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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Part I: Shape Space -- On geometric properties of the textile set and strict textile set -- Inexact elastic shape matching in the square root normal field framework -- Signatures in Shape Analysis: an Efficient Approach to Motion Identification -- Dilation operator approach for time/Doppler spectra characterization on SU(n) -- Selective metamorphosis for growth modelling with applications to landmarks -- Part II: Geometric Mechanics -- Intrinsic Incremental Mechanics -- - Multi-symplectic Extension of Lie Group Thermodynamics for Covariant Field Theories -- Euler-Poincare equation for Lie groups with non null symplectic cohomology. Application to the Mechanics -- Geometric numerical methods for mechanics -- Souriau Exponential Map Algorithm for Machine Learning on Matrix Lie Groups -- Part 3: Geometry of Tensor-Valued Data -- R-Complex Finsler Information

Geometry Applied to Manifolds of Systems -- Minkowski Sum of Ellipsoids and Means of Covariance Matrices -- Hyperquaternions: An Efficient Mathematical Formalism for Geometry -- Alpha-power sums on symmetric cones -- Packing Bounds for Outer Products with Applications to Compressive Sensing -- Part 4: Lie Group Machine Learning -- On a method to construct exponential families by representation theory -- Lie Group Machine Learning & Gibbs Density on Poincare Unit Disk from Souriau Lie Groups Thermodynamics and SU (1,1) Coadjoint Orbits -- Irreversible Langevin MCMC on Lie Groups -- Predicting Bending Moments with Machine Learning -- The exponential of nilpotent supergroups in the theory of Harish-Chandra representations -- Part 5: Geometric structures in thermodynamics and statistical physics -- Dirac structures in open thermodynamics -- From variational to single and double bracket formulations in nonequilibrium thermodynamics of simple systems -- A omological Approach to Belief Propagation and Bethe Approximations -- - About some systems-theoretic properties of Port Thermodynamic systems -- Expectation variables on a para-contact metric manifold exactly derived from master equations -- Part 6: Monotone embedding and affine immersion of probability models -- Doubly autoparallel structure and its applications -- Toeplitz Hermitian Positive Definite Matrix Machine Learning based on Fisher metric -- Deformed exponential and the behavior of the normalizing function -- Normalization problems for deformed exponential families -- New Geometry of parametric statistical Models -- Part 7: Divergence Geometry -- The Bregman chord divergence -- Testing the number and nature of components in a mixture distribution -- Robust etsimation by means of scaled Bregman power distances. Part I: Non-homogeneous data -- Robust estimation by means of scaled Bregman power distances. Part II: Extreme values -- Part 8: Computational Information Geometry -- Topological methods for unsupervised learning -- Geometry and fixed-rate quantization in Riemannian metric spaces induced by separable Bregman divergences -- The statistical Minkowski distances: Closed-form formula for Gaussian Mixture Models -- Parameter estimation with generalized empirical localization -- Properties of the cross entropy of ARMA processes -- Part 9: Statistical Manifold & Hessian Information Geometry -- Inequalities for Statistical Submanifolds in Hessian Manifolds of Constant Hessian curvature -- Inequalities for statistical submanifolds in sasakian statistical manifolds -- Generalized Wintgen Inequality for Legendrian Submanifolds in Sasakian statistical manifolds -- Logarithmic divergence: geometry and interpretation of curvature -- Hessian Curvature and Optimal Transport -- Part 10: Non-parametric Information Geometry -- Divergence functions in Information Geometry -- Sobolev Statistical Manifolds and Exponential Models -- Minimization of the Kullback-Leibler divergence over a log-normal exponential arc -- Riemannian distance and diameter of the space of probability measures and the parametrix -- Part 11: Statistics on non-linear data -- A unified formulation for the Bures-Wassersteinand Log-Euclidean/Log-Hilbert-Schmidt distances between positive definite operators -- Exploration of Balanced Metrics on Symmetric Positive Definite Matrices -- Affine-invariant midrange statistics -- Is affine-invariance well defined on SPD matrices? A principled continuum of metrics -- Shape part transfer via semantic latent space factorization -- Part 12: Geometric and structure preserving discretizations -- Variational discretization framework for geophysical flows -- Finite element methods for geometric evolution equations -- Local truncation error of low-order fractional variational integrators -- A partitioned finite element method for the structure-preserving discretization of

damped in finite-dimensional port-Hamiltonian systems with boundary control -- Geometry, Energy, and Entropy Compatible (GEEC) variational approaches to various numerical schemes for fluid dynamics -- Part 13: Optimization on Manifold -- Canonical Moments for Optimal Uncertainty Quantification on a Variety -- Computational investigations of an obstacle-type shape optimization problem in the space of smooth shapes -- Bezier curves and C^2 interpolation in Riemannian Symmetric Spaces -- A Formalization of The Natural Gradient Method for General Similarity Measures -- The Frenet-Serret framework for aligning geometric curves -- Part 14: Geometry of Quantum States -- When geometry meets psycho-physics and quantum mechanics: Modern perspectives on the space of perceived colors -- Quantum statistical manifolds: The finite-dimensional case -- Generalized Gibbs Ensembles in Discrete Quantum Gravity -- On the notion of composite system, classical and quantum -- Part 15: Probability on Riemannian Manifolds -- The Riemannian barycentre as a proxy for global optimization -- Hamiltonian Monte Carlo on Lie groups and constrained mechanics on homogeneous manifolds -- On the Fisher Rao information metric in the space of normal distributions -- Simulation of Conditioned Diffusions on the Flat Torus -- Towards parametric bi-invariant density estimation on SE(2) -- Part 16: Wasserstein Information Geometry / Optimal Transport -- Affine Natural Proximal Learning -- Parametric Fokker-Planck equation -- Multi-marginal Schroedinger bridges -- Hopf-Cole transformation and Schrodinger problems -- - Curvature of the manifold of fixed-rank positive-semidefinite matrices endowed with the Bures-Wasserstein metric -- Part 17: Geometric Science of Information Libraries -- Second-order networks in PyTorch -- Symmetric Algorithmic Components for Shape Analysis with Dieomorphisms.

Sommario/riassunto

This book constitutes the proceedings of the 4th International Conference on Geometric Science of Information, GSI 2019, held in Toulouse, France, in August 2019. The 79 full papers presented in this volume were carefully reviewed and selected from 105 submissions. They cover all the main topics and highlights in the domain of geometric science of information, including information geometry manifolds of structured data/information and their advanced applications.