Notation

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We use, as much as possible, the notation of [Ger19].

Symbol type	**Notation**
Scalar	a
Vector	$\mathbf{a} = \begin{pmatrix} a_1 \\ \vdots \\ a_n \end{pmatrix}$
Vector transpose	$\mathbf{a}^T = (a_1, \dots, a_n)$
Matrix	$\mathbf{U} = \begin{pmatrix} u_{1,1} & \dots & u_{1,n} \\ \vdots & \ddots & \vdots \\ u_{m,1} & \dots & u_{m,n} \end{pmatrix}$
Set	$\mathcal{U} = (\mathbf{u}_1, \mathbf{u}_2, \dots)$

Table 1: Font styles and their meaning.

i	Index of samples
j	Index of features
k	Index of classification classes or clusters
q	Index of neurons
l	Index of layers in neural networks
M	Number of samples
N	Number of features
Z	Number of model parameters
K	Number of of classification classes or clusters
L	Number of layers in a neural network

Table 2: Indices and cardinalities.

$\mathcal{D}$	Dataset
$\mathcal{D}^{\text{train}}$	Training set
$\mathcal{D}^{\text{test}}$	Test set

Table 3: Sets.

$\mathbf{x}^{(i)} = (1, x_1^{(i)}, \dots, x_N^{(i)})^T$	i-th sample
$y^{(i)}$	Label of sample $\mathbf{x}^{(i)}$
$\mathbf{X} = \begin{bmatrix} \mathbf{x}^{(1)^T} \\ \vdots \\ \mathbf{x}^{(M)^T} \end{bmatrix}$	Sample matrix
$\mathbf{y} = \begin{bmatrix} y^{(1)} \\ \vdots \\ y^{(M)} \end{bmatrix}$	Vector of labels
$\boldsymbol{\theta} = \begin{bmatrix} \theta_0 \\ \theta_1 \\ \vdots \\ \theta_N \end{bmatrix}$	Vector of model parameters
$\hat{y}^{(i)} = h_{\boldsymbol{\theta}}(\mathbf{x}^{(i)})$	Label predicted by the model.
$\epsilon^{(i)} = y^{(i)} - \hat{y}^{(i)}$	Residual of the i-th sample
$\hat{\mathbf{y}} = \begin{bmatrix} \hat{y}^{(1)} \\ \vdots \\ \hat{y}^{(M)} \end{bmatrix} =$	Vector of predicted labels
$J(\boldsymbol{\theta}, \mathbf{X}, \mathbf{y})$	Loss function calculated with a model with parameters $\boldsymbol{\theta}$ on a dataset with sample matrix $\mathbf{X}$ and labels $\mathbf{y}$.

Table 4: Basic elements.

References

[Ger19] Aurélien Geron, *Hands-On Machine Learning with Scikit-Learn, Keras and TensorFlow*, O'Reilly, 2019.