Index

A
Activity analysis
   Activity recognition, 316
   Diverse summarization, 377
   Recognition of Interactions, 317
Affine motion factorization, 141

B
Boosting
   Riemannian boosting, 288
   Riemannian LogitBoost, 290

C
Canonical correlation analysis, 69
   Euclidean, 72
   Magnetic resonance imaging, 85
   Manifolds, 73
   Product manifold, 80
Chromatic noise filtering, 137
Classifier adaptation, 325
   Age classification, 340
   Grassmann manifolds, 328
   Intermediate subspaces, 334
   Object recognition, 338
Coding on Riemannian manifolds, 346, 352
   K-means dictionary, 352
   Kernel coordinate coding, 356
   log-Euclidean coding, 354
   Sparse coding, 354

D
Diffusion tensor imaging, 36
   Canonical correlation analysis, 82
   Segmentation, 38

E
Exponential map, 73, 80, 285
   Inverse, 73
   Special Euclidean group, 170
   Symmetric positive-definite matrices, 82

F
Face recognition, 63
   Riemannian coordinate coding, 357
Fréchet mean, 23, 73, 102
   incremental, 26
Functional analysis
   Alignment, 216
   Elastic metrics, 216
   Parameterization-invariance, 220
   Parametrization-invariance, 235
   Shape modeling, 214
   Sobolev metrics, 239
   Square-Root Function Representation, 261
   Square-root velocity field, 215
   Square-root velocity transform, see also
      Square-root velocity field
   Surfaces, 251, 258
   Trajectories on manifolds, 221
   Transported square-root vector field, 224, 374
   Fundamental matrix, 138

G
Generalized Projection Based M-estimators, 131
Geodesic, 4, 73, 306
Grassmann manifold, 48, 126, 307, 327
  Exponential map, 128
  Inverse exponential map, 128
  Chordal distance, 308
  Geodesic, 127, 128
  Parallel transport, 127
  Product of Grassmannians, 308
  Robust estimation, 129
  Tangent and Normal space, 127
Group action, 4

K
  Karcher mean, 217, see also Fréchet mean, 287
  Kendall’s shape space, 49, see also Shapes Kernels, 49
    Fisher discriminant analysis, 61
    Grassmann manifold, 56
    K-means, 61
    Kendall’s shape space, 57
    Manifolds, 53
    Multiple kernel learning, 60
    non-Gaussian, 58
    PCA, 60
    Positive/Negative definite, 50
    RBF, 53
    Support vector machines, 59
    Symmetric positive-definite matrices, 55, 351

L
  Lie groups, 149, 306
    Adjoint operator, 170
    Average, see also Fréchet mean
    Baker-Campbell-Hausdorff formula, 151, 172
    Lie algebra, 150, 170
    Lie bracket, 171
    Rotation group (2D), 150
    Rotation group (3D), 151
    Special Euclidean group, 169

M
  Mean shift, 129
    Grassmann manifold, 129

N
  Nearest neighbor search, 377
    Euclidean exact search, 378
    Euclidean locality sensitive hashing, 378
    Riemannian locality sensitive hashing, 379

O
  Object recognition, 62, 312, 313, 315

P
  Pedestrian detection, 61, 281
    Riemannian boosting, see also Boosting
  Planar Homography, 139
  Principal geodesic analysis, 112
  Probability density function, 104
    Gaussian on shape-space, 271
    Gaussian on Special Euclidean group, 172
    Normal distribution on Sphere, 108
    Riemannian Normal distribution, 104
    Sampling from a Riemannian Normal distribution, 107

Q
  Quotient space, 5

R
  Regression on manifolds, 309
    Activity recognition, 313
    Nonlinear Least Squares, 310
    Object recognition, 312
    Probabilistic Geodesic Regression, 110
    Visual tracking, 312
  Reproducing Kernel Hilbert Spaces, see also Kernels
  Riemannian center-of-mass, see also Fréchet mean
  Riemannian geometry, 3
  Riemannian manifold, 47, 73, 283
  Robotic localization
    Bayesian filter in exponential coordinates, 177

S
  Shapes
    Analysis of Corpus Callosum, 118
    Covariance weighted Procrustes analysis, 190
    Elastic shape analysis, 218
    Procrustes analysis, 190
    Retrieval, 64
    Shape sampling, 375
    Shape variability, 119
    Smooth curves, 213
    Stiefel manifold, 48
    Structure-from-motion, 146
3D registration, 160
Motion averaging, 148
Subset selection, 365
  Column subset selection, 366
  Diversity measures on manifolds, 368
  Riemannian subset selection, 365
Surfaces
  Elastic metric, 266
  Functional representation, 260
  Image registration, 263
  Square-Root Function Representation, 261
  Square-root normal field, 268

Affine invariant Riemannian metric, 285
Bregman divergence, 347
Exponential map and inverse, 82, 285
Region covariance descriptors, 291

T
  Tangent space, 3

V
  Visual tracking, 314