Notation Reference

Core Probability

Notation	Meaning
E or F	Capital letters can denote events
A or B	Sometimes they denote sets
$\|E\|$	Size of an event or set
E^C	Complement of an event or set
EF	And of events (aka intersection)
E and F	And of events (aka intersection)
$E \cap F$	And of events (aka intersection)
E or F	Or of events (aka union)
$E \cup F$	Or of events (aka union)
$\text{count}(E)$	The number of times that E occurs
$\text{P}(E)$	The probability of an event E
$\text{P}(E\|F)$	The conditional probability of an event E given F
$\text{P}(E, F)$	The probability of event E and F
$\text{P}(E\|F, G)$	The conditional probability of an event E given both F and G
$n!$	n factorial
$\binom{n}{k}$	Binomial coefficient
$\binom{n}{r_1, r_2, r_3}$	Multinomial coefficient

Random Variables

Notation	Meaning
x or y or i	Lower case letters denote regular variables
X or Y	Capital letters are used to denote random variables
K	Capital K is reserved for constants
$\text{E}[X]$	Expectation of X

Notation	Meaning
$\mathrm{Var}(X)$	Variance of X
$\mathrm{P}(X=x)$	Probability mass function (PMF) of X, evaluated at x
$\mathrm{P}(x)$	Probability mass function (PMF) of X, evaluated at x
$f(X=x)$	Probability density function (PDF) of X, evaluated at x
$f(x)$	Probability density function (PDF) of X, evaluated at x
$f(X=x, Y=y)$	Joint probability density
$f(X=x\|Y=y)$	Conditional probability density
$F_X(x)$ or $F(x)$	Cumulative distribution function (CDF) of X
IID	Independent and Identically Distributed

Parametric Distributions

Notation	Meaning
$X \sim \mathrm{Bern}(p)$	X is a Bernoulli random variable
$X \sim \mathrm{Bin}(n, p)$	X is a Binomial random variable
$X \sim \mathrm{Poi}(p)$	X is a Poisson random variable
$X \sim \mathrm{Geo}(p)$	X is a Geometric random variable
$X \sim \mathrm{NegBin}(r, p)$	X is a Negative Binomial random variable
$X \sim \mathrm{Uni}(a, b)$	X is a Uniform random variable
$X \sim \mathrm{Exp}(\lambda)$	X is a Exponential random variable
$X \sim \mathrm{Beta}(a, b)$	X is a Beta random variable