«ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE
TO PAY A PERMANENT TRIBUTE TO ARCHIMEDES AND GALILEO GALILEI, FOUNDERS OF MODERN SCIENCE AND TO ENRICO FERMI, THE "ITALIAN NAVIGATOR", FATHER OF THE WEAK FORCES

INTERNATIONAL SCHOOL OF MATHEMATICS «GUIDO STAMPACCHIA»

72nd Workshop: *ROBUSTNESS AND RESILIENCE IN STOCHASTIC OPTIMIZATION AND STATISTICAL LEARNING: MATHEMATICAL FOUNDATIONS*

ERICE-SICILY: 19 – 25 MAY 2022

Sponsored by the: • Italian Ministry of Education, University and Scientific Research • Sicilian Regional Government

PROGRAMME AND LECTURERS

Frank-Wolfe methods in probability space
• J. BLANCHET, Stanford University, CA, US

Resilience, viability and stochastic optimization
• M. DE LARA, École des Ponts ParisTech, Champs-sur-Marne, FR

Stability and sample-based approximations of composite stochastic optimization problems
• D. DENTCHEVA, Stevens Institute of Technology, Hoboken, NJ, US

A nonparametric doubly robust test for a continuous treatment effect
• C. DOSS, University of Minnesota, Minneapolis, MN, US

Risk-averse multi-stage stochastic equilibria: models and algorithms
• M. FERRIS, University of Wisconsin, Madison, WI, US

The scenario approach as a general tool for risk control in data-driven optimization
• S. GARATTI, Politecnico di Milano, IT

Optimization of equilibrium problems under uncertainty and with partial differential operators
• M. HINTERMULLER, Weierstrass Institute, Berlin, DE

Optimal methods for risk averse distributed optimization
• G. LAN, Georgia Institute of Technology, Atlanta, GA, US

Riemannian optimization for projection robust optimal transport
• S. MA, University of California, Davis, CA, US

Optimization algorithms in the large: Exact dynamics, average-case analysis, and stepsize criticality
• C. PAQUETTE, McGill University, Montreal, CA

Constructing exact confidence regions on a vector of statistical functionals: Application to stochastic optimization, quantile, CVaR, and estimation contexts
• R. PASUPATHY, Purdue University, West Lafayette, IN, US

Guaranteed bounds for pathwise stochastic dynamic programming
• G. PFLUG, University of Vienna, AT

Uniform function estimators in reproducing kernel hilbert spaces
• A. PICHLER, Technical University of Chemnitz, DE

A regularization tour of optimization
• L.A. ROSASCO, University of Genova, IT

Advances in risk-averse learning
• A. RUSZCZYNSKI, Rutgers University, Piscataway, NJ, US

Multivariate quantiles and ranks using optimal transport
• B. SEN, Columbia University, New York, NY, US

Generalizations of compromise decisions (or bagging) for stochastic integer programming and multi-stage stochastic linear programming
• S. SEN, University of Southern California, Los Angeles, CA, US

Overparameterized learning beyond the lazy regime
• M. SOLTANOLKOTABI, University of Southern California, Los Angeles, CA, US

Primal-dual coordinate methods for robust machine learning and generalized linear programming
• S. WRIGHT, University of Wisconsin, Madison, WI, US

Bayesian approaches to distributionally robust optimization
• E. ZHOU, Georgia Institute of Technology, Atlanta, GA, US

PURPOSE OF THE WORKSHOP

The Workshop will bring together experts in the areas of stochastic optimization, robust optimization, and statistical learning for the purpose of discussing recent theoretical developments and identifying interdisciplinary challenges for future study. Stochastic optimization emerged as a discipline within mathematical programming in response to demands of applications in operations research and management science where uncertainty about current and future conditions could not be ignored in decision making. Statistical learning increased in importance with the growth of data collection in nearly all areas of human activity and the need for inference being drawn from such data. While robustness has long been recognized as a central property of any statistical estimator, the increasing reliance on statistical learning in high-consequence settings such as those related to healthcare decisions, autonomous vehicles, and military operations has brought the subject to the forefront. It has become critical to develop mathematics that not only leads to highly accurate procedures for inference but also is able to detect erroneous predictions and make corrections. Methodologies for stochastic optimization have often address the multi-stage nature of real-world decisions and studied the effect of recourse actions that can be taken at a later stage to mitigate the cost of unfortunately outcomes. The merging of these perspectives could lead to novel approaches to decision making and prediction in the presence of uncertain, corrupt, and incomplete data.

The Workshop aims to highlight resilience in statistical learning and decision making in the sense that no estimate or decision should have catastrophic consequences and any poor estimate or decision should be detectable and correctable. These goals require mathematics that dispenses of assumptions of smoothness, which were traditionally common in statistical analysis, and convex structures that frequently underpinned stochastic and robust optimization. The workshop will consist of talks challenging current approaches and pointing to new directions for addressing multi-stage nonconvex and nonsmooth problems in statistical learning and decision making.

APPLICATIONS

Persons wishing to attend the School are requested to write to:

Professor J.O. ROYSET
Naval Postgraduate School - Operations Research Department
1411 Cunningham Rd, Monterey, CA 93943, USA
email: *joroyset@nps.edu*

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POETIC TOUCH

According to legend, Erice, son of Venus and Neptune, founded a small town on top of a mountain (750 metres above sea level) more than three thousand years ago. The founder of modern history — i.e. the recording of events in a methodic and chronological sequence as they really happened without reference to mythical causes — the great Thucydides (~500 B.C.), writing about events connected with the conquest of Troy (1183 B.C.) said: *«After the fall of Troy some Trojans on their escape from the Achaei arrived in Sicily by boat and as they settled near the border with the Sicanians all together they were named Elymi: their towns were Segesta and Erice.»*

This inspired Virgil to describe the arrival of the Trojan royal family in Erice and the burial of Anchises, by his son Aeneas, on the coast below Erice. Homer (~1000 B.C.), Theocritus (~300 B.C.), Polybius (~200 B.C.), Virgil (~50 B.C.), Horace (~20 B.C.), and others have celebrated this magnificent spot in Sicily in their poems. During seven centuries (XIII-XIX) the town of Erice was under the leadership of a local oligarchy, whose wisdom assured a long period of cultural development and economic prosperity which in turn gave rise to the many churches, monasteries and private palaces which you see today.

In Erice you can admire the Castle of Venus, the Cyclopean Walls (~800 B.C.) and the Gothic Cathedral (~1300 A.D.). Erice is at present a mixture of ancient and medieval architecture. Other masterpieces of ancient civilization are to be found in the neighbourhood: at Motya (Phoenician), Segesta (Elymian), and Selinunte (Greek). On the Aegadian Islands — theatre of the decisive naval battle of the first Punic War (264-241 B.C.) — suggestive neolithic and paleolithic vestiges are still visible: the grottoes of Favignana, the carvings and murals of Levanzo.

Splendid beaches are to be found at San Vito Lo Capo, Scopello, and Cornino, and a wild and rocky coast around Monte Cofano: all at less than one hour's drive from Erice.

More information about the «Ettore Majorana» Foundation and Centre for Scientific Culture can be found on the WWW at the following address: http://www.ccsem.infn.it

PLEASE NOTE

Participants must arrive in Erice no later than 12 a.m. on 19th May 2022

L. EL GHAOUI – A. JOFRE – F. MAGGIONI – J.O. ROYSET
DIRECTORS OF THE WORKSHOP

G. BUTTAZZO – M. THÉRA
DIRECTORS OF THE SCHOOL

A. ZICHICHI
EMFCSC PRESIDENT