Modelling and model evaluation on empirical data in epidemiology: dynamic noise, chaos and predictability

N. Stollenwek

Lisboa, Portugal

Abstract:
We revisit the parameter estimation framework for population biological dynamical systems, including Bayesian approach and model selection in simple analytic examples. Then we develop the computational framework for application to more complex and more realistic models.

When it comes to complex models like multi-strain dynamics to describe the virus-host interaction in dengue fever, even most recently developed parameter estimation techniques, like maximum likelihood iterated filtering, come to their computational limits. The subtle interplay between possible chaotic dynamics and dynamical noise are investigated, and applications mainly to influenza and dengue fever are shown.

Implications for predictability in such complex scenarios are discussed. Even though large fluctuations prevent long term prediction in most cases, short term predictability can be achieved in noisy data.Joint work with Farbod Roosta-Khorasani and Kees van den Doel