



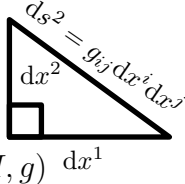
Geometric Science of Information



Blaise Pascal (1623-1662)
Aleae Geometria
Probability



Georg F. B. Riemann (1826-1866)
metric tensor (1854)
 $g = g_{ij}d\theta_i \otimes d\theta_j$



Riemannian manifold (M, g)



Élie Joseph Cartan (1869-1951)
affine connections
differential forms ω



Thermodynamics (pression Pa.)
Computer (Pascaline)
Rabindra Nath Sen (1896-1974)
dual parallel transports (ca 1945-1950)



Sir Ronald A. Fisher (1890-1962)
Mathematical statistics
Fisher information, MLE
 $I(\theta) = E_{p_\theta} [(\nabla_\theta \log p_\theta)(\nabla_\theta \log p_\theta)^T]$



Sir Harold Jeffreys (1891-1989)
Jeffreys prior $\propto \sqrt{|g|}$
J-divergence



Alexander P. Norden (1904-1993)
conjugate connections wrt g
Affinely connected spaces



Harold Hotelling (1895-1973)
Econometrician
Fisher metric (1930)



Maurice R. Fréchet (1878-1973)
Metric spaces
Fréchet barycenter
Fréchet CR bound
Legendre-Clairaut structure



Wilhelm J. E. Blaschke (1885-1962)
Affine differential geometry



Claude E. Shannon (1916-2001)
Information theory
Entropy:
 $h(p) = - \int p \log p d\mu$



Imre Csiszár (1938-)
information projections
f-divergences
 $I_f[p : q] = \int p f(\frac{p}{q}) d\mu$



C. R. Rao (1920-)
Fisher-Rao distance
Cramér-Rao lower bound (1945)



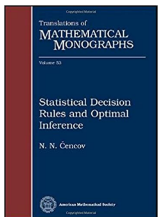
Solomon Kullback (1907-1994)
Richard A. Leibler (1914-2003)
KL divergence
 $D_{KL}[p : q] = \int p \log \frac{p}{q} d\mu$



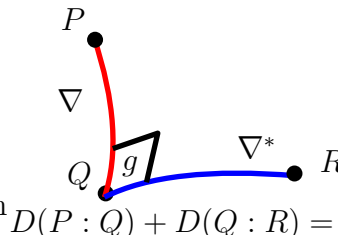
Ernest B. Vinberg (1937-2020)
characteristic functions
on homogeneous cones



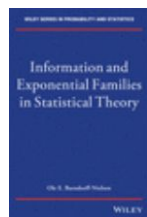
Harald Cramér (1893-1985)



Nikolai N. Chentsov (1930-1992)
statistical invariance
geometrostatistics
Gen. Pythagoras theorem



Bradley Efron (1938-)
statistical curvature
E-connection
Lev M. Bregman (1941-)
Bregman divergence
Bregman projections



Ole E. Barndorff-Nielsen (1935-)
Exponential families
observed information geometry



Jean-Louis Koszul (1921-2018)
Hirohiko Shima
Hessian Geometry



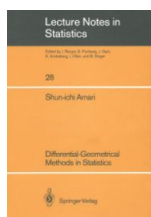
Symmetric Homogeneous Bounded Domains
Koszul forms, Fisher metric extension for sharp convex cones
Lie Algebra Cohomology, Koszul Complex, Koszul duality, Koszul connection
homogeneous bounded domains



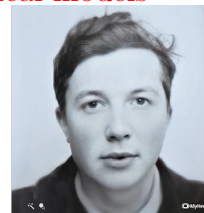
Philip Dawid (1946-)
decision theory
proper scoring rules



Steffen Lauritzen (1947-)
statistical manifold
graphical models



Shun-ichi Amari (1936-)
Information geometry
dualistic structure (M, g, ∇, ∇^*) :
 $Zg(X, Y) = g(\nabla_Z X, Y) + g(X, \nabla_Z^* Y)$
dual $\pm\alpha$ -connections
 $(M, g_F, \nabla^{-\alpha}, \nabla^\alpha)$



Jean-Marie Souriau (1922-2012)
Lie Groups Thermodynamics
Souriau 2-form, Moment map
Fisher metric extension on
Homogeneous Symplectic Manifolds
Lie Groups Statistics, Entropy as Casimir Function
Fisher Metric as calorific capacity

