

Index

A

Abraham Chandy, D., 382
Acharya, U.R., 215, 216, 234, 377, 396
Active contours
 advantages, 34
 edge-based, 37
 external energy, 36
 generalized energy function, 37–38
 internal energy, 36
 probabilistic model, 39
 region-based, 38–39
Active volume models (AVM)
 definition, 3
 efficiency, 3–4
 model dynamics and evolution, 13
 image gradient data term, 14
 model evolution, 15–16
 object region data term, 14–15
 multiple-surface constraints, 16–19
 shape representation and deformation
 deformation, 13
 explicit representation, 12–13
Adaptive 3D Metamorphs, 9
Affine transformation, 247–248
Andrews, H.C., 257
Ang, M.H., 377, 396
Anisotropic scale selection
 derivatives, 74–75
 maximum-over-scales criteria
 first-order criterion, 78
 norm, 76–77
 second-order criterion, 78–80
 related work, 80–81
 scale-space derivatives, 75–76
Annoni, A., 314
Appearance statistics, 2, 3, 9, 14, 15,
 18, 64

Area-based techniques, 312–313
Artificial neural network (ANN)
 analysis of variance (ANOVA) test,
 391–392
 binary output code, 391
 feedback network, 389–390
 feed-forward network, 389
 performance, 392–393
Automated ocular localization
 cornea locating process, 226–227
 data collection, 219
 delineation qualities for thermographic
 sequences, 229–231
 evaluation, 227–229
 methods
 differential image, 221–222
 edge map, 223
 image expansion, 222
 snake and gradient vector flow field
 gradient vector flow field, 220
 snake algorithm, 219–220
 target tracing function coupled with
 genetic algorithm, 223–226
Automatic 3-D-to-2-D-registration, 261
Automatic registration methods, 312
Automatic scale selection, 72, 74, 81, 96
Axel, L., 281, 306

B

Backward resampling, 256
Bae, K.T., 105
Bahalerao, A., 81
Basin of attraction, 86
Bazin, P.-L., 339, 373
Beache, G.M., 235, 278
Benediktsson, J.A., 309, 334
Berger, J.W., 314

- Bertalmio, M., 259
 Bhagalia, R., 264
 Bigun, J., 81
 Black, M.J., 81
 Bland–Altman plots, 117, 118
 Bookstein, F.L., 249
 Brain image topology. *See* Digital topology
 Butz, T., 312
 Byrne, J., 261
- C**
- CAD. *See* Computer-aided diagnosis
 Cain, S.C., 258
 Change detection
 - classification, 313
 - decision rule, 314
 - feature ratio, 320
 - image differencing method, 313, 314
 - image ratioing approach, 314
 - preprocessing, 319–320
 - problem definition, 313
 - thresholding approach, 320–323
 - traditional approaches, 313
 Chan, R.C., 263
 Chatterji, B.N., 242
 Cheng, Y., 84
 Chest CT. *See* Pulmonary nodule segmentation
 Cho, G.Y., 282
 Chou, P.B., 59
 Clinically significant macular edema (CSME), 380–382
 CoCRF formulation, 55
 Cohen, L., 12
 Collignon, A., 244, 255
 Comaniciu, D., 78
 Compactly supported RBF, 252
 Computer-aided diagnosis (CAD), 130
 Computer-aided measurement scheme evaluation
 - efficiency, 114
 - region-based evaluation, 112–113
 - robustness, 113
 - volume agreement evaluation, 111–112
 liver volumes, CT
 - calculations, 111, 112
 - comparison, 115, 116
 - fast-marching level-set algorithm, 109–111
 - flow chart, 107, 108
 Computer-based identification, diabetic maculopathy stages.
 - See* Diabetic maculopathy stages identification
 Computerized organ segmentation
 - anisotropic diffusion technique, 123
 - average processing time, 119
 - axial CT slice, liver, 115, 116
 - Bland–Altman plots, 117, 118
 - computer-aided measurement scheme (*see* Computer-aided measurement scheme)
 - correlation coefficient, 105
 - donor liver assessment, 104
 - FP and FN extractions, 119, 120
 - “gold-standard” manual volumetry, 107
 - graft size, 104
 - hepatectomy, 124
 - hepatic CT database, 106
 - interactive volumetry-assist software, 106–107
 - liver contours, 104
 - noise reduction, 114, 115
 - protocols and CT parameters, 106
 - seed-point dependence, 122
 - user times, 119, 121
 Conditional mutual information (cMI), 264
 Conditional random fields (CRFs), 42–43
 Contact lens wearer
 - differential image, 218
 - ocular thermographic sequence, 217–219, 229, 231
 Continuous and discrete objects, 343–345
 Continuous diffeomorphisms, 345–346
 Cootes, T., 2
 Cree, M.J., 315
 CRF-driven geometric models
 - advantages, 47
 - classification confidence, 58–59
 - CoCRF formulation, 55
 - data prior, 52–53
 - driving CRF, 54–55
 - internal energy, 49
 - model dynamics, 51–52
 - model-labels likelihood, 53–54
 - model prior, 53
 - model shape and topology, 48–50
 - partitioning energy, 50–51
 - shape-based energy, 51
 - site associations, 55–56
 - site correlations, 58
 - site interactions, 56–58
 - smoothness term, 50

- Cross-correlation (CC), 240–241
- CT pulmonary nodule segmentation algorithm
 - convex hull approach, 146
 - convexity assumption, 151
 - cost function optimization, 150
 - distance map characteristics, 146–147
 - ellipsoid model, 149
 - Euclidean distance map, 151
 - figure-ground separation, 153–155
 - $\Phi(r,D)$ illustration, 157
 - fuzzy connectivity map, 150
 - interactive mode, 180–181
 - limitations, 178–179
 - nodule core extraction, 156–157
 - parameters, 179–180
 - pleural surface removal step, 149
 - post adjustment process, 159, 160
 - size-invariance property, 146
 - speed, 179
 - spiral-scanning method, 150
 - unique features, 145–146
 - voxel transformation, 152
- click point and N_V dependency, 176–178
- diameter measurement, 170–176
- LIDC 1 data set, 160–164
- LIDC 2 data set, 164–166
- pathology
 - density types, 145
 - lung CAD nodule detection system, 144
 - primary lung cancer types, 144
- positive fractions, true and false, 166–170
- prognosis, 143
- shrinkage, volumetric measure, 144
- Cubic B-splines, 250–251
- Curse of dimensionality, 85

- D**
- D’Agostino, E., 260
- 3D deformable models
 - active volume models
 - model dynamics and evolution, 13–16
 - multiple-surface constraints, 16–19
 - shape representation and deformation, 12–13
 - application
 - multiple-surface segmentation using MSAVM, 22–24
 - prediction of missing structures, 25–26
 - segmentation using AVM, 19–22
- Metamorphs
 - adaptive 3D, 9
 - 2D shape representation and deformations, 5–6
 - model dynamics and evolution, 6–8
 - pseudo-3D segmentation, 9–10
 - variational methods for surface reconstruction, 10–12
- De Castro, E., 242
- Deformable model-based medical image segmentation
 - segmentation
 - active contours
 - edge-based, 37
 - external energy, 36
 - generalized energy function, 37–38
 - internal energy, 36
 - probabilistic model, 39
 - region-based, 38–39
 - classification, 34–35
 - definition, 34
 - geometric/implicit models
 - edge-based geometric models, 40–41
 - en face* fundus image, 43–44
 - geodesic active regions, 41–42
 - higher dimensional scalar functions, 39–40
 - Markov random fields (MRFs), 42–43
 - Metamorphs, 42
 - multi-phase level set representation, 41
 - Mumford–Shah model, 41
 - implementation details
 - geographic atrophy from OCT data, 61
 - geographic atrophy imaging with SDOCT, 61–62
 - geographic atrophy in retinal pigment epithelium, 62–63
 - local inference, 59–60
 - steps, 60–61
 - region-based models, probability fields
 - advantages, 44
 - CRF-driven geometric models, 47–59
 - image likelihoods using graphical models, 44–47
- Deformable template matching techniques, 216
- Deformation field approximation, 354
- de Hoop, B., 148
- Dempster, A., 190

- Dewan, M., 143, 187
- Diabetes detection. *See* Retinal imaging multi-temporal analysis
- Diabetic maculopathy stages identification
- ANN performance, 392–393
 - clinically significant macular edema (CSME), 380–382
 - data acquisition and processing
 - block diagram, 383
 - classifier used, 389–391
 - exudates detection, 385–388
 - features used for classification, 388–389
 - fovea detection, 385
 - fundus images, 382–383
 - image pre-processing, 384
 - optic disc detection, 384–385
 - non-clinically significant macular edema (non-CSME), 380
- Diabetic retinopathy, 378
- Differential image, 218
- Digital homeomorphisms
- comparison with unconstrained registration, 367–368
 - Mjolnir, 365–366
- Digital topology
- cortical mapping, 340
 - digital homeomorphisms
 - comparison with unconstrained registration, 367–368
 - Mjolnir, 365–366
 - fundamental tools
 - deformation field approximation, 354
 - evolution strategies, 355
 - fast marching approximation, 353–354
 - level set evolution, 351
 - minimal path segmentation, 351–353
 - morphological region growing, 350–351
 - multi-object segmentation, 355–356
 - topology atlas for brain, 356–358
 - thalamus parcellation, 363–364
 - theory
 - continuous and discrete objects, 343–345
 - continuous diffeomorphisms, 345–346
 - multiple object digital topology, 347–349
 - single object digital topology, 346–347
 - torus object, 343
 - topology-preserving anatomy-driven segmentation (TOADS) algorithm
 - minimal path segmentation, 359–361
 - noise effects, 360, 362
 - pathologies, 361–363
 - topology constraints for the initialization, 358–359
- Distance transform, 3, 5, 14–17, 39, 40, 47, 48, 53, 145, 149, 150
- Di Stefano, L., 314
- Duay, V., 259
- Dynamic flicker animation, 314
- E**
- Efron, N., 216, 229
- Elastic body spline (EBS), 250
- Elbakary, M., 259
- El-Baz, A.S., 189, 213, 235, 252, 280
- Ellingsen, L.M., 339, 374
- Entropy-based algorithm, 263–264
- Euclidean distance transform, 5, 145
- Exudates detection, 385–388
- Eye, 378–380
- F**
- Faas, F.G., 81
- False alarms, 326
- Farin, G.E., 261
- Fast marching approximation, 353–354
- Fast-marching level-set algorithm, 109–111
- Feature-based registration methods, 259, 312
- Feature ratio approach, 320
- Feedback network, 389–390
- Feed-forward network, 389
- Fei, B., 263
- Fessler, J.A., 262
- Figure-ground separation process
 - central difference approximation, 155
 - competition operator, 153
 - fitness function, 154
 - Lipschitz continuous functions, 153
 - replicator equation, 153
- Finite element method (FEM), 12–14
- Fornefett, M., 252
- Foroosh, H., 242, 259
- Forward resampling, 256
- Fourier domain methods, 242–243
- Fovea detection, 385
- Franke, R., 252
- Free form deformations (FFD), 3

- Fundus images
 center of fovea, 385, 387
 exudates, 385
 eye affected by CSME, 382–383
 eye affected by non-CSME, 382–383
 image after intensity adjustment, 384
 macula and its various regions, 379–380
 normal eye, 382–383
 original image, 384
- G**
 Gagnon, L., 381
 Gao, L., 105
 Garding, J., 76, 80
 Gaussian scale selection, 72–74, 80, 82, 84
 Geodesic active-contour level-set algorithm.
See Computerized organ
 segmentation
 Geodesic active regions, 41–42
 Geographic atrophy (GA), 43
 Geometric mapping/transformation
 affine transformation, 247–248
 cubic B-splines, 250–251
 elastic body spline (EBS), 250
 nonrigid, or elastic transformations, 249
 perspective projection
 transformations, 249
 radial basis functions (RBF)-based
 models, 252–253
 rigid or global transformations, 246–247
 similarity transformation, 249
 thin-plate splines (TPS), 249–250
 Geometric models
 edge-based geometric models, 40–41
en face fundus image, 43–44
 geodesic active regions, 41–42
 higher dimensional scalar functions,
 39–40
 Markov random fields (MRFs), 42–43
 Metamorphs, 42
 multi-phase level set representation, 41
 Mumford–Shah model, 41
 Gimel'farb, G., 189, 213, 235, 279
 Globally exhaustive alignment
 search (GEAS), 262
 Glocker, B., 263
 Goatman, K.A., 315
 “Gold-standard” manual volumetry, 107
 Goshtasby, A., 249
 Gradient vector flow (GVF) snake, traditional
 definition, 131
 Euler equations, 131
 force fields, 132, 133
 iteration equations, 132
 mathematical description, 131
 Graphical user interface (GUI),
 392–393
 Grimson, W.E.L., 249
 Guo, S., 129, 142
- H**
 Han, X., 351
 Helle-Valle, T., 282
 Hepatic CT database, 106
 Hipwell, J.H., 261
 Hou, H.S., 257
 Huang, J., 1, 3, 30
 Huang, X., 1, 2, 9, 30
 Human-interactive methods, 311
- I**
 Image alignment/mapping/matching.
See Images registration
 methodologies
 Image differencing method, 313, 314
 Image pre-processing, 384
 Image ratioing approach, 314
 Image resampling, 255–257
 Images registration methodologies
 accuracy, 261–262
 automatic 3-D-to-2-D-registration, 261
 conditional mutual information
 (cMI), 264
 entropy-based algorithm, 263–264
 feature-based registration methods, 259
 geometric mapping/transformation
 affine transformation, 247–248
 cubic B-splines, 250–251
 elastic body spline (EBS), 250
 nonrigid, or elastic
 transformations, 249
 perspective projection
 transformations, 249
 radial basis functions (RBF)-based
 models, 252–253
 rigid or global transformations,
 246–247
 similarity transformation, 249
 thin-plate splines (TPS), 249–250
 globally exhaustive alignment search
 (GEAS), 262
 image resampling, 255–257
 iterative algorithm, 257–258
 mapping or transformation models,
 236–237
 MI-based FFD registration, 259–260

- Images registration methodologies (*cont.*)
- multi-modality algorithms, 237
 - multimodal MI-based FFD registration, 260–261
 - NMI for nonrigid FFD registration, 260
 - numerical optimization, 253–255
 - optimization techniques, 237, 262
 - parametric registration, 259
 - problem, 238
 - projection-based (or vector-correlation) algorithm, 258–259
 - rigid and nonrigid algorithms, 263
 - self-organizing map (SOM), 262
 - similarity criteria, 236
 - similarity (cost) functions
 - cross-correlation (CC), 240–241
 - Fourier domain methods, 242–243
 - Markov-Gibbs random field (MGRF)-based similarity measure, 244–245
 - mutual information (MI), 243–244
 - normalized mutual information (NMI), 244
 - other similarity/cost measures, 245–246
 - scale-invariant feature transform (SIFT), 239–240
 - single image modality, 237
 - spatial Fourier frequency domain, 237
 - spatial signal domain, 237
 - SSD-based nonrigid registration, 262–263
 - SSD-based parametric elastic registration, 261
 - topology-preserving inter-subject registration, 258
 - volume-preserving technique, 260
- Implicit models. *See* Geometric models
- Implicit shape representation, 5, 6, 8, 9, 40, 49
- Infrared thermography, 216
- Interactive volumetry-assist software, 106–107
- Internal energy, 49
- Iso-contour-based retinal registration, 253–254
- Iterative algorithm, 257–258
- J**
- Jayakumari, C., 382
- Jerebko, A.K., 143, 186
- K**
- Kaneko, S., 259
- Kass, M., 2, 35, 130, 131
- Khalifa, F., 235, 252, 278
- Kim, J., 262
- Klein, J.-C., 381
- Konofagou, E.E., 281, 305
- Krishnan, A., 143, 188
- Krucker, J.F., 263
- Kubota, T., 143, 186
- Kuhnigk, J., 149
- Kybic, J., 261
- L**
- Lafferty, J., 45
- Lampert, C.H., 81
- Lee, S., 262
- Lee, W.-N., 281, 299, 304
- Level set evolution, 351
- LIDC 1 data set, 160–164
- LIDC 2 data set, 164–166
- Likar, B., 257
- Lim, T.-C., 377, 398
- Lindeberg, T., 72, 76, 80
- Linear combination discrete Gaussians (LCDG) model
 - aorta in CTA images, 207–208
 - blood vessels in TOF-MRA images, 203–204
 - brain blood vessels for PC-MRA images, 206–207
 - brain tissues in MRI, 204–206
 - EM-based refinement, 194–196
 - initial approximation, 192–194
 - spiral LDCT chest scans, 198–203
 - synthetic data, 196–198
- Li, S.Z., 59
- Liu, J., 259
- Liver extraction
 - contour evolution, 2D representation, 109, 110
 - convergence criterion, 111
 - geodesic-active-contour level-set function, 110–111
 - preprocessing, 108–109
- L-normalized scale-space derivatives, 75
- Loeckx, D., 264
- Lowe, D.G., 239
- Lung cancer, 70
- M**
- Maes, F., 244, 255
- Malik, J., 80, 134
- Mangin, J.-F., 350
- Manmatha, R., 81
- Mapping or transformation models, 236–237

- Markov-Gibbs random field (MGRF)-based similarity measure, 244–245
 - Matsopoulos, G.K., 255, 262
 - Mattes, D., 259
 - Matungka, R., 243
 - Maximum likelihood estimates (MLE)
 - 12-component Gaussian mixture, 190
 - LCDG models
 - convergence, 192
 - formal notation, 191
 - goal model, 191
 - problem statement, 191
 - Mean shift, 83–84
 - Medical image registration, 238
 - Metamorphs
 - adaptive 3D, 9
 - 2D shape representation and deformations, 5–6
 - as geometric model, 42
 - model dynamics and evolution
 - evolution, 7
 - texture, 6–7
 - origin, 2–3
 - pseudo-3D segmentation, 9–10
 - vs. shape-based deformable models, 3
 - variational methods for surface reconstruction, 10–12
 - Metaxas, D.N., 1, 31, 281, 306
 - Mikolajczyk, K., 81
 - Minimal path segmentation, 351–353, 359–361
 - Mora, M., 261
 - Morandi, C., 242
 - Morgan, P.B., 216
 - Morphological region growing, 350–351
 - Moser, G., 309, 335
 - Moving image. *See* Target image
 - Multi-modality algorithms, 237
 - Multimodal MI-based FFD registration, 260–261
 - Multi-object segmentation, 355–356
 - Multiple object digital topology, 347–349
 - Multiple-surface AVM (MSAVM), 4
 - Multiple-surface constraints, 16–19
 - Musse, O., 258
 - Mutual information (MI), 243–244
 - definition, 243
 - 3-D rigid-body registration, 263
 - FFD registration, 259–260
 - medical image analysis, 244
 - multimodal FFD registration, 260–261
- N**
- Nakayama, Y., 105
 - Nanayakkara, N.D., 263
 - Ng, E.Y.K., 215, 233
 - Niu, C., 244
 - Noblet, V., 260
 - Non-clinically significant macular edema (non-CSME), 380
 - Nonrigid, or elastic transformations, 249
 - Normalized mutual information (NMI), 244
 - definition, 243
 - for nonrigid FFD registration, 260
 - medical image analysis, 244
 - similarity measure, 244
 - Notomi, Y., 282
 - Numerical optimization, 253–255
- O**
- Object boundary extraction, 2
 - Ocular surface temperature (OST), 215–216, 219, 231
 - Okada, K., 69, 74, 101
 - Okada, T., 105
 - Ophthalmology, 310
 - Optic disc detection, 384–385
 - Optimization techniques, 237, 262
 - Orchard, J., 262
 - Orthogonal transformation, 249
 - Osareh, A., 381
- P**
- Parametric deformable models. *See* Active contours
 - Parametric registration, 259
 - Parry, S.R., 250
 - Partitioning energy, 50–51
 - Penney, G., 261
 - Pernus, F., 257
 - Perona, P., 80, 134
 - Perspective projection transformations, 249
 - Peters, T.M., 262
 - Pham, D.L., 339, 375
 - Planar (2-D) affine transformation, 248
 - Platt, J.C., 56
 - Pratt's quality measurement metric (FOM), 137
 - Prince, J.L., 220, 339, 374
 - Projection-based (or vector-correlation) image registration algorithm, 258–259
 - Prototype image. *See* Reference image

- Pulmonary nodule
 diameter measurement
 Bland–Altman plots,
 172–174
 descriptive statistics,
 172, 173
 ELCAP protocol, 170, 171
 histograms, normalized estimation
 errors, 171, 172
 multivendor data set,
 170, 171
 non-solid nodules, 175, 176
 part-solid nodules, 175, 176
 solid nodules, 175
 pathology
 density types, 145
 lung CAD nodule detection
 system, 144
 primary lung cancer types, 144
 segmentation (*see* Pulmonary nodule
 segmentation)
- Pulmonary nodule segmentation
 anisotropic scale selection
 derivatives, 74–75
 maximum-over-scales criterion,
 76–80
 related work, 80–81
 scale-space derivatives, 75–76
 experimental evaluations
 lung CT data, 93–95
 synthetic data with noise, 90–93
 problem
 accuracy, 70–71
 reproducibility in nodule
 volumetry, 71
 robust anisotropic Gaussian fitting
 covariance estimation, 87–90
 mean estimation, 86–87
 mean shift and anisotropic
 scale-space, 83–84
 most-stable-over-scales
 methods, 84–86
 problem, 81–83
 segmentation algorithm design
 boundary refinement, 74
 ellipsoidal boundary approximation,
 73–74
 Gaussian model fitting, 72–73
 steps, 71
- Purslow, C., 231
- Q**
 Qian, Z., 281, 304
- R**
 Radial basis functions (RBF)-based models,
 252–253
 Ramadge, P., 263
 Rangarajan, A., 244
 Ravel, J.G., 166
 Reddy, S., 242
 Reference image, 236
 Region-based models, probability fields
 advantages, 44
 CRF-driven geometric models
 advantages, 47
 classification confidence, 58–59
 CoCRF formulation, 55
 data prior, 52–53
 driving CRF, 54–55
 internal energy, 49
 model dynamics, 51–52
 model-labels likelihood, 53–54
 model prior, 53
 model shape and topology, 48–50
 partitioning energy, 50–51
 shape-based energy, 51
 site associations, 55–56
 site correlations, 58
 site interactions, 56–58
 smoothness term, 50
 image likelihoods using graphical
 models, 44–47
- Relative classification confidence, 57
 Retinal imaging multi-temporal analysis
 automatic approach, global
 optimization techniques
 change detection, 318–323
 registration, 316–318
 change detection results (*see also*
 Change detection)
 experimental results, 327–328
 performance evaluation, 325–327
 existing methods
 change detection, 313–315
 registration, 311–313
 experimental registration results,
 324–325
 preliminary registration results, 324
- Retinopathy, 378, 379
 Rigid and nonrigid algorithms, 263
 Rigid or global transformations, 246–247
 Robust anisotropic Gaussian fitting
 covariance estimation, 87–90
 mean estimation, 86–87
 mean shift and anisotropic scale-space,
 83–84

- most-stable-over-scales methods, 84–86
 - problem, 81–83
- Robust estimation, 81, 87
- Roche, A., 257
- Rohde, G.K., 260
- Rohlfing, T., 260
- Rosin, P., 314
- Rueckert, D., 250

- S**
- Sabuncu, M.R., 263
- Salganicoff, M., 143, 187
- Santhanam, T., 382
- Sbeh, J.B., 315
- Scale-invariant feature transform (SIFT), 239–240
- Scale-space mean shift, 82, 84–87, 96
- Schlesinger, M., 190
- Schmid, C., 81
- Sdika, M., 262
- Sederberg, T.W., 250
- Segmentation algorithm
 - convex hull approach, 146
 - convexity assumption, 151
 - cost function optimization, 150
 - design
 - boundary refinement, 74
 - ellipsoidal boundary approximation, 73–74
 - Gaussian model fitting, 72–73
 - steps, 71
 - distance map characteristics, 146–147
 - ellipsoid model, 149
 - Euclidean distance map, 151
 - figure-ground separation, 153–155
 - $\Phi(r,D)$ illustration, 157
 - fuzzy connectivity map, 150
 - interactive mode, 180–181
 - limitations, 178–179
 - nodule core extraction, 156–157
 - parameters, 179–180
 - pleural surface removal step, 149
 - post adjustment process, 159, 160
 - pulmonary nodules (*see* Pulmonary nodule segmentation)
 - size-invariance property, 146
 - speed, 179
 - spiral-scanning method, 150
 - unique features, 145–146
 - voxel transformation, 152
- Self-organizing map (SOM), 262
- Selver, M.A., 105
- Sensed image. *See* Target image
- Serpico, S.B., 309, 336
- Shape-based energy, 51
- Shekarforoush, H., 242
- Shen, T., 1, 3, 29
- Shiee, N., 339, 373
- Similarity criteria, 236
- Similarity (cost) functions
 - cross-correlation (CC), 240–241
 - Fourier domain methods, 242–243
 - Markov-Gibbs random field (MGRF)-based similarity measure, 244–245
 - mutual information (MI), 243–244
 - normalized mutual information (NMI), 244
 - other similarity/cost measures, 245–246
 - scale-invariant feature transform (SIFT), 239–240
- Similarity transformation, 249
- Singh, J., 382
- Single image modality, 237
- Single object digital topology, 346–347
- Sinthanayothin, C., 381
- Sivaswamy, J., 382
- Skin cancer segmentation images
 - melanoma image and external forces, 137–138
 - vs. Pratt’s quality measurement, 138, 140
- partial-differential-equation (PDE)-based algorithm, 130
- snakes, wavelet diffusion
 - anisotropic diffusion (ANDI) filters, 134
 - inverse wavelet transform, 134–135
 - multiscale dyadic wavelet transform, 134
 - normalized diffusion function, 135
- synthetic image segmentation
 - Pratt’s quality measurement metric (FOM), 137
 - synthetic heart images, 135, 136
- traditional GVF snake
 - definition, 131
 - Euler equations, 131
 - force fields, 132, 133
 - iteration equations, 132
 - mathematical description, 131
- Slomka, P.J., 263
- Smits, P., 314
- Source image. *See* Target image
- Spatial Fourier frequency domain, 237

- Spatial signal domain, 237
 - Sree, S.V., 377, 397
 - Srimal, N., 81
 - SSD-based nonrigid registration, 262–263
 - SSD-based parametric elastic registration, 261
 - Staring, M., 263
 - Stefansson, E., 309, 336
 - Studholme, C., 244, 264
 - Sundareshan, M.K., 259
 - Surface splines. *See* Thin-plate splines
 - Suri, J.S., 215, 234, 235, 279, 377, 398
 - Suzuki, K., 103, 128
- T**
- Tagged MRI (tMRI), 282
 - data acquisition, 282–283
 - interpolation and parameter tuning, 21–24
 - rigid-body registration
 - intermodal registration, 290–291
 - tag removal, 285–290
 - tag separation, 284–285
 - strain comparison results, 299–301
 - strain estimation, 292–299
 - Tang, J., 129, 142
 - Tan, J.-H., 215, 216, 233
 - Target image, 236
 - Texture, 6–7
 - Thalamus parcellation, 363–364
 - Thermographic sequence, 217, 219, 221, 231
 - Thévenaz, P., 255, 257
 - Thin-plate splines (TPS), 249–250
 - Thiran, J.-P., 312
 - Thresholding approach, 320–323
 - Topology atlas for brain, 356–358
 - Topology-preserving anatomy-driven segmentation (TOADS) algorithm
 - minimal path segmentation, 359–361
 - noise effects, 360, 362
 - pathologies, 361–363
 - topology constraints for initialization, 358–359
 - Topology-preserving inter-subject registration, 258
 - Topology-preserving segmentation, 361–363
 - Torus object, 343
 - Troglio, G., 309, 334
 - True negative rate, 326
 - True positive rate, 325, 326
 - Tsechpenakis, G., 33, 67
 - Tustison, N.J., 261
- U**
- Ultrasound myocardial elastography (UME), 282
 - data acquisition, 282–283
 - interpolation and parameter tuning, 296–299
 - strain comparison results, 299–301
 - strain estimation, 291–292
 - Unser, M., 261
 - Unsupervised change detection. *See* Change detection
- V**
- van Vliet, L.J., 81
 - Vemuri, B.C., 259
 - Viola, P.A., 244, 255
 - Volume-preserving technique, 260
 - Voxel transformation, 152
- W**
- Wachowiak, M.P., 262
 - Walter, T., 381
 - Wells, W.M., 244, 255
 - Wendland, H., 252
 - Wilson, R., 81
 - Wirjadi, O., 81
 - Wolberg, G., 242, 255
- X**
- Xie, Z., 261
 - Xu, C., 132, 220
- Z**
- Zeng, X., 4
 - Zhang, S., 1, 3, 29
 - Zhu, Y.M., 244, 260
 - Zokai, S., 242, 255