10강. 가설함수, 비용, 손실함수

가설함수

X	Y
1	3
2	5
3	7

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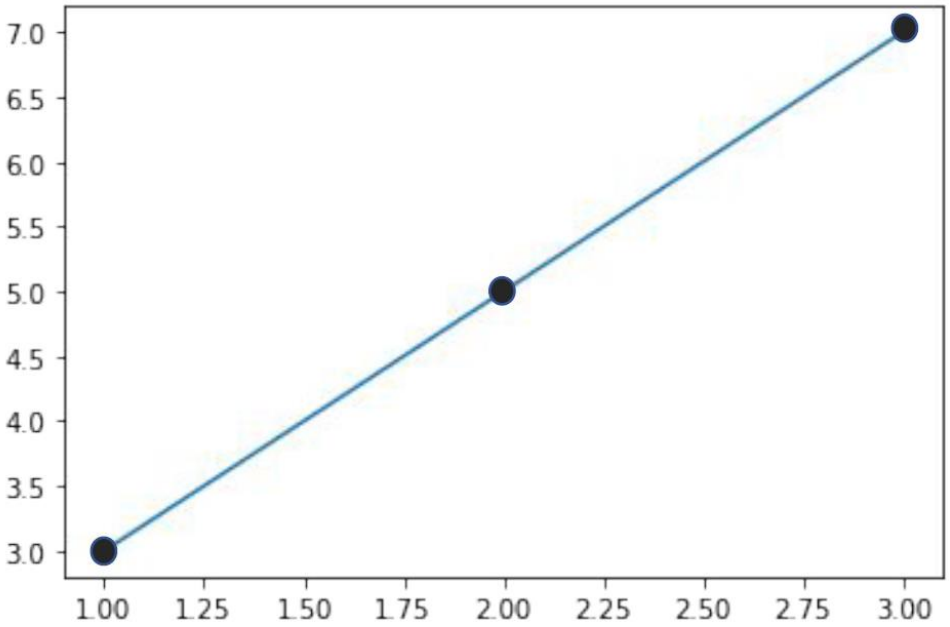

가설함수

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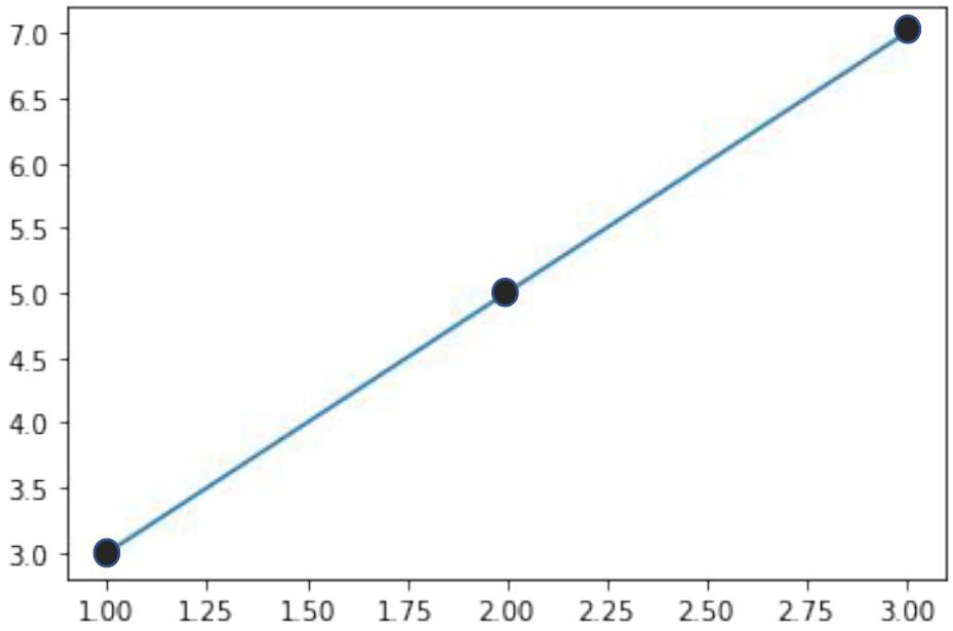
$$H(x) = W * X + b$$



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

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

$$H(x) = Y\ Predict$$

손실

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

$$H(x) = Y\ Predict$$

$$\text{손실} = Y\ Predict - Y$$

$$\text{손실함수} = W * X + b - Y$$

손실의 총합

$$\text{손실함수} = W * X + b - Y$$

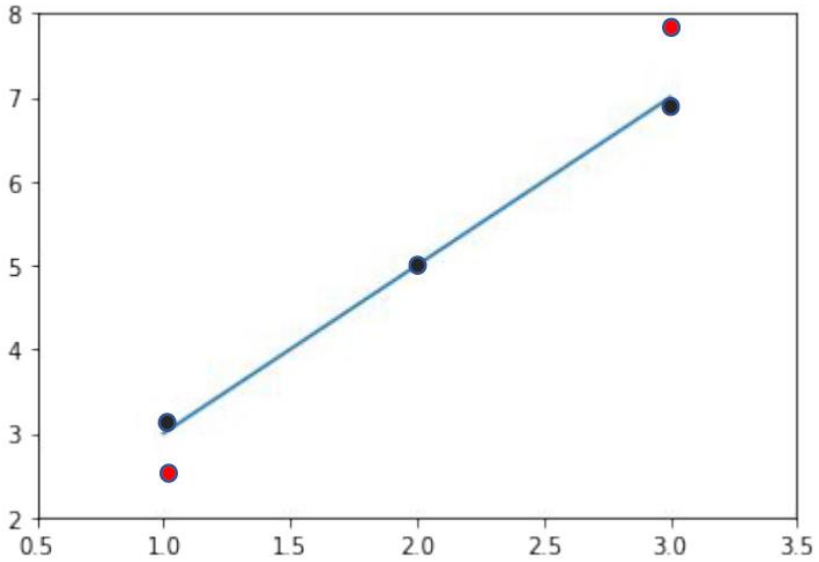
Y Predict	Y	Loss
1	3	-2
1.5	5	-3.5
2	7	-5
2	3	-1
3	5	-2
4	7	-3
3	3	0
5	5	0
7	7	0

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

손실의 총합의 오류?

$$\text{손실함수} = W * X + b - Y = 2X + 1 - Y$$

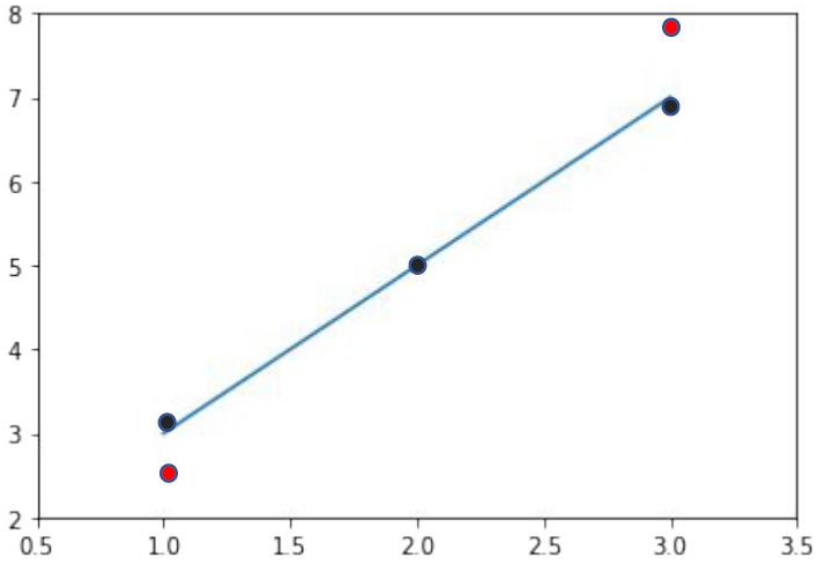
X	Y	Loss	X2	Y2	Loss
1	3	**0**	1	2	-1
2	5	**0**	2	5	0
3	7	**0**	3	8	1



손실의 총합의 제곱 오차 (Mean Squared Error)

$$\text{손실함수} = W * X + b - Y = (2X + 1 - Y)^2$$

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



제곱 오차 (Mean Squared Error)

$$\text{손실함수} = W * X + b - Y$$

$$= (W * X + b - Y)^2 \text{의 전체 합}$$

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

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데이터의 개수가 많아지면 손실이 커지므로
전체 손실의 평균을 구합니다

$$= \sum (W * X + b - Y)^2 / N(\text{데이터 개수})$$

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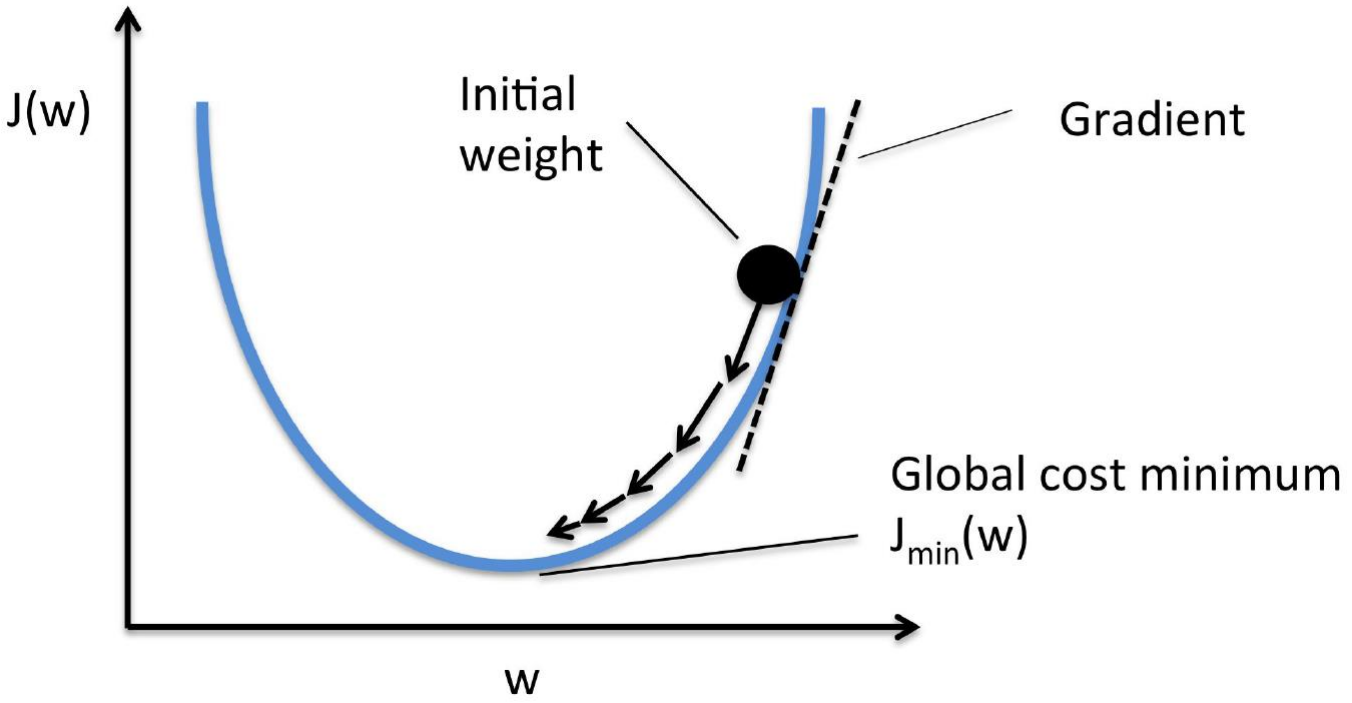
$$= \sum (W * X + b - Y)^2 / N(\text{데이터 개수})$$

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

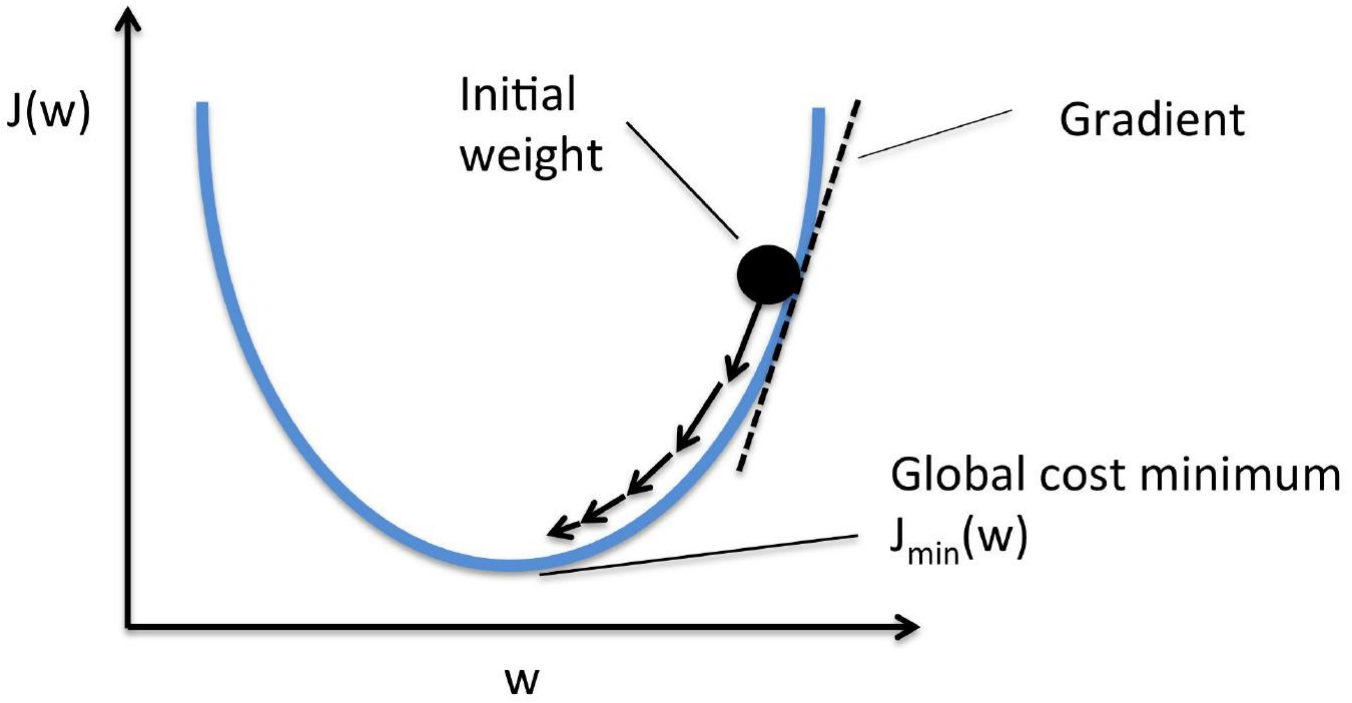
최적의 W를 찾는 것 = 최소 오차

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



경사하강법 (Gradient Descent)

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



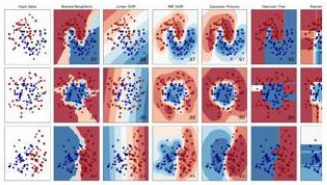
scikit-learn

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...

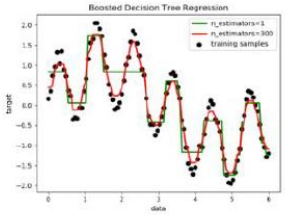


Examples

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.

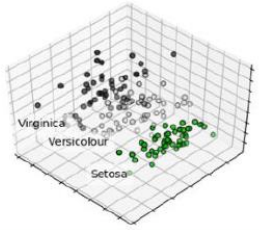
Applications: Customer segmentation, Grouping experiment outcomes
Algorithms: k-Means, spectral clustering, mean-shift, and more...

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...

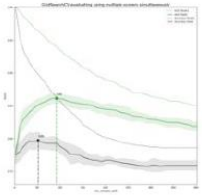


Examples

Model selection

Comparing, validating and choosing parameters and models.

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

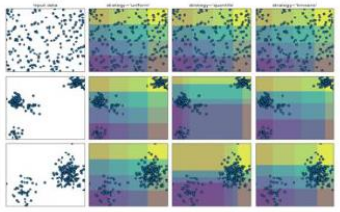


Examples

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