Index

assumption
  convexity, 34
  existence and uniqueness, 38
  nondegeneracy, 96
average approach, 2, 4

ball-solution
  definition of, 61
beta distribution, 39

chance-constrained approach, 3, 4
chance-constrained optimization, 4, 44
Chebyshev layer, 70, 73
classification, 79
conditional value at risk (CVaR), 99
confidence parameter, 12, 20, 72
constraint removal, 44
control
  robust, 21
  with quantized input, 105
convex function, 6
convex hull, 102
convexity assumption, 34
CVaR (conditional value at risk), 99

data-driven optimization, 9
degenerate problem, 62, 103
deterministic robustness, 49
Dirichlet distribution, 90
distribution-free result, 14, 41, 72, 84, 98
disturbance compensation, 27

empirical costs
  definition of, 90
empirical frequency, 43, 44
expected shortfall, 99
  empirical, 100

fully supported problem, 58, 73
  definition of, 58

GEM (guaranteed error machine), 81
guaranteed error machine (GEM), 81

Helly's lemma, 57
histogram, 85

IMC (internal model control), 27
internal model control (IMC), 27
interval uncertainty, 51

linear matrix inequality (LMI), 22
LMI (linear matrix inequality), 22

machine learning, 10, 79
mixed-integer program, 106
model
  beyond the use of, 53
  region estimation, 67

pole placement, 25
portfolio optimization, 11, 99
prediction, 68
prior information, 14, 70, 72
prior knowledge, 14
probability box, 89
procedure
  constraint removal, 44
  greedy removal, 44
  optimal constraint removal, 44
  random removal, 44

quadratic stability, 21
quadratic stabilization, 24

region estimation model (REM), 67
  identification, 70
  reliability, 68
  size, 68
regularization, 91
REM (region estimation model), 67, 68, 70
risk, 3, 16, 90
  empirical, 18
risk parameter, 12, 72
risk-performance trade-off, 16

sample complexity, 13, 14, 95
scenario optimization
  definition of, 6
  fast algorithm, 93
  generalization theorem for, 38
  generalization theory of, 12
  nonconvex, 101
  wait-and-judge, 95, 101
  with constraint removal, 44, 52
scenario program, 7, 20, 34
scenarios, 7
statistical learning, 79
support constraint, 57
  definition of, 57
support set
  definition of, 104

value at risk (VaR), 11, 99
Vapnik–Chervonenkis dimension, 40

VaR (value at risk), 11, 99
violation, 33
  cumulative distribution of, 39
  expected value of, 42
  probability, 33
  set, 33
violation parameter, 20
violation probability
  definition of, 33
violation set
  definition of, 33

worst-case approach, 2, 4