1
h2: feature2
h3: feature3



ML

Y

y1: digit

```
graph LR; h -- "ML" --> y1; Note[Y] -.-> y1;
```