Illustrations

1.1	High-dimensional phenomena in linear discriminant analysis	4
1.2	Illustration of the Marčenko–Pastur law	6
1.3	Geometry of sampling in a high-dimensional cube	8
1.4	Hard- and soft-thresholding estimators for sparse vectors	11
1.5	Hard-thresholded estimators of a sparse covariance matrix	12
1.6	Flow diagram of chapters and their interdependence	18
3.1	Concentration of measure on the sphere $\mathbb{S}^{n-1}$	69
4.1	Population and empirical cumulative distribution functions	99
5.1	Packings and coverings of a set	122
5.2	Metric entropy of Lipschitz function class	128
5.3	Illustration of Kolmogorov chaining procedure	141
6.1	Covariance estimation and graphical structure	182
7.1	Weak models of sparsity using ℓ_q-balls	195
7.2	Geometry of the tangent cone and restricted nullspace property	201
7.3	Phase transitions for basis pursuit linear program	206
7.4	Basis pursuit performance for correlated designs	207
7.5	From strong convexity to bounds on estimation error	208
7.6	Failure of strong convexity in high dimensions	209
7.7	Phase transitions for Lasso variable selection	222
8.1	Principal component analysis for low-rank matrix approximation	238
8.2	PCA and eigenfaces for face recognition	239
8.3	Estimating Gaussian mixture models via PCA	240
8.4	Performance of PCA as a function of signal-to-noise ratio	246
8.5	Sparse versions of eigenfaces	249
9.1	Unit balls of various decomposable norms	261
9.2	Standard versus overlapping group Lasso	263
9.3	Group Lasso with disjoint and overlapping groups	264
9.4	Multivariate regression models and matrix recovery	266
9.5	Geometry of the nuclear norm ball	268
9.6	Geometry of decomposable regularizers	270
9.7	Illustration of the cone $\mathbb{C}_{\theta^*}(\mathbb{M}, \overline{\mathbb{M}}^{\perp})$	274
9.8	Cost functions and convexity in high dimensions	276
9.9	Illustration of proof technique in Lemma 9.21	282
9.10	Decomposable norms for additive matrix decomposition	293
10.1	Low-rank matrix completion and recommender systems	314
10.2	Consistency of estimator based on nuclear norm regularization	324
11.1	Maximal cliques and vertex cutsets in graphs	348
11.2	Hammersley–Clifford theorem for Gaussian graphical models	353

Published online by Cambridge University Press

12.1 Exact interpolation using RKHS methods 405
12.2 Kernel ridge regression with polynomial and Sobolev kernels 408
13.1 Convex and monotonic regression estimates 421
13.2 Localized complexity measures and the critical radius 422
13.3 Star-shaped sets and their properties 424
13.4 Trade-offs between approximation and estimation error 435
13.5 Eigenspectra of empirical kernel matrices 441
14.1 Plots of the behavior of the histogram density estimate 478
14.2 Plots of the behavior of the orthogonal series density estimate 479
15.1 Reduction from estimation to testing 488
15.2 Lower bounds for Lipschitz classes via hat functions 495
15.3 Perturbed densities for Le Cam lower bound 497
15.4 Construction of mixture distribution for lower bounds 500

Published online by Cambridge University Press