

Contents

Dimension Reduction on Riemannian Manifolds

Evolution Equations with Anisotropic Distributions and Diffusion PCA	3
<i>Stefan Sommer</i>	
Barycentric Subspaces and Affine Spans in Manifolds	12
<i>Xavier Pennec</i>	
Dimension Reduction on Polyspheres with Application to Skeletal Representations	22
<i>Benjamin Eltzner, Sungkyu Jung, and Stephan Huckemann</i>	
Affine-Invariant Riemannian Distance between Infinite-Dimensional Covariance Operators	30
<i>Hà Quang Minh</i>	
A Sub-Riemannian Modular Approach for Diffeomorphic Deformations	39
<i>Barbara Gris, Stanley Durrleman, and Alain Trounev</i>	

Optimal Transport

The Nonlinear Bernstein-Schrödinger Equation in Economics	51
<i>Alfred Galichon, Scott Duke Kominers, and Simon Weber</i>	
Some Geometric Consequences of the Schrödinger Problem	60
<i>Christian Léonard</i>	
Optimal Transport, Independance Versus Indetermination Duality, Impact on a New Copula Design	69
<i>Benoit Huyot, Yves Mabiala, and J.F. Marcotorchino</i>	
Optimal Mass Transport over Bridges	77
<i>Yongxin Chen, Tryphon Georgiou, and Michele Pavon</i>	

Optimal Transport and Applications in Imagery/Statistics

Non-convex Relaxation of Optimal Transport for Color Transfer between Images	87
<i>Julien Rabin and Nicolas Papadakis</i>	

Generalized Pareto Distributions, Image Statistics and Autofocusing in Automated Microscopy	96
<i>Reiner Lenz</i>	
Barycenter in Wasserstein Spaces: Existence and Consistency.	104
<i>Thibaut Le Gouic and Jean-Michel Loubes</i>	
Multivariate L-Moments Based on Transports.	109
<i>Alexis Decurninge</i>	
Shape Space and Diffeomorphic Mappings	
Spherical Parameterization for Genus Zero Surfaces Using Laplace-Beltrami Eigenfunctions	121
<i>Julien Lefèvre and Guillaume Auzias</i>	
Biased Estimators on Quotient Spaces	130
<i>Nina Miolane and Xavier Pennec</i>	
Reparameterization Invariant Metric on the Space of Curves.	140
<i>Alice Le Brigrant, Marc Arnaudon, and Frédéric Barbaresco</i>	
Invariant Geometric Structures on Statistical Models	150
<i>Lorenz Schwachhöfer, Nihat Ay, Jürgen Jost, and Hông Vân Lê</i>	
The Abstract Setting for Shape Deformation Analysis and LDDMM Methods.	159
<i>Sylvain Arguillère</i>	
Random Geometry/Homology	
The Extremal Index for a Random Tessellation.	171
<i>Nicolas Chenavier</i>	
A Two-Color Interacting Random Balls Model for Co-localization Analysis of Proteins	179
<i>F. Lavancier and C. Kervrann</i>	
Asymptotics of Superposition of Point Processes.	187
<i>L. Decreusefond and A. Vasseur</i>	
Asymptotic Properties of Random Polytopes	195
<i>Pierre Calka</i>	
Asymmetric Topologies on Statistical Manifolds	203
<i>Roman V. Belavkin</i>	

Hessian Information Geometry

Hessian Structures and Non-invariant (F, G) -Geometry on a Deformed Exponential Family	213
<i>K.V. Harsha and K.S. Subrahmanian Moosath</i>	
New Metric and Connections in Statistical Manifolds	222
<i>Rui F. Vigelis, David C. de Souza, and Charles C. Cavalcante</i>	
Curvatures of Statistical Structures	230
<i>Barbara Opozda</i>	
The Pontryagin Forms of Hessian Manifolds	240
<i>J. Armstrong and S. Amari</i>	
Matrix Realization of a Homogeneous Cone.	248
<i>Hideyuki Ishi</i>	
Multiply CR-Warped Product Statistical Submanifolds of a Holomorphic Statistical Space Form	257
<i>Michel Nguiffo Boyom, Mohammed Jamali, and Mohammad Hasan Shahid</i>	

Topological Forms and Information

Information Algebras and Their Applications	271
<i>Matilde Marcolli</i>	
Finite Polylogarithms, Their Multiple Analogues and the Shannon Entropy	277
<i>Philippe Elbaz-Vincent and Herbert Gangl</i>	
Heights of Toric Varieties, Entropy and Integration over Polytopes	286
<i>José Ignacio Burgos Gil, Patrice Philippon, and Martín Sombra</i>	
Characterization and Estimation of the Variations of a Random Convex Set by Its Mean n -Variogram: Application to the Boolean Model	296
<i>Saïd Rahmani, Jean-Charles Pinoli, and Johan Debayle</i>	

Information Geometry Optimization

Laplace's Rule of Succession in Information Geometry	311
<i>Yann Ollivier</i>	
Standard Divergence in Manifold of Dual Affine Connections	320
<i>Shun-ichi Amari and Nihat Ay</i>	

Transformations and Coupling Relations for Affine Connections	326
<i>James Tao and Jun Zhang</i>	
Online k -MLE for Mixture Modeling with Exponential Families	340
<i>Christophe Saint-Jean and Frank Nielsen</i>	
Second-Order Optimization over the Multivariate Gaussian Distribution	349
<i>Luigi Malagò and Giovanni Pistone</i>	
The Information Geometry of Mirror Descent	359
<i>Garvesh Raskutti and Sayan Mukherjee</i>	
Information Geometry in Image Analysis	
Texture Classification Using Rao's Distance on the Space of Covariance Matrices	371
<i>Salem Said, Lionel Bombrun, and Yannick Berthoumieu</i>	
Color Texture Discrimination Using the Principal Geodesic Distance on a Multivariate Generalized Gaussian Manifold	379
<i>Geert Verdoolaege and Aqsa Shabbir</i>	
Bag-of-Components: An Online Algorithm for Batch Learning of Mixture Models	387
<i>Olivier Schwander and Frank Nielsen</i>	
Statistical Gaussian Model of Image Regions in Stochastic Watershed Segmentation	396
<i>Jesús Angulo</i>	
Quantization of Hyperspectral Image Manifold Using Probabilistic Distances	406
<i>Gianni Franchi and Jesús Angulo</i>	
Divergence Geometry	
Generalized EM Algorithms for Minimum Divergence Estimation	417
<i>Diaa Al Mohamad and Michel Broniatowski</i>	
Extension of Information Geometry to Non-statistical Systems: Some Examples	427
<i>Jan Naudts and Ben Anthonis</i>	
An Information Geometry Problem in Mathematical Finance	435
<i>Imre Csiszár and Thomas Breuer</i>	

Multivariate Divergences with Application in Multisample Density Ratio Models	444
<i>Amor Keziou</i>	

Generalized Mutual-Information Based Independence Tests	454
<i>Amor Keziou and Philippe Regnault</i>	

Optimization on Manifold

Riemannian Trust Regions with Finite-Difference Hessian Approximations are Globally Convergent	467
<i>Nicolas Boumal</i>	

Block-Jacobi Methods with Newton-Steps and Non-unitary Joint Matrix Diagonalization.	476
<i>Martin Kleinstaubler and Hao Shen</i>	

Weakly Correlated Sparse Components with Nearly Orthonormal Loadings	484
<i>Matthieu Genicot, Wen Huang, and Nickolay T. Trendafilov</i>	

Fitting Smooth Paths on Riemannian Manifolds: Endometrial Surface Reconstruction and Preoperative MRI-Based Navigation	491
<i>Antoine Arnould, Pierre-Yves Gousenbourger, Chafik Samir, Pierre-Antoine Absil, and Michel Canis</i>	

PDE Constrained Shape Optimization as Optimization on Shape Manifolds.	499
<i>Volker H. Schulz, Martin Siebenborn, and Kathrin Welker</i>	

Lie Groups and Geometric Mechanics/Thermodynamics

Poincaré Equations for Cosserat Shells: Application to Cephalopod Locomotion	511
<i>Frederic Boyer and Federico Renda</i>	

Entropy and Structure of the Thermodynamical Systems	519
<i>Géry de Saxcé</i>	

Symplectic Structure of Information Geometry: Fisher Metric and Euler-Poincaré Equation of Souriau Lie Group Thermodynamics.	529
<i>Frédéric Barbaresco</i>	

Pontryagin Calculus in Riemannian Geometry	541
<i>François Dubois, Danielle Fortuné, Juan Antonio Rojas Quintero, and Claude Vallée</i>	

Rolling Symmetric Spaces	550
<i>Krzysztof A. Krakowski, Luís Machado, and Fátima Silva Leite</i>	

Enlargement, Geodesics, and Collectives	558
<i>Eric W. Justh and P.S. Krishnaprasad</i>	

Computational Information Geometry

Geometry of Goodness-of-Fit Testing in High Dimensional Low Sample Size Modelling	569
<i>Paul Marriott, Radka Sabolova, Germain Van Bever, and Frank Critchley</i>	

Computing Boundaries in Local Mixture Models	577
<i>Vahed Maroufy and Paul Marriott</i>	

Approximating Covering and Minimum Enclosing Balls in Hyperbolic Geometry	586
<i>Frank Nielsen and Gaëtan Hadjeres</i>	

From Euclidean to Riemannian Means: Information Geometry for SSVEP Classification	595
<i>Emmanuel K. Kalunga, Sylvain Chevallier, Quentin Barthélemy, Karim Djouani, Yskandar Hamam, and Eric Monacelli</i>	

Group Theoretical Study on Geodesics for the Elliptical Models	605
<i>Hiroto Inoue</i>	

Path Connectedness on a Space of Probability Density Functions	615
<i>Shinto Eguchi and Osamu Komori</i>	

Lie Groups: Novel Statistical and Computational Frontiers

Image Processing in the Semidiscrete Group of Rototranslations	627
<i>Dario Prandi, Ugo Boscain, and Jean-Paul Gauthier</i>	

Universal, Non-asymptotic Confidence Sets for Circular Means	635
<i>Thomas Hotz, Florian Kelma, and Johannes Wieditz</i>	

A Methodology for Deblurring and Recovering Conformational States of Biomolecular Complexes from Single Particle Electron Microscopy	643
<i>Bijan Afsari and Gregory S. Chirikjian</i>	

Nonlinear Operators on Graphs via Stacks	654
<i>Santiago Velasco-Forero and Jesús Angulo</i>	

An Intrinsic Cramér-Rao Bound on Lie Groups	664
<i>Silvère Bonnabel and Axel Barrau</i>	

Geometry of Time Series and Linear Dynamical systems

Clustering Random Walk Time Series	675
<i>Gautier Marti, Frank Nielsen, Philippe Very, and Philippe Donnat</i>	
A Common Symmetrization Framework for Iterative (Linear) Maps	685
<i>Alain Sarlette</i>	
New Model Search for Nonlinear Recursive Models, Regressions and Autoregressions	693
<i>Anna-Lena Kißlinger and Wolfgang Stummer</i>	
Random Pairwise Gossip on $CAT(\kappa)$ Metric Spaces	702
<i>Anass Bellachehab and Jérémie Jakubowicz</i>	

Bayesian and Information Geometry for Inverse Problems

Stochastic PDE Projection on Manifolds: Assumed-Density and Galerkin Filters	713
<i>John Armstrong and Damiano Brigo</i>	
Variational Bayesian Approximation Method for Classification and Clustering with a Mixture of Student-t Model.	723
<i>Ali Mohammad-Djafari</i>	
Geometric Properties of Textile Plot	732
<i>Tomonari Sei and Ushio Tanaka</i>	
A Generalization of Independence and Multivariate Student's t -distributions	740
<i>Monta Sakamoto and Hiroshi Matsuzoe</i>	

Probability Density Estimation

Probability Density Estimation on the Hyperbolic Space Applied to Radar Processing	753
<i>Emmanuel Chevallier, Frédéric Barbaresco, and Jesús Angulo</i>	
Histograms of Images Valued in the Manifold of Colours Endowed with Perceptual Metrics	762
<i>Emmanuel Chevallier, Ivar Farup, and Jesús Angulo</i>	
Entropy Minimizing Curves with Application to Automated Flight Path Design.	770
<i>Stephane Puechmorel and Florence Nicol</i>	

Kernel Density Estimation on Symmetric Spaces.	779
<i>Dena Marie Asta</i>	
Author Index	789

Geometric Science of Information

Second International Conference, GSI 2015, Palaiseau,
France, October 28-30, 2015, Proceedings

Nielsen, F.; Barbaresco, F. (Eds.)

2015, XXII, 790 p. 97 illus., Softcover

ISBN: 978-3-319-25039-7