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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Probability and Statistics on Riemannian Manifolds -- From Bayesian inference to MCMC and convex optimisation in Hadamard manifolds -- Finite Sample Smeariness on Spheres -- Gaussian distributions on Riemannian symmetric spaces in the large N limit -- Smeariness Begets Finite Sample Smeariness -- Online learning of Riemannian hidden Markov models in homogeneous Hadamard spaces -- Quinten Tupker, Salem Said and Cyrus MostajeranSub-Riemannian Geometry and Neuromathematics -- Submanifolds of fixed degree in graded manifolds for perceptual completion -- An auditory cortex model for sound processing -- Conformal model of hypercolumns in V1 cortex and the Moebius group. Application to the visual stability problem -- Extremal controls for Duits car -- Multi-Shape Registration with

Constrained Deformations -- Shapes Spaces -- Geodesics of the Quotient-Affine Metrics on Full-Rank Correlation Matrices -- Parallel Transport on Kendall Shape Spaces -- Diffusion Means and Heat Kernel on Manifolds -- A reduced parallel transport equation on Lie Groups with a left-invariant metric -- Currents and K-functions for Fiber Point Processes -- Geometry of Quantum States -- Q-Information Geometry of Systems -- Group actions and Monotone Metric Tensors: The qubit case -- Quantum Jensen-Shannon divergences between infinite-dimensional positive definite operators -- Towards a geometrization of quantum complexity and chaos -- Hunt's colorimetric effect from a quantum measurement viewpoint -- Geometric and Structure Preserving Discretizations -- The Herglotz principle and vakonomic dynamics -- Structure-preserving discretization of a coupled heat-wave system, as interconnected port-Hamiltonian systems -- Examples of symbolic and numerical computation in Poisson geometry.-New directions for contact integrators -- Information Geometry in Physics -- Space-time thermo-mechanics for a material continuum -- Entropic dynamics yields reciprocal relations -- Lie Group Machine Learning.-Gibbs states on symplectic manifolds with symmetries -- Gaussian Distributions on the Space of Symmetric Positive Definite Matrices from Souriau’s Gibbs State for Siegel Domains by Coadjoint Orbit and Moment Map -- On Gaussian Group Convex Models -- Exponential-wrapped probability densities on SL(2,C) -- Information Geometry and Hamiltonian Systems on Lie Groups -- Geometric and Symplectic Methods for Hydrodynamical Models -- Multisymplectic variational integrators for fluid models with constraints -- Metriplectic Integrators for Dissipative Fluids -- From quantum hydrodynamics to Koopman wavefunctions I -- From quantum hydrodynamics to Koopman wavefunctions II -- Harmonic Analysis on Lie Groups -- The Fisher information of curved exponential families and the elegant Kagan inequality -- Continuous Wavelet transforms for vector-valued functions -- Entropy under disintegrations -- Koszul Information Geometry, Liouville-Mineur Integrable Systems and Moser Isospectral Deformation Method for Hermitian Positive-Definite Matrices -- Flapping Wing Coupled Dynamics in Lie Group Setting -- Statistical Manifold and Hessian Information Geometry -- Canonical foliations of statistical manifolds with hyperbolic compact leaves -- Open problems in global analysis. Structured foliations and the information Geometry -- Curvature inequalities and Simons' type formulas in statistical geometry -- Harmonicity of Conformally-Projectively Equivalent Statistical Manifolds and Conformal Statistical Submersions -- Algorithms for approximating means of semi-infinite quasi-Toeplitz matrices -- Geometric Mechanics -- Archetypal Model of Entropy by Poisson Cohomology as Invariant Casimir Function in Coadjoint Representation and Geometric Fourier Heat Equation -- Bridge Simulation and Metric Estimation on Lie Groups -- Constructing the Hamiltonian from the behaviour of a dynamical system by proper symplectic decomposition -- Non-relativistic Limits of General Relativity -- Deformed Entropy,Cross-entropy, and Relative Entropy -- A Primer on Alpha-Information Theory with Application to Leakage in Secrecy Systems -- Schrödinger encounters Fisher and Rao: a survey -- Projections with logarithmic divergences -- Chernoff, Bhattacharyya, Rényi andSharma-Mittal divergence analysis for Gaussian stationary ARMA processes -- Transport Information Geometry -- Wasserstein statistics in one-dimensional location-scale models -- Traditional and accelerated gradient descent for neural architecture search -- Recent developments on the MTW tensor -- Wasserstein Proximal of GANs -- Statistics, Information and Topology -- Information cohomology of

classical vector-valued observables -- On Marginal Estimation Algorithms - Belief Propagation as Diffusion -- Towards a functorial description of quantum relative entropy -- Frobenius Statistical manifolds & geometric invariants -- Geometric Deep Learning -- SU(1, 1) Equivariant Neural Networks and Application to Robust Toeplitz HermitianPositive Definite Matrix Classification -- Iterative SE(3)-Transformers -- End-to-End Similarity Learning and Hierarchical clustering for unfixed size datasets -- Information theory and the embedding problem for Riemannian manifolds -- cCorrGAN: Conditional CorrGAN for Learning Empirical Conditional Distributions in the Correlation Elliptope -- Topological and Geometrical Structures in Neurosciences -- Topological Model of Neural Information Networks -- On Information Links -- Betti Curves of Rank One Symmetric Matrices -- Algebraic Homotopy Interleaving Distance -- A Python hands-on tutorial on network and topological neuroscience -- Computational Information Geometry -- Computing statistical divergences with sigma points -- Remarks to Laplacian of graphical models in various graphs -- Classification in the Siegel space for vectorial autoregressive data -- Information Metrics for Phylogenetic Trees via Distributions of Discrete and Continuous Characters -- Wald Space for Phylogenetic Trees -- Necessary Condition for Semiparametric Efficiency of Experimental Designs -- Parametrisation Independence of the Natural Gradient in Overparametrised Systems -- Properties of nonlinear diffusion equations on networks and their geometric aspects -- Rényi Relative Entropy from Homogeneous Kullback-Leibler Divergence Lagrangian -- Statistical bundle of the transport model -- Manifolds and Optimization -- Endpoint Quasi-geodesics on the Stiefel Manifold -- Optimization of a shape metric based on information theory applied to segmentation fusion and evaluation in multimodal MRI for DIPG tumor analysis -- Metamorphic image registration using a semi-Lagrangian scheme -- Geometry of the symplectic Stiefel manifold endowed with the Euclidean metric -- Divergence Statistics -- On f-divergences between Cauchy distributions -- Transport information Hessian distances -- Minimization with respect to divergences and applications -- Optimal transport with some directed distances -- Robust Empirical Likelihood -- Optimal Transport and Learning -- Mind2Mind : Transfer Learning for GANs -- Fast and asymptotic steering to a steady state for networks flows -- Geometry of Outdoor Virus Avoidance in Cities -- A Particle-Evolving method for approximating the Optimal Transport plan -- Geometric Structures in Thermodynamics and Statistical Physics -- Schrödinger problem for lattice gases: a heuristic point of view -- A variational perspective on the thermodynamics of non-isothermal reacting open systems -- On the Thermodynamic Interpretation of Deep Learning Systems -- Dirac structures in thermodynamics of non-simple systems.

Sommario/riassunto

This book constitutes the proceedings of the 5th International Conference on Geometric Science of Information, GSI 2021, held in Paris, France, in July 2021. The 98 papers presented in this volume were carefully reviewed and selected from 125 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. The papers are organized in the following topics: Probability and statistics on Riemannian Manifolds; sub-Riemannian geometry and neuromathematics; shapes spaces; geometry of quantum states; geometric and structure preserving discretizations; information geometry in physics; Lie group machine learning; geometric and symplectic methods for hydrodynamical models; harmonic analysis on

Lie groups; statistical manifold and Hessian information geometry; geometric mechanics; deformed entropy, cross-entropy, and relative entropy; transformation information geometry; statistics, information and topology; geometric deep learning; topological and geometrical structures in neurosciences; computational information geometry; manifold and optimization; divergence statistics; optimal transport and learning; and geometric structures in thermodynamics and statistical physics.