

AutoML Lecture: Notation Cheat Sheet

Symbol	Meaning
Machine Learning	
\mathcal{D}	Dataset
$\mathcal{D}_{\text{train}}$	Training dataset
\mathcal{D}_{val}	Validation dataset
$\mathcal{D}_{\text{test}}$	Test dataset
\mathbf{D}	Space of datasets
\mathbf{x}	Feature vector
y	Label
$(\mathbf{x}^{(i)}, y^{(i)})$	i -th observation
\mathcal{L}	(empirical) loss
Hyperparameter Optimization	
λ	Hyperparameter configuration
λ_i	Value of i -th hyperparameter
λ_{def}	Default hyperparameter configuration
$\hat{\lambda}$	finally returned hyperparameter configuration
λ^*	Optimal hyperparameter configuration
Λ	Space of possible hyperparameter configurations
\mathcal{A}	Algorithm (e.g. SVM, RF, DNN)
\mathbf{A}	Distribution or set of algorithms
$c(\lambda)$	Target cost function (e.g., empirical risk, validation loss, runtime)
$\hat{c}(\lambda)$	Surrogate (probabilistic) model of target function
$\mathcal{D}_{\text{HPO}} = \langle \lambda^{(t)}, c(\lambda^{(t)}) \rangle_{t=1}^T$	All observations collected for BO / HPO
Gaussian Processes and Bayesian Optimization	
\mathcal{G}	Gaussian process
t	BO loop counter
T	BO loop counter max, the counter runs from 1 to this value
u	Acquisition Function, no args
ϕ	Standard Normal PDF
Φ	Standard Normal CDF
μ	Mean
σ	Standard Deviation
σ^2	Variance
ν	Noise
\mathbb{R}	Real numbers set
\mathbb{E}	Expected value
κ	kernel
c	Constraint function
\mathcal{N}	Normal distribution

Symbol	Meaning
Algorithm Selection	
\mathbf{x}_{meta}	Vector of (meta-) features
$\mathcal{X}_{\text{meta}}$	Space of (meta-)features
\mathcal{P}	Portfolio (i.e., discrete set) of algorithms or hyperparameter configurations
\mathcal{S}	Schedule of algorithms or hyperparameter configurations
Meta-Learning	
θ	Weights (a.k.a. parameters) of ML model (e.g., DNN)
ϕ	Weights of meta-model
$\mathcal{D}_{\text{meta}}$	Meta-dataset
Reinforcement Learning	
π	Reinforcement learning policy
Π	Space of policies
a	action in RL-setting
s	state in RL-setting
\mathcal{S}	Space of states
r	Reward in RL-setting
\mathcal{R}	Random variable or function of reward
Algorithm Configuration	
κ	Cutoff (often runtime) of an algorithm run
i	a single instances (a.k.a. problem, dataset, task)
\mathcal{I}	Distribution over instances (a.k.a. problems, datasets, tasks)