AutoML Lecture: Notation Cheat Sheet

Macro	Symbol	Meaning
		Machine Learning
`\dataset`	$\mathcal{D}$	Dataset
`\datasettrain`	$\mathcal{D}_{\text{train}}$	Training dataset
`\datasetval`	$\mathcal{D}_{\text{val}}$	Validation dataset
`\datasettest`	$\mathcal{D}_{\text{test}}$	Test dataset
`\datasets`	$\mathbf{D}$	Space of datasets
`\x`	$\mathbf{x}$	Feature vector
`\y`	y	Label
`\(\xI{i},\yI{i})`	$(\mathbf{x}^{(i)}, y^{(i)})$	i-th observation
`\loss(y,\fh(\x))`	$L(y, \hat{f}(\mathbf{x}))$	(empirical) loss
`\risks`	$\mathcal{R}$	risk
`\riske`	$\mathcal{R}_{\text{emp}}$	empirical risk
`\fx`	$f(\mathbf{x})$	continuous prediction function
`\Hspace`	$\mathcal{H}$	hypothesis space where f is from
`\fh`	$\hat{f}$	estimated prediction function
		Hyperparameter Optimization
`\conf`	$\boldsymbol{\lambda}$	Hyperparameter configuration
`\conf_i`	$\boldsymbol{\lambda}_i$	Value of i-th hyperparameter
`\defconf`	$\boldsymbol{\lambda}_{\text{def}}$	Default hyperparameter configuration
`\finconf`	$\hat{\boldsymbol{\lambda}}$	finally returned hyperparameter configuration
`\optconf`	$\boldsymbol{\lambda}^*$	Optimal hyperparameter configuration
`\pcs`	$\boldsymbol{\Lambda}$	Space of possible hyperparameter configurations
`\algo`	$\mathcal{A}$	Algorithm (e.g. SVM, RF, DNN)
`\algos`	$\mathbf{A}$	Distribution or set of algorithms
`\cost(\conf)`	$c(\boldsymbol{\lambda})$	Target cost function (e.g., empirical risk, validation loss, runtime)
`\surro(\conf)`	$\hat{c}(\boldsymbol{\lambda})$	Surrogate (probabilistic) model of target function
—	$\mathcal{D}_{\text{Hist}} = \langle \boldsymbol{\lambda}^{(t)}, c(\boldsymbol{\lambda}^{(t)}) \rangle_{t=1}^{T}$	All observations collected for BO / HPO
		Gaussian Processes and Bayesian Optimization
`\gp`	$\mathcal{G}$	Gaussian process
`\bocount`	t	BO loop counter
`\bobudget`	T	BO loop counter max, the counter runs from 1 to this value
`\acq`	u	Acquisition Function, no args
`\pdf`	ϕ	Standard Normal PDF
`\cdf`	Φ	Standard Normal CDF
`\mean`	μ	Mean
`\stddev`	σ	Standard Deviation
`\variance`	σ^2	Variance
`\noise`	ν	Noise
`\realnum`	$\mathbb{R}$	Real numbers set
`\expectation`	$\mathbb{E}$	Expected value
`\kernel`	κ	kernel
`\constraintf`	c	Constraint function
`\normaldist`	$\mathcal{N}$	Normal distribution

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