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Part III. The models

Notation

Set notation

$x, y, z, \ldots$	points of $\mathbb{R}^d$
$X, Y, Z, \ldots$	subsets of $\mathbb{R}^d$
$\mathcal{X}, \mathcal{Y}, \ldots$	classes of subsets of $\mathbb{R}^d$
$\mathfrak{X}, \mathfrak{Y}, \ldots$	family of classes of subsets of $\mathbb{R}^d$
X^c	complement of X in $\mathbb{R}^d$
$X \cup Y$	union of X and Y
$X \cap Y$	intersection of X and Y
$X \backslash Y = X \bigcap Y^c$	set difference of X and Y
$\check{X} = \{-x : x \in X\}$	reflection of X
X_x	X shifted by $\overrightarrow{ox}$ ($o =$ origin of $\mathbb{R}^d$)
$X \oplus Y = \cup_{y \in Y} X_y$	Minkowski sum of X and Y
$X \ominus Y = \cap_{y \in Y} X_y$	Minkowski difference of X and Y
$X^Y = (X \ominus \check{Y}) \oplus Y$	morphological opening of X w.r.t. Y
$X^Y = (X \oplus \check{Y}) \ominus Y$	morphological closure of X w.r.t. Y
$X \downarrow S$	projection of X onto subspace S
$\mathring{X}$	topological interior of X
$\overline{X}$	topological closure of X
∂X	boundary of X
$\|X\|$	volume of X (case X infinite)
$\#X$	cardinality of X (case X finite)
$B(x, r)$	ball with center x and radius r
$B_d = B(o, 1)$	standard unit ball in $\mathbb{R}^d$
$\omega_d = \|B_d\|$	volume of the unit ball in $\mathbb{R}^d$
$S_d = \partial B_d$	standard unit sphere in $\mathbb{R}^d$
$H(\alpha, p)$	hyperplane with direction α and location p
Y^X	set of all mappings from X to Y

Classes of subsets

$\mathcal{F}_d$	closed subsets of $\mathbb{R}^d$
$\mathcal{G}_d$	open subsets of $\mathbb{R}^d$
$\mathcal{K}_d$	compact subsets of $\mathbb{R}^d$
$\mathcal{K}_d^\star$	nonempty compact subsets of $\mathbb{R}^d$
$\mathcal{C}_d$	convex subsets of $\mathbb{R}^d$
$\mathcal{R}_d$	polyconvex subsets of $\mathbb{R}^d$

Analysis

1_X	indicator function of set X
$d(X,Y)$	Hausdorff distance between $X, Y \in \mathcal{K}_d^\star$
$W_i(X)$	i^{th} Minkowski functional of $X \in \mathcal{R}_d$
$\chi(X) = W_d(X)$	Euler-Poincaré characteristic of $X \in \mathcal{R}_d$
$L^2(X,p)$	set of scalar functions defined on X and square integrable for p
$< f, g >$	scalar product between $f, g \in L^2(X,p)$
$\| f \|_2$	norm of $f \in L^2(X,p)$
$\| \mu \|$	total variation of measure μ

Probability and statistics

$A \vee B$	union of the events A and B
$A \wedge B$	intersection of the events A and B
$\mathcal{D}(X)$	distribution of X
$X \sim p$	the distribution of X is p
$X \overset{df}{\sim} F$	the distribution function of X is F
$X \overset{\mathcal{D}}{\equiv} Y$	X and Y have the same distribution
T_X	hitting functional of $X \in \mathcal{F}_d$
$P(x,A)$	transition kernel
$P^{(n)}(x,A)$	n^{th} iterate of the transition kernel P
$s^2(X\|Y)$	dispersion variance of X in Y

Distributions

$Unif$	Uniform distribution on $]0,1[$
$Unif(D)$	Uniform distribution on D
$Gauss$	Standard Gaussian distribution
$Gauss(m,\sigma^2)$	Gaussian distribution with mean value m and variance σ^2
Exp	Exponential distribution with scale factor 1
$Exp(b)$	Exponential distribution with scale factor b
$Gamma(\alpha,b)$	Gamma distribution with parameter α and scale factor b
$Beta(\alpha,\beta)$	Beta distribution with parameters α and β
$Ber(p)$	Bernoulli distribution with parameter p
$Bin(n,p)$	Binomial distribution with index n and parameter p
$Poisson(\theta)$	Poisson distribution with mean θ
$Geom(p)$	Geometric distribution with parameter p
$Nbd(\nu,p)$	Negative binomial distribution with index ν and parameter p
$Sichel(\theta,\alpha)$	Sichel distribution with parameters α and θ
$Invg(\alpha,\beta)$	Inverse Gaussian disribution with parameters α and β
$Bigauss(\rho)$	standard bigaussian distribution with correlation ρ
$Multb(n;p_1,...,p_n)$	Multinomial distribution with index n and parameters $p_1,...,p_n$

Miscellaneous

$a \equiv b \bmod m$	a and b are congruent modulo m
$\left(\frac{a}{b}\right)$	Legendre coefficient of a and b
$(X,\preceq)$	poset
$M_x = \{y \in X : x \preceq y\}$	upper bounds of x in $(X,\preceq)$
$M^x = \{y \in X : y \preceq x\}$	lower bounds of x in $(X,\preceq)$

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