

# 國立成功大學統計學系暨數據科學研究所

## 專題演講

演講者: Prof. Samuel S.C. Kou (寇星昌 教授)  
Department of Statistics, Harvard University

時間: 2021年06月04日 (星期五) 9:00 - 10:00

地點: Online Seminar (本次演講將採純線上形式進行)

題目: Statistical inference of dynamic systems via manifold-constrained Gaussian processes

### 摘要

Parameter estimation for nonlinear dynamic system models, represented by ordinary differential equations (ODEs), using noisy and sparse data is a vital task in many fields. We will introduce a fast and accurate method, MAGI (MANifold-constrained Gaussian process Inference), in this task. MAGI uses a Gaussian process model over time-series data, explicitly conditioned on the manifold constraint that derivatives of the Gaussian process must satisfy the ODE system. By doing so, we completely bypass the need for numerical integration and achieve substantial savings in computational time. MAGI is also suitable for inference with unobserved system components, which often occur in real experiments. MAGI is distinct from existing approaches as we provide a principled statistical construction under a Bayesian framework, which incorporates the ODE system through the manifold constraint. We demonstrate the accuracy and speed of MAGI using realistic examples based on physical experiments.

敬請公佈 歡迎蒞臨

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協辦單位: 國立成功大學附設醫院巨量科學中心

統計學系: <http://www.stat.ncku.edu.tw/>

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