Proceedings of the 5th International Conference on Statistics: Theory and Applications (ICSTA'23)
Brunel University, London, United Kingdom – August 03-05, 2023
DOI: 10.11159/icsta23.002

Stochastic Environmental Modeling in a Time of Convergence: Physics Meets Artificial Intelligence

Dr. Stefano Castruccio
University of Notre Dame, USA

Abstract

It is widely acknowledged how the relentless surge of Volume,Velocity and Variety of data, as well as the simultaneous increase of computational resources have stimulated the development of data-driven methods with unprecedented flexibility and predictive power. However, not every environmental study entails a large data set: many applications ranging from astronomy or paleo-climatology have a high associated sampling cost and are instead constrained by physics-informed partial differential equations. Throughout the past few years, a new and powerful paradigm has emerged in the machine learning literature, merging data-driven and physics-informed problems, hence providing a unified framework for a whole spectrum of problems ranging from data-rich/context-poor to data-poor/context-rich. In this talk, I will present this new framework and discuss some of the most recent efforts to reformulate it as a stochastic model-based approach, thereby allowing calibrated uncertainty quantification.