Chapter. 01

머신러닝의 개요

I가설함수, 비용, 손실함수

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직장인을 위한 파이썬 데이터분석

강사. 이경록

Chapter. 01

가설함수, 비용, 손실함수
Hypothesis, Cost, Loss Function

I 가설함수

X	Y
1	3
2	5
3	7

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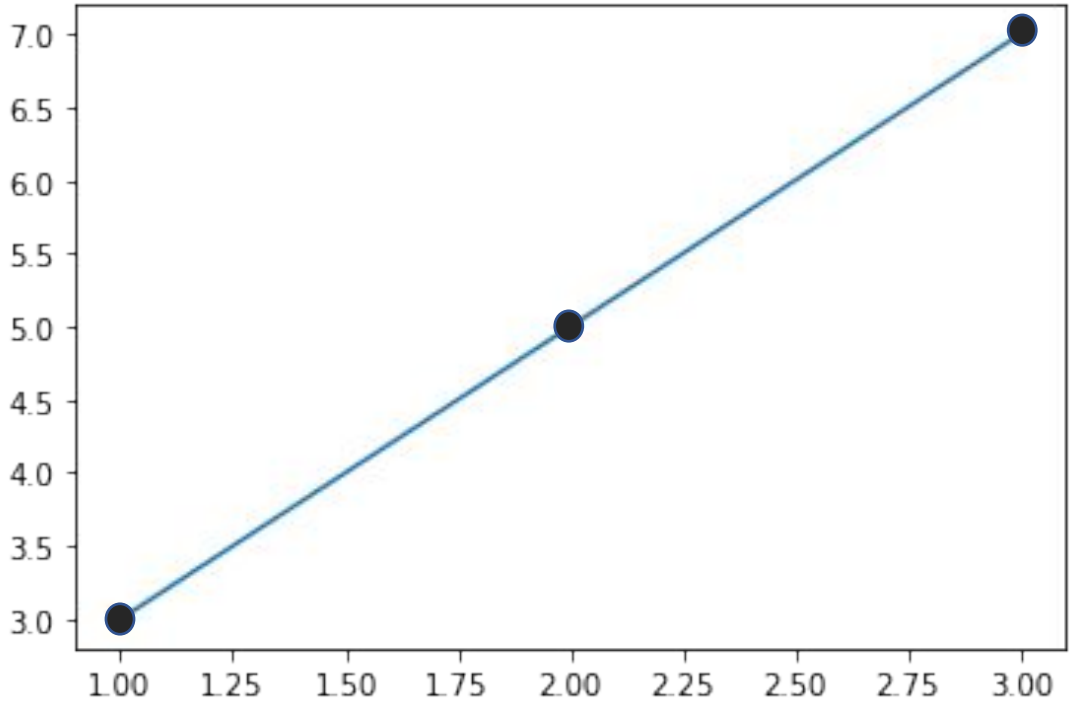
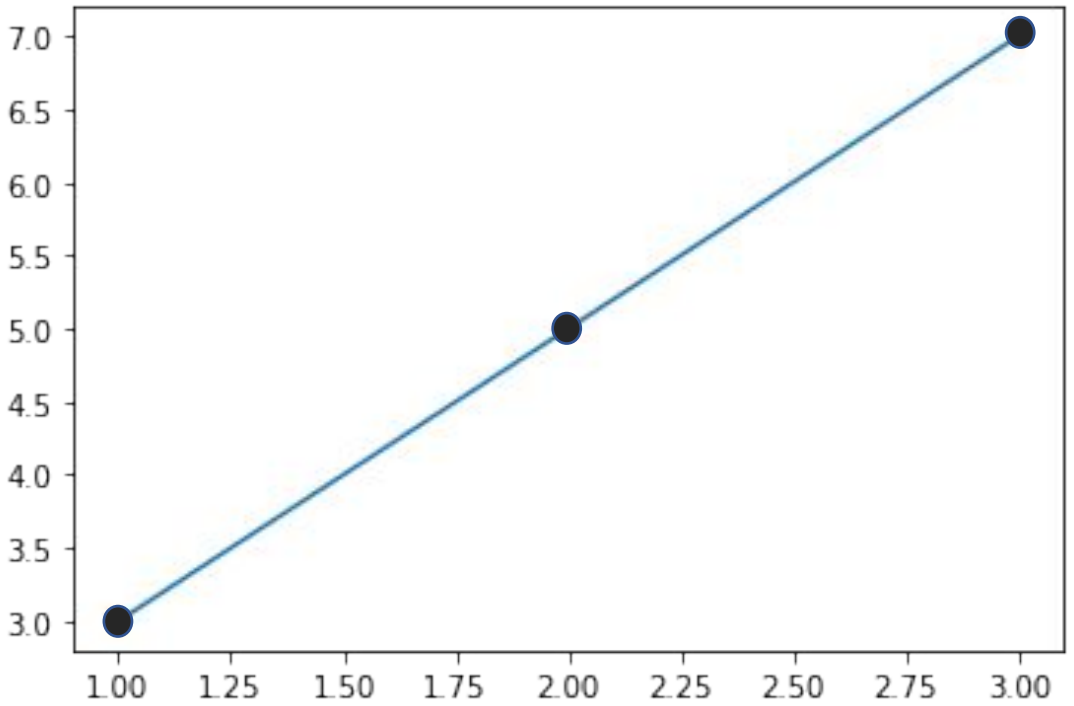
I 가설함수

X	Y
1	3
2	5
3	7



I 가설함수

X	Y
1	3
2	5
3	7



$$H(x) = W * X + b$$

I 가설함수

X	Trial	Y Predict	Y
1	w=0.5, b=0.5	1	3
2		1.5	5
3		2	7
1	w=1, b=1	2	3
2		3	5
3		4	7
1	w=2, b=1	3	3
2		5	5
3		7	7

$$H(x) = W * X + b$$

I 가설함수

X	Trial	Y Predict	Y
1	w=0.5, b=0.5	1	3
2		1.5	5
3		2	7
1	w=1, b=1	2	3
2		3	5
3		4	7
1	w=2, b=1	3	3
2		5	5
3		7	7

H(x) = W * X + b

H(x) = Y Predict

I 손실

X	Trial	Y Predict	Y
1	w=0.5, b=0.5	1	3
2		1.5	5
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2		5	5
3		7	7

H(x) = W * X + b

H(x) = Y Predict

손실 = Y Predict - Y

I 손실함수

X	Trial	Y Predict	Y
1	w=0.5, b=0.5	1	3
2		1.5	5
3		2	7
1	w=1, b=1	2	3
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2		5	5
3		7	7

H(x) = W * X + b

H(x) = Y Predict

손실 = Y Predict - Y

손실함수
= W * X + b - Y

I 손실의 총합

Y Predict	Y	Loss
1	3	-2
1.5	5	-3.5
2	7	-5
2	3	-1
3	5	-2
4	7	-3
3	3	0
5	5	0
7	7	0

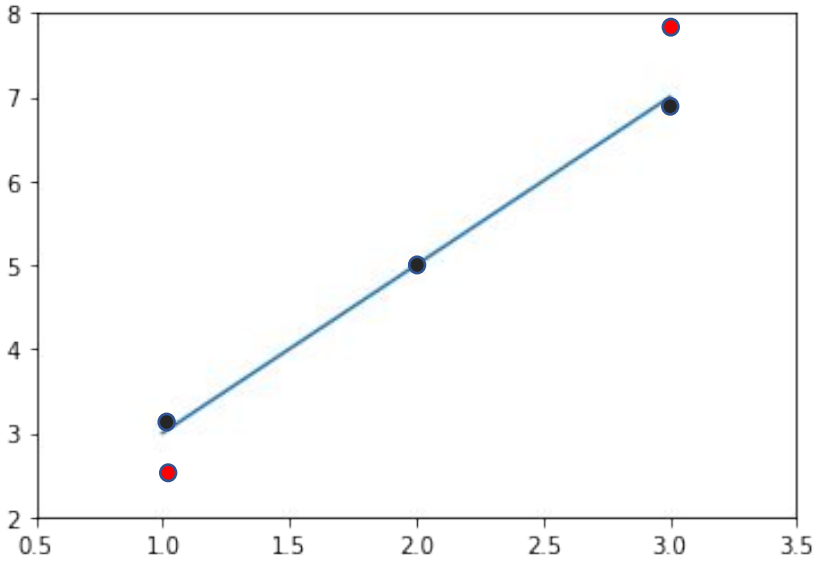
손실함수
= W * X + b - Y

Trial	Y
w=0.5, b=0.5	-2 + -3.5 + -5 = **-10.5**
w=1, b=1	-5 + -1 + -2 = **-8**
w=2, b=1	0 + 0 + 0 = **0**

I 손실의 총합의 오류?

X	Y	Loss	X2	Y2	Loss
1	3	**0**	1	2	-1
2	5	**0**	2	5	0
3	7	**0**	3	8	1

손실함수
= W * X + b – Y
= 2X + 1 - Y



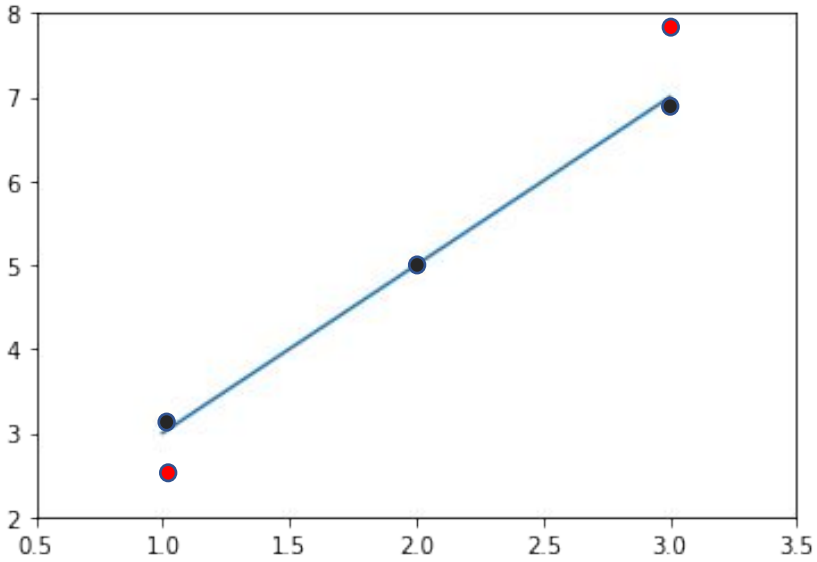
I 손실의 총합의 제곱 오차 (Mean Squared Error)

X	Y	Loss	X2	Y2	Loss
1	3	**0**	1	2	1
2	5	**0**	2	5	0
3	7	**0**	3	8	1

손실함수

$$= W * X + b - Y$$

$$= (2X + 1 - Y)^2$$



I 제곱 오차 (Mean Squared Error)

손실함수 (Loss Function)

$= W * X + b - Y$

$= (W * X + b - Y)^2$ 의 전체 합

$= \sum (W * X + b - Y)^2$

I 제곱 오차 (Mean Squared Error)

손실함수 (Loss Function)
= W * X + b – Y
= (W * X + b – Y)^2 의 전체 합
= ∑(W * X + b – Y)^2

데이터의 개수가 많아지면 손실이
커지므로
전체 손실의 평균을 구합니다

= ∑(W * X + b – Y)^2 / N(데이터 개수)

I 제곱 오차 (Mean Squared Error)

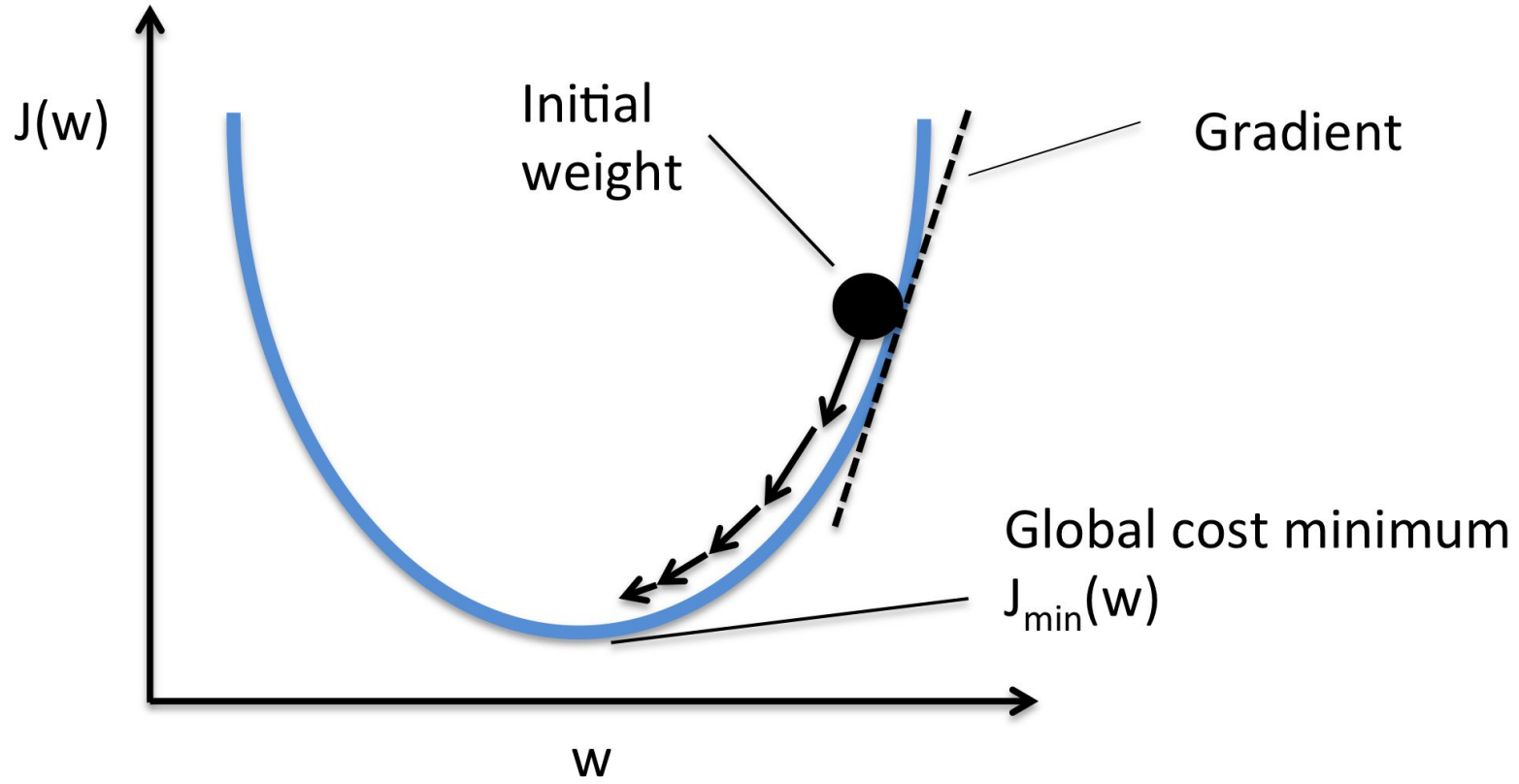
데이터의 개수가 많아지면 손실이
커지므로
전체 손실의 평균을 구합니다

= ∑(W * X + b – Y)² / N(데이터 개수)

$$\mathrm{MSE} = \frac{1}{n}\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2.$$

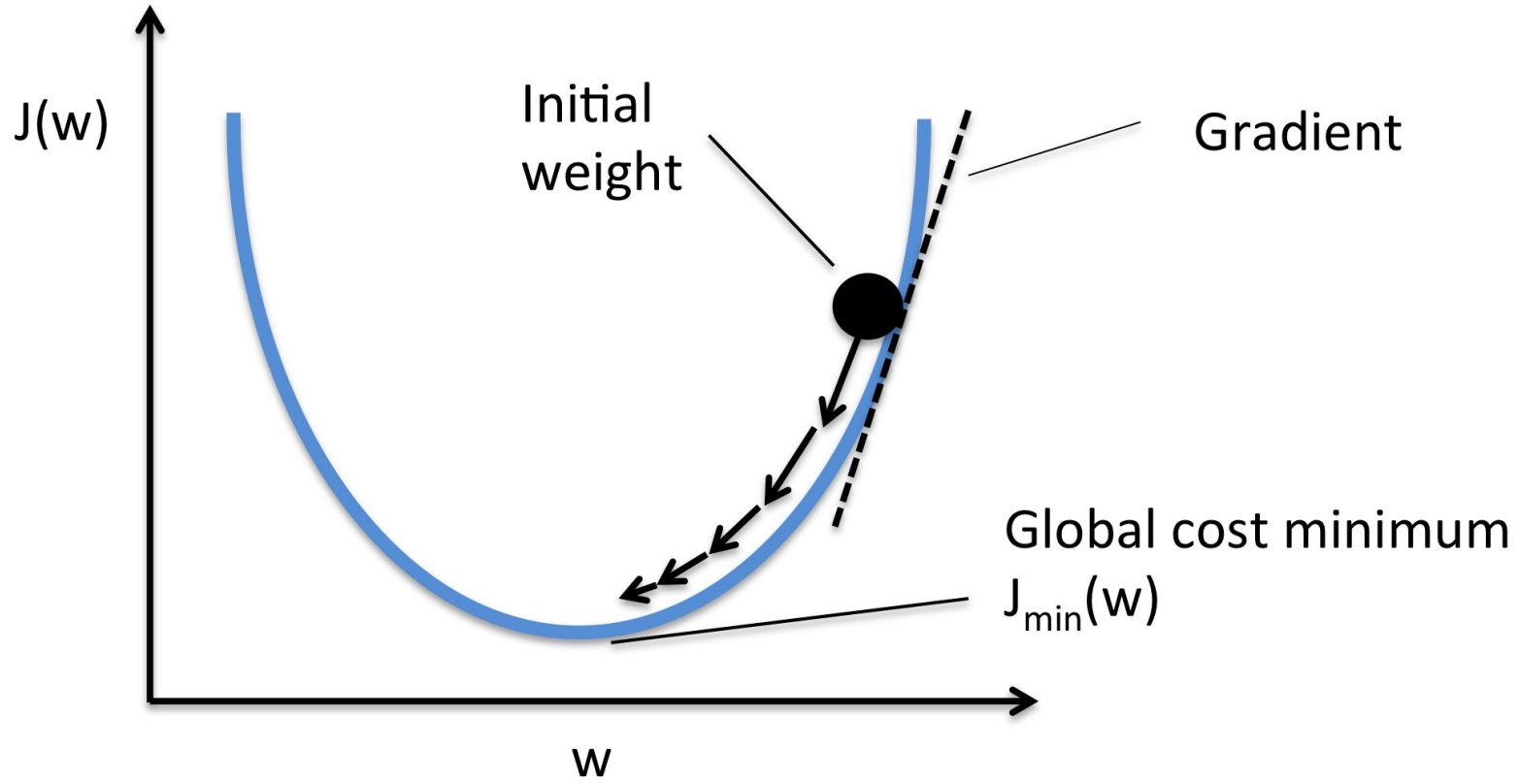
I 최적의 W를 찾는 것 = 최소 오차

$$\mathrm{MSE} = \frac{1}{n}\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2.$$



I 경사하강법 (Gradient Descent)

$$\mathrm{MSE} = \frac{1}{n}\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2.$$



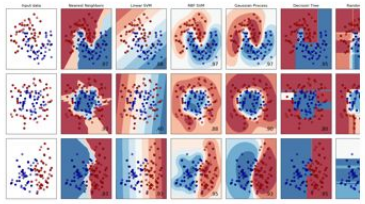
I scikit-learn

https://scikit-learn.org

Classification

Identifying which category an object belongs to.

Applications: Spam detection, image recognition.
Algorithms: SVM, nearest neighbors, random forest, and more...

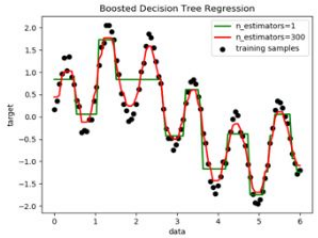


Examples

Regression

Predicting a continuous-valued attribute associated with an object.

Applications: Drug response, Stock prices.
Algorithms: SVR, nearest neighbors, random forest, and more...

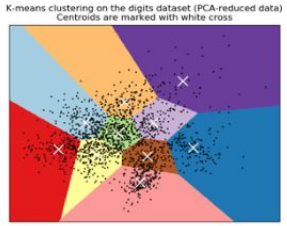


Examples

Clustering

Automatic grouping of similar objects into sets.

Applications: Customer segmentation, Grouping experiment outcomes
Algorithms: k-Means, spectral clustering, mean-shift, and more...

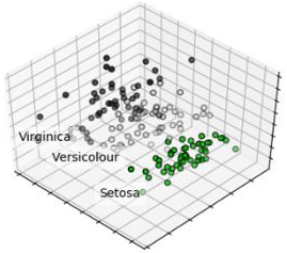


Examples

Dimensionality reduction

Reducing the number of random variables to consider.

Applications: Visualization, Increased efficiency
Algorithms: k-Means, feature selection, non-negative matrix factorization, and more...

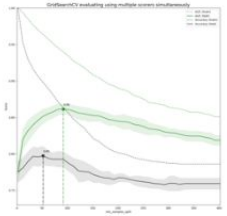


Examples

Model selection

Comparing, validating and choosing parameters and models.

Applications: Improved accuracy via parameter tuning
Algorithms: grid search, cross validation, metrics, and more...

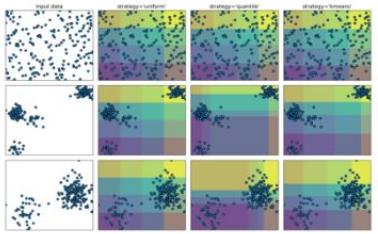


Examples

Preprocessing

Feature extraction and normalization.

Applications: Transforming input data such as text for use with machine learning algorithms.
Algorithms: preprocessing, feature extraction, and more...



Examples