`latex-math` Macros

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Latex macros like `\frac{#1}{#2}` with arguments are displayed as $\frac{\#1}{\#2}$.

Note that macro declarations may only span a single line to be displayed correctly in the below tables.

Contents

basic-math

Macro	Notation	Comment
`\N`	$\mathbb{N}$	N, naturals
`\Z`	$\mathbb{Z}$	Z, integers
`\Q`	$\mathbb{Q}$	Q, rationals
`\R`	$\mathbb{R}$	R, reals
`\C`	$\mathbb{C}$	C, complex
`\continuous`	$\mathcal{C}$	C, space of continuous functions
`\M`	$\mathcal{M}$	machine numbers
`\epsm`	ϵ_m	maximum error
`\setzo`	$\{0, 1\}$	{0, 1}
`\setmp`	$\{-1, +1\}$	set -1, 1
`\unitint`	$[0, 1]$	unit interval
`\xt`	$\tilde{x}$	x tilde
`\argmax`	$\arg\max$	argmax
`\argmin`	$\arg\min$	argmin
`\argminlim`	$\arg\min$	argmax with limits
`\argmaxlim`	$\arg\max$	argmin with limits
`\sign`	sign	sign, signum
`\I`	$\mathbb{I}$	I, indicator
`\order`	$\mathcal{O}$	O, order
`\fp`	$\frac{\partial \cdot}{\partial \cdot}$	partial derivative
`\pd`	$\frac{\partial \cdot}{\partial \cdot}$	partial derivative
`\sumin`	$\sum\limits_{i=1}^{n}$	summation from i=1 to n
`\sumim`	$\sum\limits_{i=1}^{m}$	summation from i=1 to m
`\sumjp`	$\sum\limits_{j=1}^{p}$	summation from j=1 to p
`\sumik`	$\sum\limits_{i=1}^{k}$	summation from i=1 to k
`\sumkg`	$\sum\limits_{k=1}^{g}$	summation from k=1 to g
`\sumjg`	$\sum\limits_{j=1}^{g}$	summation from j=1 to g
`\meanin`	$\frac{1}{n}\sum\limits_{i=1}^{n}$	mean from i=1 to n
`\meankg`	$\frac{1}{g}\sum\limits_{k=1}^{g}$	mean from k=1 to g
`\prodin`	$\prod\limits_{i=1}^{n}$	product from i=1 to n
`\prodkg`	$\prod\limits_{k=1}^{g}$	product from k=1 to g
`\prodjp`	$\prod\limits_{j=1}^{p}$	product from j=1 to p
`\one`	$\mathbf{1}$	1, unitvector
`\zero`	$\mathbf{0}$	0-vector
`\id`	$\boldsymbol{I}$	I, identity
`\diag`	diag	diag, diagonal
`\trace`	tr	tr, trace
`\spn`	span	span
`\scp`	$\langle \cdot, \cdot \rangle$	<.,.>, scalarproduct
`\mat`	$\begin{pmatrix} \cdot \end{pmatrix}$	short pmatrix command

`\Amat`	$\mathbf{A}$	matrix A
`\Deltab`	$\boldsymbol{\Delta}$	error term for vectors
`\E`	$\mathbb{E}$	E, expectation
`\var`	Var	Var, variance
`\cov`	Cov	Cov, covariance
`\corr`	Corr	Corr, correlation
`\normal`	$\mathcal{N}$	N of the normal distribution
`\iid`	$\overset{i.i.d}{\sim}$	dist with i.i.d superscript
`\distas`	$\dot{\sim}$	... is distributed as ...

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basic-ml

Macro	Notation	Comment
`\Xspace`	$\mathcal{X}$	X, input space
`\Yspace`	$\mathcal{Y}$	Y, output space
`\nset`	$\{1, \ldots, n\}$	set from 1 to n
`\pset`	$\{1, \ldots, p\}$	set from 1 to p
`\gset`	$\{1, \ldots, g\}$	set from 1 to g
`\Pxy`	$\mathbb{P}_{xy}$	P_xy
`\Exy`	$\mathbb{E}_{xy}$	E_xy: Expectation over random variables xy
`\xv`	$\mathbf{x}$	vector x (bold)
`\xtil`	$\tilde{\mathbf{x}}$	vector x-tilde (bold)
`\yv`	$\mathbf{y}$	vector y (bold)
`\xy`	$(\mathbf{x}, y)$	observation (x, y)
`\xvec`	$(x_1, \ldots, x_p)^T$	(x1, ..., xp)
`\Xmat`	$\mathbf{X}$	Design matrix
`\allDatasets`	$\mathbb{D}$	The set of all datasets
`\D`	$\mathcal{D}$	D, data
`\obsi`	$\left(\mathbf{x}^{(\cdot)}, y^{(\cdot)}\right)$	observation (x^(i), y^(i))
`\Dset`	$\left(\left(\mathbf{x}^{(1)}, y^{(1)}\right), \ldots, \left(\mathbf{x}^{(n)}, y^{(n)}\right)\right)$	{(x1,y1)), ..., (xn,yn)}, data
`\Dn`	$\mathcal{D}_n$	D_n, data of size n
`\allDatasetsn`	$\mathbb{D}_n$	The set of all datasets of size n
`\defAllDatasetsn`	$(\mathcal{X} \times \mathcal{Y})^n$	Def. of the set of all datasets of size n
`\defAllDatasets`	$\bigcup_{n \in \mathbb{N}} (\mathcal{X} \times \mathcal{Y})^n$	Def. of the set of all datasets
`\xdat`	$\left\{\mathbf{x}^{(1)}, \ldots, \mathbf{x}^{(n)}\right\}$	{x1, ..., xn}, input data
`\ydat`	$\mathbf{y}$	y (bold), vector of outcomes
`\yvec`	$\left(y^{(1)}, \ldots, y^{(n)}\right)^T$	(y1, ..., yn), vector of outcomes
`\yi`	$y^{(\cdot)}$	y^i, i-th observed value of y
`\xyi`	$\left(\mathbf{x}^{(\cdot)}, y^{(\cdot)}\right)$	(x^i, y^i), i-th observation
`\xivec`	$\left(x_1^{(i)}, \ldots, x_p^{(i)}\right)^T$	(x1^i, ..., xp^i), i-th observation vector
`\xj`	$\mathbf{x}_j$	x_j, j-th feature
`\xjvec`	$\left(x_j^{(1)}, \ldots, x_j^{(n)}\right)^T$	(x^1_j, ..., x^n_j), j-th feature vector
`\Dtrain`	$\mathcal{D}_{\text{train}}$	D_train, training set

`\Dtest`	$\mathcal{D}_{\text{test}}$	D_test, test set
`\phiv`	ϕ	Basis transformation function phi
`\phixi`	$\phi^{(i)}$	Basis transformation of xi: phi^i := phi(xi)
`\lamv`	$\boldsymbol{\lambda}$	lambda vector, hyperconfiguration vector
`\Lam`	$\boldsymbol{\Lambda}$	Lambda, space of all hpos
`\preimageInducer`	$\left(\bigcup_{n \in \mathbb{N}} (\mathcal{X} \times \mathcal{Y})^n\right) \times \boldsymbol{\Lambda}$	Set of all datasets times the hyperparameter space
`\preimageInducerShort`	$\mathbb{D} \times \boldsymbol{\Lambda}$	Set of all datasets times the hyperparameter space
`\inducer`	$\mathcal{I}$	Inducer, inducing algorithm, learning algorithm
`\ftrue`	f_{true}	True underlying function (if a statistical model is assumed)
`\ftruex`	$f_{\text{true}}(\mathbf{x})$	True underlying function (if a statistical model is assumed)
`\fx`	$f(\mathbf{x})$	f(x), continuous prediction function
`\Hspace`	$\mathcal{H}$	hypothesis space where f is from
`\fix`	$f_i(\mathbf{x})$	f_i(x), discriminant component function
`\fjx`	$f_j(\mathbf{x})$	f_j(x), discriminant component function
`\fkx`	$f_k(\mathbf{x})$	f_k(x), discriminant component function
`\fgx`	$f_g(\mathbf{x})$	f_g(x), discriminant component function
`\fh`	$\hat{f}$	f hat, estimated prediction function
`\fxh`	$\hat{f}(\mathbf{x})$	fhat(x)
`\fxt`	$f(\mathbf{x} \mid \boldsymbol{\theta})$	f(x | theta)
`\fxi`	$f\left(\mathbf{x}^{(i)}\right)$	f(x^(i))
`\fxih`	$\hat{f}\left(\mathbf{x}^{(i)}\right)$	f(x^(i))
`\fxit`	$f\left(\mathbf{x}^{(i)} \mid \boldsymbol{\theta}\right)$	f(x^(i) | theta)
`\fhD`	$\hat{f}_{\mathcal{D}}$	fhat_D, estimate of f based on D
`\fhDtrain`	$\hat{f}_{\mathcal{D}_{\text{train}}}$	fhat_Dtrain, estimate of f based on D
`\fhDnlambda`	$\hat{f}_{\mathcal{D}_n, \boldsymbol{\lambda}}$	model learned on Dn with hp lambda
`\fhDlambda`	$\hat{f}_{\mathcal{D}, \boldsymbol{\lambda}}$	model learned on D with hp lambda
`\fhDnlambdastar`	$\hat{f}_{\mathcal{D}_n, \boldsymbol{\lambda}^*}$	model learned on Dn with optimal hp lambda
`\fhDlambdastar`	$\hat{f}_{\mathcal{D}, \boldsymbol{\lambda}^*}$	model learned on D with optimal hp lambda
`\hx`	$h(\mathbf{x})$	h(x), discrete prediction function
`\hxv`	$h(\mathbf{x})$	h(x), discrete prediction function with x (vector) as input
`\hh`	$\hat{h}$	h hat
`\hxh`	$\hat{h}(\mathbf{x})$	hhat(x)
`\hxt`	$h(\mathbf{x} \vert \boldsymbol{\theta})$	h(x | theta)
`\hxi`	$h\left(\mathbf{x}^{(i)}\right)$	h(x^(i))
`\hxit`	$h\left(\mathbf{x}^{(i)} \mid \boldsymbol{\theta}\right)$	h(x^(i) | theta)
`\yh`	$\hat{y}$	yhat for prediction of target
`\yih`	$\hat{y}^{(i)}$	yhat^(i) for prediction of ith targiet
`\thetah`	$\hat{\theta}$	theta hat
`\thetab`	$\boldsymbol{\theta}$	theta vector
`\thetabh`	$\hat{\boldsymbol{\theta}}$	theta vector hat
`\thetat`	$\boldsymbol{\theta}^{[t]}$	theta^[t] in optimization
`\thetatn`	$\boldsymbol{\theta}^{[t+1]}$	theta^[t+1] in optimization
`\thxh`	$\boldsymbol{\theta}^T \mathbf{x}$	linear combination with theta
`\thetahDnlambda`	$\hat{\boldsymbol{\theta}}_{\mathcal{D}_n, \boldsymbol{\lambda}}$	theta learned on Dn with hp lambda
`\thetahDlambda`	$\hat{\boldsymbol{\theta}}_{\mathcal{D}, \boldsymbol{\lambda}}$	theta learned on D with hp lambda
`\pdf`	p	p
`\pdfx`	$p(\mathbf{x})$	p(x)
`\pixt`	$\pi(\mathbf{x} \mid \boldsymbol{\theta})$	pi(x|theta), pdf of x given theta
`\pixit`	$\pi\left(\mathbf{x}^{(i)} \mid \boldsymbol{\theta}\right)$	pi(x^i|theta), pdf of x given theta
`\pixii`	$\pi\left(\mathbf{x}^{(i)}\right)$	pi(x^i), pdf of i-th x
`\pdfxy`	$p(\mathbf{x}, y)$	p(x, y)
`\pdfxyt`	$p(\mathbf{x}, y \mid \boldsymbol{\theta})$	p(x, y | theta)

\pdfxyit	$p\left(\mathbf{x}^{(i)}, y^{(i)} \mid \boldsymbol{\theta}\right)$	p(x^(i), y^(i) | theta)
\pdfxyk	$p(\mathbf{x}\|y=k)$	p(x | y = k)
\pdfxyj	$p(\mathbf{x}\|y=j)$	p(x | y = j)
\lpdfxyk	$\log p(\mathbf{x}\|y=k)$	log p(x | y = k)
\pdfxiyk	$p\left(\mathbf{x}^{(i)}\|y=k\right)$	p(x^i | y = k)
\pik	π_k	pi_k, prior
\lpik	$\log \pi_k$	log pi_k, log of the prior
\pit	$\pi(\boldsymbol{\theta})$	Prior probability of parameter theta
\post	$\mathbb{P}(y=1 \mid \mathbf{x})$	P(y = 1 | x), post. prob for y=1
\pix	$\pi(\mathbf{x})$	pi(x), P(y = 1 | x)
\postk	$\mathbb{P}(y=k \mid \mathbf{x})$	P(y = k | y), post. prob for y=k
\pikx	$\pi_k(\mathbf{x})$	pi_k(x), P(y = k | x)
\pikxt	$\pi_k(\mathbf{x} \mid \boldsymbol{\theta})$	pi_k(x | theta), P(y = k | x, theta)
\pijx	$\pi_j(\mathbf{x})$	pi_j(x), P(y = j | x)
\pigx	$\pi_g(\mathbf{x})$	pi_g(x), P(y = g | x)
\pdfygxt	$p(y \mid \mathbf{x}, \boldsymbol{\theta})$	p(y | x, theta)
\pdfyigxit	$p\left(y^{(i)} \mid \mathbf{x}^{(i)}, \boldsymbol{\theta}\right)$	p(y^i |x^i, theta)
\lpdfygxt	$\log p(y \mid \mathbf{x}, \boldsymbol{\theta})$	log p(y | x, theta)
\lpdfyigxit	$\log p\left(y^{(i)} \mid \mathbf{x}^{(i)}, \boldsymbol{\theta}\right)$	log p(y^i |x^i, theta)
\pixh	$\hat{\pi}(\mathbf{x})$	pi(x) hat, P(y = 1 | x) hat
\pikxh	$\hat{\pi}_k(\mathbf{x})$	pi_k(x) hat, P(y = k | x) hat
\pixih	$\hat{\pi}(\mathbf{x}^{(i)})$	pi(x^(i)) with hat
\pikxih	$\hat{\pi}_k(\mathbf{x}^{(i)})$	pi_k(x^(i)) with hat
\eps	ϵ	residual, stochastic
\epsi	$\epsilon^{(i)}$	epsilon^i, residual, stochastic
\epsh	$\hat{\epsilon}$	residual, estimated
\yf	$y f(\mathbf{x})$	y f(x), margin
\yfi	$y^{(i)} f\left(\mathbf{x}^{(i)}\right)$	y^i f(x^i), margin
\Sigmah	$\hat{\Sigma}$	estimated covariance matrix
\Sigmahj	$\hat{\Sigma}_j$	estimated covariance matrix for the j-th class
\Lyf	$L(y, f)$	L(y, f), loss function
\Lxy	$L(y, f(\mathbf{x}))$	L(y, f(x)), loss function
\Lxyi	$L\left(y^{(i)}, f\left(\mathbf{x}^{(i)}\right)\right)$	loss of observation
\Lxyt	$L(y, f(\mathbf{x} \mid \boldsymbol{\theta}))$	loss with f parameterized
\Lxyit	$L\left(y^{(i)}, f\left(\mathbf{x}^{(i)} \mid \boldsymbol{\theta}\right)\right)$	loss of observation with f parameterized
\Lxym	$L\left(y^{(i)}, f\left(\tilde{\boldsymbol{x}}^{(i)} \mid \boldsymbol{\theta}\right)\right)$	loss of observation with f parameterized
\Lpixy	$L(y, \pi(\mathbf{x}))$	loss in classification
\Lpixyi	$L\left(y^{(i)}, \pi\left(\mathbf{x}^{(i)}\right)\right)$	loss of observation in classification
\Lpixyt	$L(y, \pi(\mathbf{x} \mid \boldsymbol{\theta}))$	loss with pi parameterized
\Lpixyit	$L\left(y^{(i)}, \pi\left(\mathbf{x}^{(i)} \mid \boldsymbol{\theta}\right)\right)$	loss of observation with pi parameterized
\Lhxy	$L(y, h(\mathbf{x}))$	L(y, h(x)), loss function on discrete classes
\Lr	$L(r)$	L(r), loss defined on residual (reg) / margin (classif)
\risk	$\mathcal{R}$	R, risk
\riskf	$\mathcal{R}(f)$	R(f), risk
\riskt	$\mathcal{R}(\boldsymbol{\theta})$	R(theta), risk
\riske	$\mathcal{R}_{\text{emp}}$	R_emp, empirical risk w/o factor 1 / n
\riskeb	$\bar{\mathcal{R}}_{\text{emp}}$	R_emp, empirical risk w/ factor 1 / n
\riskef	$\mathcal{R}_{\text{emp}}(f)$	R_emp(f)
\risket	$\mathcal{R}_{\text{emp}}(\boldsymbol{\theta})$	R_emp(theta)
\riskr	$\mathcal{R}_{\text{reg}}$	R_reg, regularized risk
\riskrt	$\mathcal{R}_{\text{reg}}(\boldsymbol{\theta})$	R_reg(theta)
\riskrf	$\mathcal{R}_{\text{reg}}(f)$	R_reg(f)
\riskrth	$\hat{\mathcal{R}}_{\text{reg}}(\boldsymbol{\theta})$	hat R_reg(theta)

\risketh	$\hat{\mathcal{R}}_{\text{emp}}(\boldsymbol{\theta})$	hat R_emp(theta)
\LL	$\mathcal{L}$	L, likelihood
\LLt	$\mathcal{L}(\boldsymbol{\theta})$	L(theta), likelihood
\logl	ℓ	l, log-likelihood
\loglt	$\ell(\boldsymbol{\theta})$	l(theta), log-likelihood
\LS	$\mathfrak{L}$	????????????
\TS	$\mathfrak{T}$	??????????????
\errtrain	$\text{err}_{\text{train}}$	training error
\errtest	err_{test}	training error
\errexp	$\overline{\text{err}_{\text{test}}}$	training error

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ml-bagging

Macro	Notation	Comment
\bl	$b^{[\cdot]}(\mathbf{x})$	baselearner with argument for m
\blm	$b^{[m]}(\mathbf{x})$	baselearner without argument for m
\blmh	$\hat{b}^{[m]}(\mathbf{x})$	estimated base learner
\fM	$f^{[M]}(\mathbf{x})$	ensembled predictor
\fMh	$\hat{f}^{[M]}(\mathbf{x})$	estimated ensembled predictor
\ambifM	$\Delta\left(f^{[M]}(\mathbf{x})\right)$	ambiguity/instability of ensemble

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ml-boosting

Macro	Notation	Comment
\fm	$f^{[m]}$	prediction in iteration m
\fmh	$\hat{f}^{[m]}$	prediction in iteration m
\fmd	$f^{[m-1]}$	prediction m-1
\fmdh	$\hat{f}^{[m-1]}$	prediction m-1
\bmm	$b^{[m]}$	basemodel m
\bmmh	$\hat{b}^{[m]}$	basemodel m with hat
\betam	$\beta^{[m]}$	weight of basemodel m
\betamh	$\hat{\beta}^{[m]}$	weight of basemodel m with hat
\betai	$\beta^{[\cdot]}$	weight of basemodel with argument for m
\errm	$\text{err}^{[m]}$	weighted in-sample misclassification rate
\wm	$w^{[m]}$	weight vector of basemodel m
\wmi	$w^{[m](i)}$	weight of obs i of basemodel m

\thetam	$\theta^{[m]}$	parameters of basemodel m
\thetamh	$\hat{\theta}^{[m]}$	parameters of basemodel m with hat
\rmm	$\tilde{r}^{[m]}$	pseudo residuals
\rmi	$\tilde{r}^{[m](i)}$	pseudo residuals
\Rtm	$R_t^{[m]}$	terminal-region
\Tm	$T^{[m]}$	
\ctm	$c_t^{[m]}$	mean, terminal-regions
\ctmh	$\hat{c}_t^{[m]}$	mean, terminal-regions with hat
\ctmt	$\tilde{c}_t^{[m]}$	mean, terminal-regions
\fxk	$f_k(x)$	f_k(x)
\Lp	L'	
\Ldp	L''	
\Lpleft	L'_{left}	

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ml-eval

Macro	Notation	Comment
\ntest	n_{test}	size of the test set
\ntrain	n_{train}	size of the train set
\ntesti	$n_{\text{test},\cdot}$	size of the i-th test set
\ntraini	$n_{\text{train},\cdot}$	size of the i-th train set
\Jtrain	J_{train}	index vector associated to the train data
\Jtest	J_{test}	index vector associated to the test data
\Jtraini	$J_{\text{train},\cdot}$	index vector associated to the i-th train dataset
\Jtesti	$J_{\text{test},\cdot}$	index vector associated to the i-th test dataset
\Dtraini	$\mathcal{D}_{\text{train},\cdot}$	D_train,i, i-th training set
\Dtesti	$\mathcal{D}_{\text{test},\cdot}$	D_test,i, i-th test set
\JSpace	$\{1,\ldots,n\}^{\cdot}$	space of train indices of size m_train
\JtrainSpace	$\{1,\ldots,n\}^{n_{\text{train}}}$	space of train indices of size m_train
\JtestSpace	$\{1,\ldots,n\}^{n_{\text{test}}}$	space of train indices of size m_test
\yJ	$\mathbf{y}_{\cdot}$	output vector associated to index J
\yJDef	$\left(y^{(J^{(1)})},\ldots,y^{(J^{(m)})}\right)$	def of the output vector associated to index J
\JJ	$\mathcal{J}$	cali-J, set of all splits
\JJset	$((J_{\text{train},1},J_{\text{test},1}),\ldots,(J_{\text{train},B},J_{\text{test},B}))$	(Jtrain_1,Jtest_1) ...(Jtrain_B,Jtest_B)
\GE	GE	GE
\GEh	$\widehat{\mathrm{GE}}$	GE-hat
\GEfull	$\mathrm{GE}(\mathcal{I},\boldsymbol{\lambda},\cdot,\rho)$	GE(I, lam, ?, rho)
\GEhholdout	$\widehat{\mathrm{GE}}_{J_{\text{train}},J_{\text{test}}}(\mathcal{I},\boldsymbol{\lambda},\lvert J_{\text{train}}\rvert,\rho)$	GE-hat_{Jtrain,Jtest} (I, lam, |J|, rho)
\GEhholdouti	$\widehat{\mathrm{GE}}_{J_{\text{train},\cdot},J_{\text{test},\cdot}}(\mathcal{I},\boldsymbol{\lambda},\lvert J_{\text{train},\cdot}\rvert,\rho)$	GE-hat_{Jtrain_i,Jtest_i} (I, lam, |Jtrain_i|, rho)
\GEhlam	$\widehat{\mathrm{GE}}(\boldsymbol{\lambda})$	GE-hat(lam)
\GEhlamsubIJrho	$\widehat{\mathrm{GE}}_{\mathcal{I},\mathcal{J},\rho}(\boldsymbol{\lambda})$	GE-hat_I,J,rho(lam)
\GEhresa	$\widehat{\mathrm{GE}}(\mathcal{I},\mathcal{J},\rho,\boldsymbol{\lambda})$	GE-hat_I,J,rho(lam)
\GErhoDef	$\lim_{n_{\text{test}}\to\infty}\mathbb{E}\left[\rho\left(\mathbf{y}_{J_{\text{test}}},\boldsymbol{F}_{J_{\text{test}},\mathcal{I}(\mathcal{D}_{\text{train}},\boldsymbol{\lambda})}\right)\right]$	GE formal def
\agr	agr	aggregate function

`\GEf`	$\mathrm{GE}\left(\hat{f}\right)$	Generalization error of a fitted model
`\GEind`	$GE_n\left(\mathcal{I}_{L,O}\right)$	Generalization error of a fitted model
`\GEnf`	$GE_n\left(\hat{f}_{\cdot}\right)$	Generalization error GE
`\GEhat`	$\widehat{\mathrm{GE}}$	Estimated train error
`\GED`	$\mathrm{GE}_{\mathcal{D}}$	Generalization error GE
`\EGEn`	EGE_n	expected GE
`\EDn`	$\mathbb{E}_{\lvert D\rvert=n}$	expectation wrt data of size n
`\rhoL`	ρ_L	perf. measure derived from pointwise loss function L
`\F`	$\boldsymbol{F}$	matrix of prediction scores
`\Fi`	$\boldsymbol{F}^{(\cdot)}$	i'th row vector of the prediction scores matrix
`\FJ`	$\boldsymbol{F}_{\cdot}$	predscore mat index vector J
`\FJf`	$\boldsymbol{F}_{J,f}$	predscore mat index vector J and model f
`\FJtestfh`	$\boldsymbol{F}_{J_{\mathrm{test}},\hat{f}}$	predscore mat index vector Jtest and model f hat
`\FJtestftrain`	$\boldsymbol{F}_{J_{\mathrm{test}},\mathcal{I}(\mathcal{D}_{\mathrm{train}},\boldsymbol{\lambda})}$	predscore mat index vector Jtest and model f
`\FJtestftraini`	$\boldsymbol{F}_{J_{\mathrm{test},\cdot},\mathcal{I}(\mathcal{D}_{\mathrm{train},\cdot},\boldsymbol{\lambda})}$	predscore mat i-th index vector Jtest and model f
`\FJfDef`	$\left(f(\mathbf{x}^{(J^{(1)})}),\dots,f(\mathbf{x}^{(J^{(m)})})\right)$	def of predscore mat index vector J and model f
`\preimageRho`	$\bigcup_{m\in\mathbb{N}}\left(\mathcal{Y}^m\times\mathbb{R}^{m\times g}\right)$	Set of all datasets times the hyperparameter space
`\np`	n_+	no. of positive instances
`\nn`	n_-	no. of negative instances
`\rn`	π_-	proportion negative instances
`\rp`	π_+	proportion negative instances
`\tp`	$\#\mathrm{TP}$	true pos
`\fap`	$\#\mathrm{FP}$	false pos (fp taken for partial derivs)
`\tn`	$\#\mathrm{TN}$	true neg
`\fan`	$\#\mathrm{FN}$	false neg

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ml-feature-sel

Macro	Notation	Comment
`\xjNull`	x_{j_0}	
`\xjEins`	x_{j_1}	
`\xl`	$\mathbf{x}_l$	
`\pushcode`		

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ml-gp

Macro	Notation	Comment
`\gp`	$\mathcal{GP}\left(m(\mathbf{x}), k\left(\mathbf{x}, \mathbf{x}'\right)\right)$	Gaussian Process Definition
`\mvec`	$\mathbf{m}$	Gaussian process mean vector
`\Kmat`	$\mathbf{K}$	estimated base learner
`\kstarx`	$\mathbf{k}_*(x)$	cov of new obs with x
`\ls`	ℓ	length-scale

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ml-hpo

Macro	Notation	Comment
`\Ilam`	$\mathcal{I}_{\boldsymbol{\lambda}}$	I_lambda
`\lami`	$\boldsymbol{\lambda}^{(\cdot)}$	lambda i
`\clam`	$c(\boldsymbol{\lambda})$	c(lambda)
`\clamh`	$c(\hat{\boldsymbol{\lambda}})$	c(lambda-hat)
`\lams`	$\boldsymbol{\lambda}^*$	Theoretical min of c
`\lamh`	$\hat{\boldsymbol{\lambda}}$	returned lambda of HPO
`\LamS`	$\tilde{\boldsymbol{\Lambda}}$	search space
`\lamp`	$\boldsymbol{\lambda}^+$	proposed lambda
`\clamp`	$c(\boldsymbol{\lambda}^+)$	c of proposed lambda
`\archive`	$\mathcal{A}$	archive at time step t
`\archivet`	$\mathcal{A}^{[\cdot]}$	archive at time step t
`\tuner`	$\mathcal{T}$	tuner
`\tunerfull`	$\mathcal{T}_{\mathcal{I},\tilde{\boldsymbol{\Lambda}},\rho,\mathcal{J}}$	tuner with inducer, search space, performance measure and resampling strategy
`\chlam`	$\hat{c}(\boldsymbol{\lambda})$	post mean of SM
`\shlam`	$\hat{\sigma}(\boldsymbol{\lambda})$	post sd of SM
`\vhlam`	$\hat{\sigma^2}(\boldsymbol{\lambda})$	post var of SM
`\ulam`	$u(\boldsymbol{\lambda})$	acquisition function
`\lambdaopt`	λ^*	Minimum of the black box function Psi
`\metadata`	$\left\{\left(\boldsymbol{\lambda}^{(i)}, \Psi^{[i]}\right)\right\}$	Metadata for the Gaussian process
`\lamvec`	$\left(\lambda^{[1]}, \ldots, \lambda^{[m_{\text{init}}]}\right)$	Vector of different inputs
`\minit`	m_{init}	Size of the initial design
`\lambu`	λ_{budget}	single lambda_budget komponent HP
`\lamfid`	λ_{fid}	single lambda_budget komponent HP
`\lamfidl`	$\lambda_{\text{fid}}^{\text{low}}$	single lambda_budget komponent HP
`\lamfidu`	$\lambda_{\text{fid}}^{\text{upp}}$	single lambda_budget komponent HP
`\etahb`	η_{HB}	HB multiplier eta
`\costs`	$\mathcal{C}$	costs
`\Celite`	$\boldsymbol{\theta}^*$	elite configurations
`\instances`	$\mathcal{I}$	sequence of instances
`\budget`	$\mathcal{B}$	computational budget

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ml-interpretable

Macro	Notation	Comment
\fj	f_j	marginal function f_j, depending on feature j
\fnj	f_{-j}	marginal function f_{-j}, depending on all features but j
\fS	f_S	marginal function f_S depending on feature set S
\fC	f_C	marginal function f_C depending on feature set C
\fhj	$\hat{f}_j$	marginal function fh_j, depending on feature j
\fhnj	$\hat{f}_{-j}$	marginal function fh_{-j}, depending on all features but j
\fhS	$\hat{f}_S$	marginal function fh_S depending on feature set S
\fhC	$\hat{f}_C$	marginal function fh_C depending on feature set C
\XSmat	$\mathbf{X}_S$	Design matrix subset
\XCmat	$\mathbf{X}_C$	Design matrix subset
\Xnj	$\mathbf{X}_{-j}$	Design matrix subset -j = {1, .., j-1, j+1, ..., p}
\Scupj	$S \cup \{j\}$	coalition S but without player j
\Scupk	$S \cup \{k\}$	coalition S but without player k
\SsubP	$S \subseteq P$	coalition S subset of P
\SsubPnoj	$S \subseteq P \setminus \{j\}$	coalition S subset of P without player j
\SsubPnojk	$S \subseteq P \setminus \{j, k\}$	coalition S subset of P without player k
\phiij	$\hat{\phi}_j^{(i)}$	Shapley value for feature j and observation i
\Gspace	$\mathcal{G}$	Hypothesis space for surrogate model
\neigh	$\phi_{\mathbf{x}}$	Proximity measure
\zv	$\mathbf{z}$	Sampled datapoints for surrogate
\Zspace	$\mathcal{Z}$	Space of sampled datapoints
\Gower	d_G	Gower distance

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ml-nn

Macro	Notation	Comment
\neurons	$z_1, \dots, z_M$	vector of neurons
\hidz	$\mathbf{z}$	vector of hidden activations
\biasb	$\mathbf{b}$	bias vector
\biasc	c	bias in output
\wtw	$\mathbf{w}$	weight vector (general)
\Wmat	$\mathbf{W}$	weight vector (general)
\wtu	$\mathbf{u}$	weight vector of output neuron
\Oreg	$R_{reg}(\theta \vert X, y)$	regularized objective function
\Ounreg	$R_{emp}(\theta \vert X, y)$	unconstrained objective function
\Pen	$\Omega(\theta)$	penalty
\Oregweight	$R_{reg}(w \vert X, y)$	regularized objective function with weight
\Oweight	$R_{emp}(w \vert X, y)$	unconstrained objective function with weight
\Oweighti	$R_{emp}(w_i \vert X, y)$	unconstrained objective function with weight w_i
\Oweightopt	$J(w^* \vert X, y)$	unconstrained objective function withoptimal weight
\Oopt	$\hat{J}(\theta \vert X, y)$	optimal objective function
\Odropout	$J(\theta, \mu \vert X, y)$	dropout objective function

\Loss	$L(y, f(\mathbf{x}, \boldsymbol{\theta}))$	
\Lmomentumnest	$L(y^{(i)}, f(x^{(i)}, \boldsymbol{\theta} + \varphi \boldsymbol{\nu}))$	momentum risk
\Lmomentumtilde	$L(y^{(i)}, f(x^{(i)}, \tilde{\boldsymbol{\theta}}))$	Nesterov momentum risk
\Lmomentum	$L(y^{(i)}, f(x^{(i)}, \boldsymbol{\theta}))$	
\Hess	$\mathbf{H}$	
\nub	$\boldsymbol{\nu}$	
\uauto	$L(x, g(f(x)))$	undercomplete autoencoder objective function
\dauto	$L(x, g(f(\tilde{x})))$	denoising autoencoder objective function
\deltab	$\boldsymbol{\delta}$	
\Lossdeltai	$L(y^{(i)}, f(\mathbf{x}^{(i)} + \boldsymbol{\delta} \vert \boldsymbol{\theta}))$	
\Lossdelta	$L(y, f(\mathbf{x} + \boldsymbol{\delta} \vert \boldsymbol{\theta}))$	

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ml-rf

Macro	Notation	Comment
\betaM	$\beta^{[M]}$	baselearner with argument for M
\betai	$\beta^{[1]}$	baselearner with argument for 1

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ml-survival

Macro	Notation	Comment
\Ti	$T^{(\cdot)}$	??
\Ci	$C^{(\cdot)}$	??
\oi	$o^{(\cdot)}$	??
\ti	$t^{(\cdot)}$	??
\deltai	$\delta^{(\cdot)}$	
\Lxdi	$L\left(\boldsymbol{\delta}, f(\mathbf{x})\right)$	

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ml-svm

Macro	Notation	Comment
`\sv`	SV	supportvectors
`\HS`	Φ	H, hilbertspace
`\slvec`	$\left(\zeta^{(1)}, \zeta^{(n)}\right)$	slack variables (SVM)
`\sli`	$\zeta^{(i)}$	slack variable (SVM)
`\alphah`	$\hat{\alpha}$	alpha-hat
`\alphav`	$\boldsymbol{\alpha}$	vector alpha (bold)
`\alphavh`	$\hat{\boldsymbol{\alpha}}$	vector alpha-hat
`\phix`	$\phi(\mathbf{x})$	\phi(x)
`\phixt`	$\phi(\tilde{\mathbf{x}})$	\phi(x-tilde)

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ml-trees

Macro	Notation	Comment
`\Np`	$\mathcal{N}$	(Parent) node N
`\Npk`	$\mathcal{N}_k$	node N_k
`\Nl`	$\mathcal{N}_1$	Left node N_1
`\Nr`	$\mathcal{N}_2$	Right node N_2
`\pikN`	$\pi_k^{(\mathcal{N})}$	class probability node N
`\pikNh`	$\hat{\pi}_\cdot^{(\mathcal{N})}$	estimated class probability node N
`\pikNlh`	$\hat{\pi}_\cdot^{(\mathcal{N}_1)}$	
`\pikNrh`	$\hat{\pi}_\cdot^{(\mathcal{N}_2)}$	

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probmodel

Macro	Notation	Comment
`\muk`	$\boldsymbol{\mu_k}$	

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