

中央研究院統計科學研究所

學術演講

講題：Statistical Modeling and Uncertainty Quantification for Digital Twins

演講人：Prof. Ying Hung (洪瑛 教授)

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時間：2024-08-01(Thu.) 10:30-12:00

地點：Auditorium, B1F, Institute of Statistical Science ; The tea reception will be held at 10:10.

備註：online live streaming through Cisco Webex will be available.

Abstract

In this talk, a brief overview of statistical methodologies for the developments of digital twins will be given. We will then focus on two particular applications, dynamical systems in robotics and inverse scattering problems. Based on sparse data, a novel procedure integrating statistical surrogate models and algebraic topological dynamics is introduced to characterize local and global dynamics with statistical guarantees. The theoretical properties are discussed, and the proposed method is implemented to optimal control problems in robotics. Inverse scattering aims to infer information about a hidden object by using the received scattered waves and training data collected from forward mathematical models. Motivated by an inverse scattering problem where the objective is to infer the functional input representing the refractive index of a bounded scatterer, a new Bayesian framework is proposed. It contains a surrogate model that takes into account the functional inputs directly through kernel functions and a Bayesian procedure that infers functional inputs through the posterior distribution. Comparisons with existing methods show the advantages of the proposed method.



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